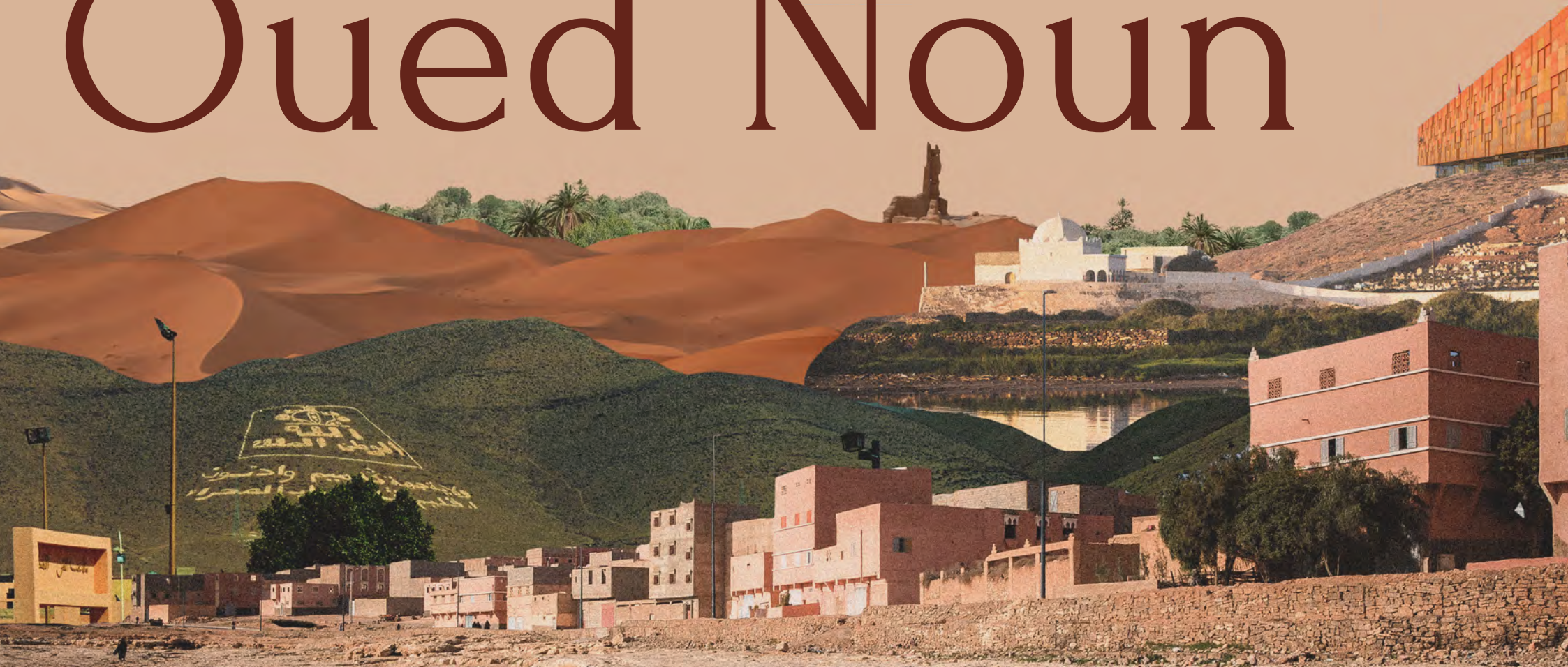


REGIONAL GREEN CITY ACTION PLAN



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RÉGION DE GUELMIM-OUED NOUN

Guelmim- Oued Noun



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Glossary

Acronym or term	Definition				
ABHDON	Agence du Bassin Hydraulique de Draa Oued Noun (Hydraulic Basin Agency)	DMA	District Metered Area	Chergui wind	Chergui is a cool dry wind that blows from the northeast or east in the western Sahara and is strongest from late November to mid-March. It usually carries large amounts of dust, which it can transport hundreds of miles out over the Atlantic Ocean.
AMEE	Agence Marocaine de l'Efficacite Energetique (Moroccan Agency for Energy Efficiency)	EBRD	European Bank for Reconstruction and Development		
ANDA	Agence Nationale pour le Développement de l'Aquaculture (National Aquaculture Development Agency)	GCAP	Green City Action Plan		
ANP	Agence Nationale des Ports (National Ports Agency)	GDP	Gross Domestic Product	INDH	Initiative Nationale pour le Development Humain (National Initiative for Human Development)
CAP	Communal Action Plan	GEF	Global Environment Facility	IWRM	Integrated Water Resource Management
CAPEX	Capital Expenditure - expenditure on acquisitions of or improvements to fixed assets	GESI	Gender Equality and Social Inclusion	IWMI	International Water Management Institute
CEV	Centre d'Enfouissement et de Valorisation (CEV) des dechets - Waste landfill and recovery centre	GID	Gestion Intégrée des Dépenses (Integrated Spend Management)	Kasbah	Kasbahs are traditional fortified residences or residential areas in Morocco, historically built for notable figures. These structures served a defensive, as well as residential, purpose.
Collectivités territoriales	Collectivités territoriales are local authorities. In Morocco, these are the regions, prefectures, provinces and communes. They are legal entities under public law, which manage their affairs democratically. Morocco has 12 regions, 75 prefectures and provinces and 1,503 communes, which are all 'Collectivités territoriales'.	Green City actions	Defined investment, policy and other initiatives that are principally focused on environmental outcomes and address Green City challenges, which may result in resilience or socio-economic benefits.	Ksour	A ksour is a fortified village, often built out of mud and clay, which are designed to protect against external forces or weather conditions.
Communes	One of the levels of territorial organisation in the Kingdom of Morocco. It is a local authority governed by public law, with legal personality and administrative and financial autonomy. It is the smallest territorial administrative level.	Green City Action Plan	Assessing and prioritising environmental challenges and urban vulnerabilities based on specific indicators and developing an action plan to tackle the challenges and vulnerabilities through policy intervention and sustainable infrastructure investments.	MTEDD	Ministère de la Transition Énergétique et du Développement Durable (Ministry for Energy Transition and Sustainable Development)
CRI	Centre Regional d'Investissement (Regional Centre for Investment)	Green City baseline	The current status of a city's environment and influencing conditions including exposure to risks and vulnerabilities, and socio-economic frameworks.	MTN	Ministère de l'Intérieur
DGI	Direction Générale des Impôts (General Revenue Office)	Green City challenges	Specific issues affecting a city's environment with respect to the quality of the environment or ecosystem services, infrastructure operations, policy responses, risks and vulnerabilities, or socio-economic pressures.	Municipal Equipment Fund	Public bank dedicated to lending funds to municipalities (Fonds d'Équipement Communal).
		Guelmim-Oued Noun region	The Guelmim-Oued Noun region is made up of four provinces: Guelmim, Sidi Ifni, Tan-Tan and Assa-Zag, spread over 53 municipalities, including 8 urban ones.	MSW	Municipal Solid Waste
				NDC	Nationally Determined Contribution

ODCO	Office du Developpement de la Cooperation (Office for Cooperation Development) – organisation placed under the supervision of the Ministry of Tourism, Handicrafts and the Social and Solidarity Economy with the aim of promoting a general policy of the cooperative sector through support mechanisms in the areas of training, information and legal assistance.	Priority Environmental Challenges	Thematic areas stemming from the categories of GCAP state indicators that the Region selects to describe the aggregate environmental challenges to address.	SNRVD	Stratégie Nationale de Réduction et de Valorisation des Déchets (National Waste Reduction and Recovery Strategy)
		PV	Photovoltaic	SNTRO	Société nouvelle des travaux routiers et ouvrages (New Agency for Roadworks and Highway Infrastructure)
		TGR	Trésorerie Générale du Royaume (General Treasury of the Kingdom)	SRM	Société Régionale Multiservices
OFPPT	Office de la Formation Professionnelle et de la Promotion du Travail (Office of Vocational Training and Employment Promotion)	Traffic light screening	A simple method of assessing and comparing the region's environmental performance indicators with established benchmarks, whereby a green light indicates good performance in line with international standards; an amber light indicates insufficient performance and cause for concern; and a red light indicates low performance and need for critical attention.	WWTP	Wastewater Treatment Plants
ONEE	Office Nationale de l'Electricité et de l'Eau (National Office of Electricity and Drinking Water)				
OPEX	Operating Expenditure - expenses related to carrying out normal business activities.				
PLU	Plan Local d'Urbanisme (Local Urban Plan)	UDP	Urban Development Programme		
PDR	Plan de Developpement Regional – Development Plan for the period 2022-2027 setting a roadmap to strengthen economic, social and environmental development	Ministère de la transition énergétique et du développement durable	Ministry of Energy Transition and Sustainable Development		
PNAEPI	Programme National d'Approvisionnement en Eau Potable et d'Irrigation (National Drinking Water Supply and Irrigation Programme)	Ministère de la transition numérique	Ministry of Digital Transformation		
Pressure-state-response (PSR) framework	Developed by the OECD, the PSR framework categorises various, specific indicators to illustrate the causal linkages between environmental pressures, the resulting state of the environment, and associated responses by the government, residents and the private sector.	SGAR	Secreteriat General des Affaires Regionales (General Secretariat for Regional Affairs)		
		SMEs	Small and Medium Enterprises		
		SNEE	Stratégie Nationale de l'Efficacité Énergétique à l'horizon 2030 (National Energy Efficiency Strategy 2030)		

Foreword



The Guelmim-Oued Noun region's membership of the international Green City programme is an important initiative that reflects its commitment to sustainable development. This approach is now embedded in the region's projects, particularly those set out in the Regional Development Plan 2022-2027, which was developed in response to the fundamental issues affecting regional development and the major environmental challenges facing the territory. Foremost among these are the impacts and consequences of climate change, a global concern that compels us to prepare for an uncertain future and requires

collective efforts to preserve environmental balance and ecosystems, while meeting the daily needs of the population. This includes ensuring access to essential water resources, energy and decent housing, as well as promoting the sustainable management of economic activities and urban systems across the region's cities, thereby guaranteeing a dignified quality of life for its citizens.

The Guelmim-Oued Noun region is distinguished by its strategic geographical location as a gateway to the desert linking northern and southern Morocco, and by the diversity of its ecosystems. These range from desert areas with valuable yet scarce resources, opening onto the Kingdom's African hinterland, to oasis territories with significant potential, fertile plains characterised by modern activities and strong external connections, and mountainous areas rich in natural and human assets, local expertise and high-value regional products. In addition, the region, with its centuries-old history and rich heritage, is the heir to two major urban centres of southern Morocco that flourished during the Middle Ages and exerted considerable social and economic influence: the cities of Noul Lamta and Tagaoust. The region was also one of the main stopping points for the trade caravans of that era, making it a place of cultural exchange and fusion, where Arab-Hassaniya and Amazigh traditions intersected with African and Hebrew influences.

Endowed with this rich environmental, cultural and human heritage, the Guelmim-Oued Noun region deserves a sustained commitment to improving its social and economic conditions, strengthening its infrastructure and unlocking the full potential of its human and natural

resources. This can be achieved through action plans developed using a participatory approach that integrates gender and environmental considerations, engages key development stakeholders, and empowers local talent and leadership through training and capacity-building, particularly among women and young people.

We firmly believe that our region's membership of the Green Cities programme represents an opportunity to further strengthen its development trajectory by expanding and diversifying partnerships, engaging with a wide range of national and international experiences, and developing joint initiatives to address shared challenges. It also enables us to reinforce our efforts through innovative programmes that harness advances in technology and artificial intelligence for community development, while supporting these initiatives through a system of good governance founded on informed decision-making, effective coordination among stakeholders and the sharing of best practices.

Mbarka Bouaida

President of the Regional Council of Guelmim-Oued Noun

Executive summary

Guelmim-Oued Noun



The Guelmim-Oued Noun Region is located in southern Morocco, between the Atlantic Ocean to the west, the Anti-Atlas mountains to the north, and the Saharan hinterland to the south and east. Covering an area of 46,108 km², or 6.49% of the national territory, the Region is one of the country's largest by land area but among the least densely populated. It is home to around 448,685 inhabitants, distributed across four provinces - Guelmim, Sidi Ifni, Tan-Tan and Assa-Zag - and 53 communes, including both urban centres and widely dispersed rural, coastal and

oasis communities. Urbanisation has increased rapidly over the past two decades, with around two-thirds of the population now living in urban areas, though settlement patterns remain fragmented and infrastructure provision uneven across the territory.

The Region occupies a strategic position within Morocco's southern territories, acting as a gateway between Atlantic coastal systems, inland oases and emerging national energy and logistics corridors. Its economy is anchored in agriculture, fisheries and port-related activities, with growing tourism and significant potential in renewable energy and green industries. At the same time, the Region is highly exposed to climate extremes, facing chronic water scarcity alongside episodic but severe flooding, conditions that are being intensified by climate change. Social and gender inequalities - particularly affecting rural communities, women and young people - shape access to services, mobility and economic opportunity, making inclusion a core consideration for regional development and investment planning.

The Guelmim-Oued Noun Regional Green City Action Plan (GCAP) sets out a clear and prioritised framework to respond to these challenges, while supporting inclusive economic development and alignment with Morocco's national transition objectives. Developed under the EBRD Green Cities programme, the GCAP provides a strategic and investment-oriented roadmap to guide regional action over the next ten years.

Guelmim-Oued Noun Regional Green City Action Plan (GCAP)



The Guelmim-Oued Noun Region joined the EBRD Green Cities programme in 2024 to accelerate solutions to its most pressing regional challenges: severe water scarcity, rising heat stress, uneven access to essential services, and rapid urban growth. As a regional entity to join the programme, the Region committed to financing improvements to drinking water supply in rural areas and upgrade four wastewater treatment plants to enable the reuse of treated water for irrigating green spaces. This investment, financed by EBRD in 2023, marked the beginning of the Region's journey to develop this Action Plan.

The Region's Regional Development Plan (PDR) 2022–2027 sets a vision for a sustainable and inclusive transformation across key sectors, based on five pillars: structuring and building a strong, united and efficient Region; accelerating the catching up of critical backlogs; strengthening and improving integration and social services; sustainable development of the Region's economic potential; focusing the Region on becoming a major pole for green energy production. The GCAP builds on these pillars, supporting the Region towards becoming a sustainable and inclusive place, putting the quality of life of its citizens at the heart of its actions. It targets key urban centres across the Region, including Guelmim, Tan-Tan and Sidi Ifni, reinforcing the GCAP's urban dimension alongside region-wide priorities.

The development of the GCAP followed a highly collaborative, multi-stage engagement process that brought together regional departments, national agencies, civil society, academia, and private-sector stakeholders through workshops, interviews, site visits, and an online survey. Beginning with a major engagement event in February 2025 and followed by targeted sessions throughout the year, the process gathered insights from 92 stakeholders to identify environmental challenges, co-create a shared vision, shape strategic priorities and develop a dedicated Gender Action Plan (GAP). To complement this structured engagement and broaden public participation, a social-media campaign was launched in January 2026, inviting residents to share feedback on proposed actions across key sectors, including water, energy and buildings, transport, land use and solid waste.

Emerging challenges

The main challenges the region is facing include:

SEVERE AND INCREASING WATER STRESS

Arid conditions, overexploited groundwater (25 Mm³/year deficit), and limited wastewater reuse strain resources. Climate change, declining precipitation and inefficient irrigation worsen supply for drinking water and agriculture, while lack of effective sewage infrastructure and wastewater recovery infrastructure miss opportunities for reuse. This leads to water pollution and infiltration of untreated sewage, causing soil degradation and potential biodiversity loss. These pressures are further shaped by the region's exposure to destructive flash flooding, which, together with chronic water scarcity, creates a dual hydrological challenge that influences all sectors and underpins the need for resilient infrastructure.

LIMITED ENERGY SELF-SUFFICIENCY AND RESILIENCE

Energy use is rising, driven by reliance on petroleum products and firewood, accounting for 68.7% of total use. Key challenges include decarbonising the grid by reducing fossil fuel dependence in transport, buildings, and industry while meeting future demand. The Region is piloting various initiatives to decarbonise energy, focusing on large-scale investment in renewable energy for export, leveraging its strong solar and wind potential.

FRAGMENTED SOLID WASTE COLLECTION AND DISPOSAL PRACTICES

Waste generation is rising (210 kg/capita/year), with uncontrolled dump sites and fragmented collection and disposal causing soil and water contamination, health risks, and harmful leachate runoff.

UNDER-PROVISION OF PUBLIC TRANSPORT AND LOW-CARBON MODES

Despite improved main roads and a new highway to Agadir, rural areas are lagging, with a lower-quality secondary roads and a lack of a public transport options increasing reliance on private vehicles. Urban centres see high walking and cycling rates but lack a safe, continuous and accessible active travel infrastructure network.

ACCELERATED URBANISATION

Urban growth in the Guelmim-Oued Noun region is uneven across its provinces, with planning efforts struggling to keep pace with rapid urbanisation in core cities. Between 1990 and 2023, Guelmim, Sidi Ifni, and Tan-Tan expanded by 172%, 27%, and 73% respectively. Green space provision remains low (less than 10 m² per capita) impacting health and quality of life. Expansion and densification strain infrastructure and services.

Climate risks interface with and exacerbate each of these challenges, amplifying their impacts across sectors.

Guelmim-Oued Noun's environmental challenges intersect with gender and social dimensions. For women in particular, heat stress and water scarcity directly affect livelihoods such as argan harvesting and women-led cooperatives, while limited and unaffordable transport options compound care responsibilities and restrict mobility, making access to services and economic opportunities more difficult. At the same time, women play a central role in household water management, agriculture, small-scale commerce and local service provision, positioning them as key economic actors in climate-sensitive sectors. Their continued under-representation in the formal labour market and in emerging green and technical sectors, however, limits the region's ability to fully realise the potential of the investment in sustainable infrastructure.

Integrating gender-responsive approaches across all sectors is therefore not only a social imperative, but also a means of improving the effectiveness, sustainability and economic returns of climate investments, supporting more inclusive growth and stronger long-term regional resilience.

These interlinked environmental and social challenges call for an integrated approach to infrastructure investment, one able to leverage the assets of the region while advancing on climate action and social inclusion.

The vision for the Guelmim-Oued Noun Region

The Guelmim-Oued Noun Region will leverage its natural and cultural assets to build resilient communities and a thriving green economy, supporting Morocco's green and inclusive transition.

Through sustainable water, energy, waste and land management, the Region will create jobs, raise living standards, and drive innovation in renewable energy and circular economy. Guided by inclusive governance and community participation, the Guelmim-Oued Noun region will become a model for climate adaptation and sustainable development in the face of rising temperatures and water stress.



Strategic goals

The vision is underpinned by seven strategic goals that guide the action plan's priorities.

The strategic goals place equal access to infrastructure and services, along with improving the quality of life for the Guelmim-Oued Noun region's residents, at the heart of the GCAP. They build on the pillars of the Regional Development Plan, the ongoing investments across the region, and align with national priorities for decarbonisation and wider climate action included in the National Determined Contributions 3.0.



SG1

Ensure sustainable, equitable, and resilient water management across the region



SG2

Ensure universal access to clean and affordable energy and become a national leader in renewable energy and green hydrogen production



SG3

Transition to a circular economy with zero uncontrolled dumping and high resource recovery



SG4

Build an inclusive, low-carbon, and accessible transport system connecting all communities



SG5

Promote green, and climate-adaptive urban development while protecting ecosystems



SG6

Retrofit and build climate-resilient, energy-efficient infrastructure for all



SG7

Build a more gender-inclusive Region.

Actions

There are 29 actions in this Regional GCAP, representing the activities prioritised by the Region to achieve the vision of a resilient and inclusive Guelmim-Oued Noun region (Figure 2). These build on the different dimensions and pillars of the Regional Development Plan (PDR) 2022 – 2027 to ensure a coordinated approach to infrastructure investment in the region. The GCAP prioritises sustainable water management through integrated solutions that enhance supply security, reduce losses, and improve resilience to drought and flooding. Actions include modernising networks, promoting reuse, and deploying nature-based approaches to safeguard ecosystems. The plan advances clean energy by expanding renewable generation, modernising grids and preparing for future growth and needs. Improving transport follows closely, with measures to improve road infrastructure, develop active travel networks, and expand public transport provision making mobility safer and more sustainable. Land use interventions aim to modernise and upgrade urban and rural areas, develop green infrastructure and preserve natural areas while supporting eco-tourism. Finally, waste management is another priority for the plan, with actions driving the creation of a comprehensive sorting and recycling system for the region.

Gender inclusion and equality are integrated across all interventions, ensuring equal access to services, meaningful participation in decision-making, and targeted training for women in green and emerging sectors. By consolidating gender-responsive measures

into a single, coordinated framework, the Gender Action Plan (GAP) brings together actions related to participation, safety, accessibility, skills development, financial inclusion and awareness-raising, ensuring that gender considerations are applied consistently throughout the GCAP. This structured approach strengthens alignment with Strategic Goal 7 and enables the Region to deliver inclusive and equitable urban development in a systematic, measurable and scalable manner.

This ambitious GCAP equals a total potential CAPEX investment of an estimated MAD 18.3 billion (EUR 1.7 billion) over a time horizon of 10 years. It is estimated that the OPEX of the actions combined will reach MAD 5 billion (EUR 485 million) over the next five years. The estimates of costs presented in the document are intended to show the potential scale of investment which could be deployed in each sector and for each of the actions. It is estimated that more than 5,900 direct jobs will have the potential to be created within the local economy, and the actions represent a significant opportunity to nurture innovation, supporting local startups as well as involving local craftsmanship.

The actions will significantly contribute to increasing the region's urban and climate resilience. 16 actions will help reduce water stress, adapting Guelmim-Oued Noun's natural and built environment to the impacts of both drought and extreme weather events such as floods. An estimated MAD 2.7 billion (EUR 250 million) is earmarked for actions what will mitigate heat risk in urban and rural areas, these include an urban greening programme in all provinces and deep renovations of public buildings, which include rooftop solar photovoltaic panels, and

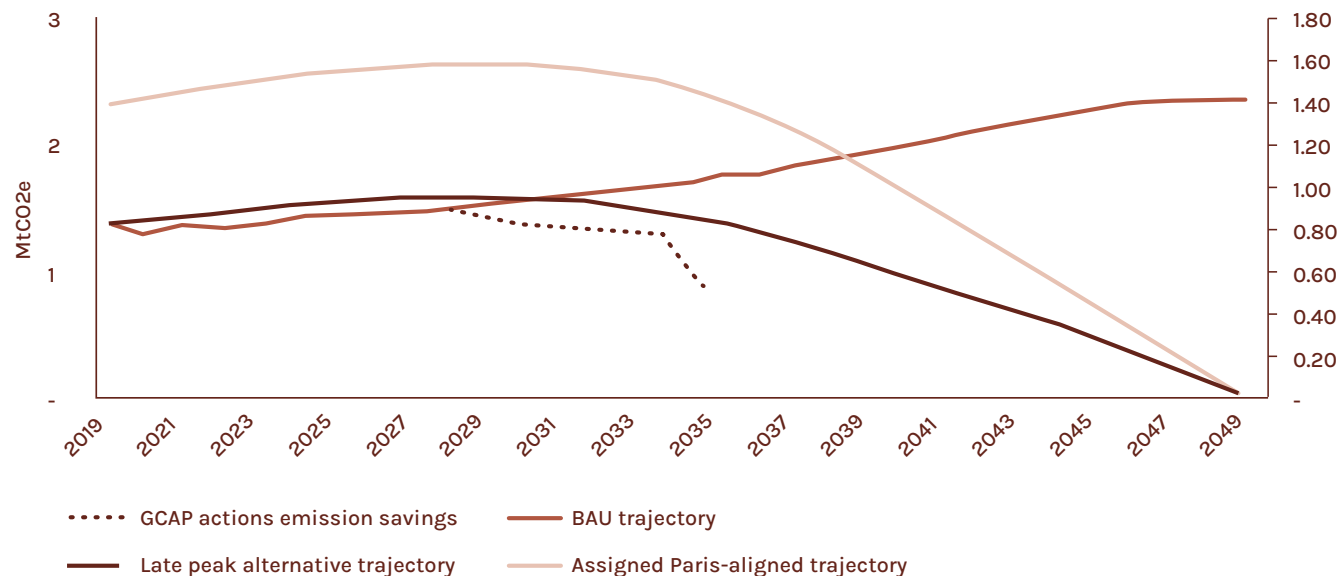


Figure 1. Summary of GHG emission trajectories

solar thermal systems. While responding to the region's most pressing challenges, the plan aims to prevent infrastructure failure and obsolescence, through a context-sensitive upgrade and expansion of all water, waste, transport and energy networks.

This Regional GCAPs also represents an important opportunity to decarbonise Guelmim-Oued Noun's infrastructure and urban systems in line with the goals of the Paris Agreement and Morocco's NDC 3.0 commitments. The region's emissions are projected to grow from around 3.3 MtCO₂eq per capita in 2019 to 3.7 MtCO₂eq per capita in 2050 under a business-as-usual

emissions scenario. Based on its GHG emissions and national income status in 2019, Guelmim-Oued Noun was assigned the Paris-aligned the Late Peak trajectory, which involves a 2% reduction from baseline emissions by 2030 before full decarbonisation in 2050. GCAP actions are expected to save around 730,000 tCO₂eq per annum assuming they are all implemented in full, which represents 65% of the required emissions reductions between business-as-usual and Paris alignment pathways.

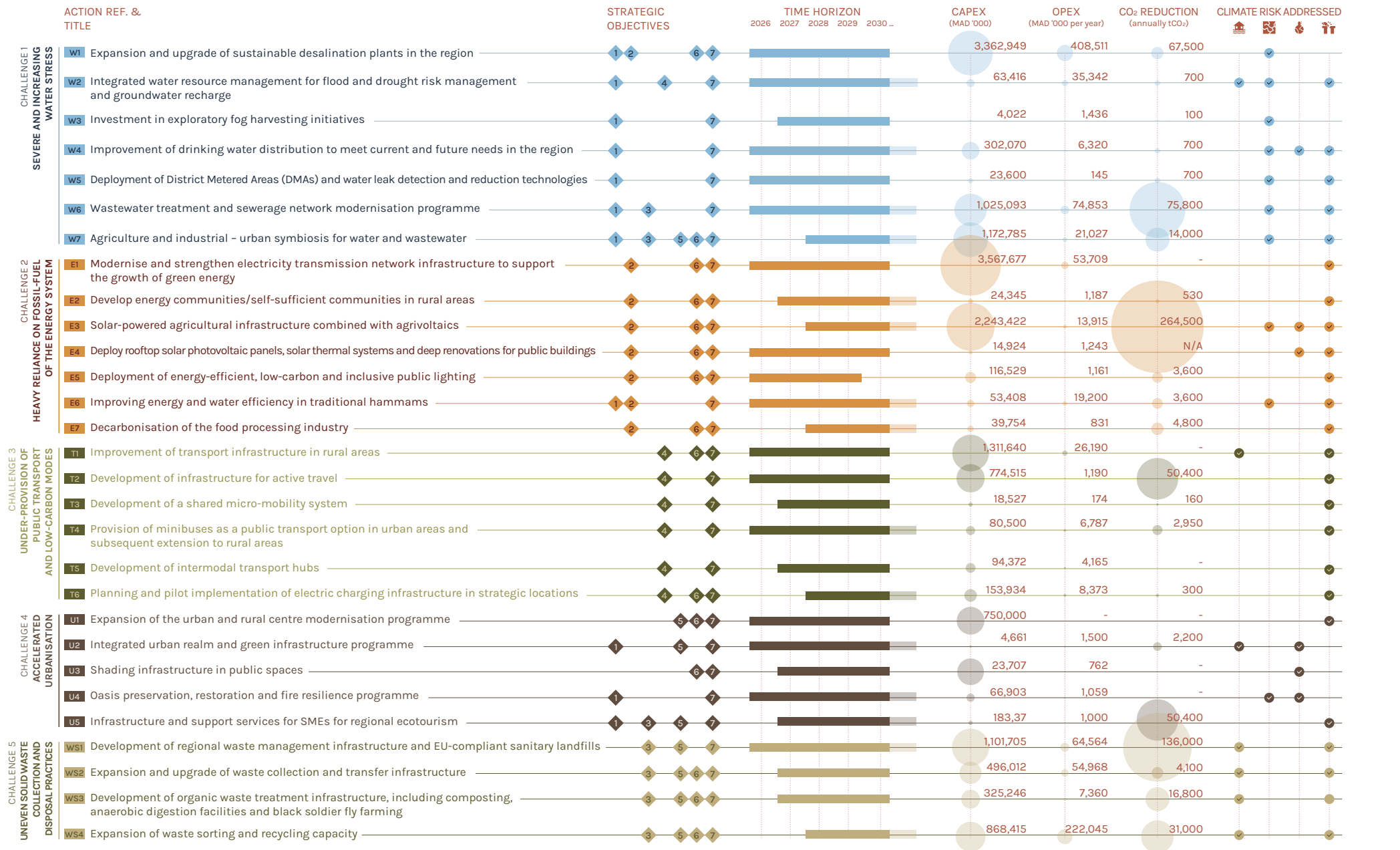


Figure 2. Summary of Regional Green City actions



01

Introduction

The Guelmim-Oued Noun region

Located in the northern part of the Moroccan Sahara, the Guelmim-Oued Noun region opens onto the Atlantic Ocean and covers an area of 46,108 km², or 6.49% of the national territory. The region is made up of 4 provinces comprising a total of 53 communes. Results from the 2024 census indicate that the region has around 448,685 inhabitants. In 2024, the region had a low population density, with 7.7 inhabitants per square kilometre. In 2023, the Region's GDP was around MAD 21 billion, or 1.4% of the national GDP. GDP per capita was MAD 47,121, well above the national average of MAD 40,580. Regional GDP increased by 5.2% compared with 2022. This growth is largely due to investment in infrastructure and housing projects. In addition, fishing, its contribution growing between 2022 and 2023, continues to support the local economy by providing jobs and contributing to food supply. The fish processing industry has also grown in recent years, with an 8.2% increase in Gross Value Added between 2022 and 2023. Agriculture also remains a major sector, particularly in terms of employment in the region.

The share of urban population in Morocco has increased significantly over the last twenty years, rising from 29.1% in 2004 to 62.8% in 2024. The Guelmim-Oued Noun region has followed a similar trend, with its population now largely living in towns and cities (66.76%), except for the province of Sidi Ifni. This rapid urbanisation combined with growing climate change pressures are increasing the region's vulnerabilities to environmental shocks and stresses.

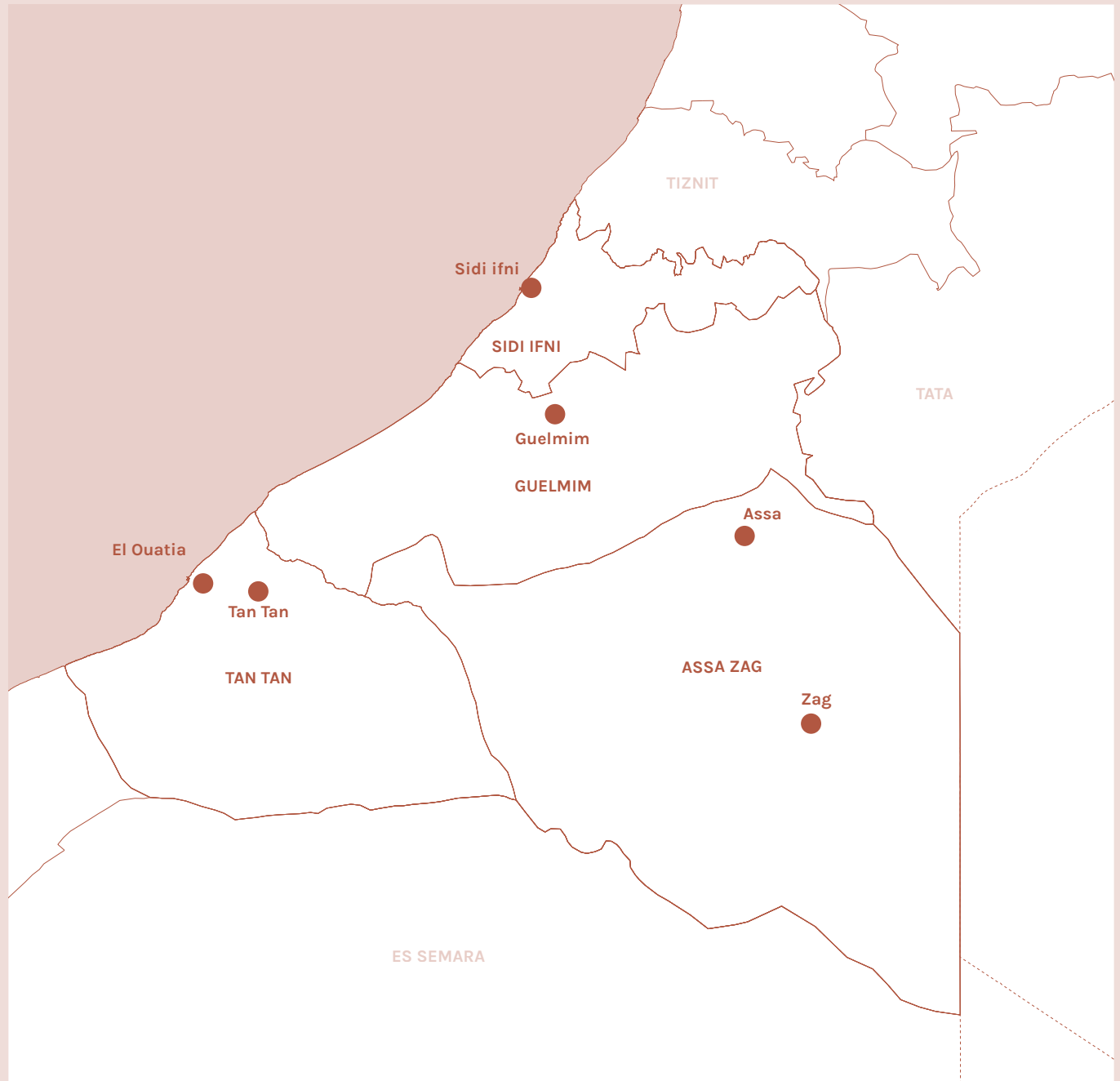


Figure 3.
Administrative map of the provinces of Guelmim-Oued Noun, SIREDD, 2025

EBRD Green Cities

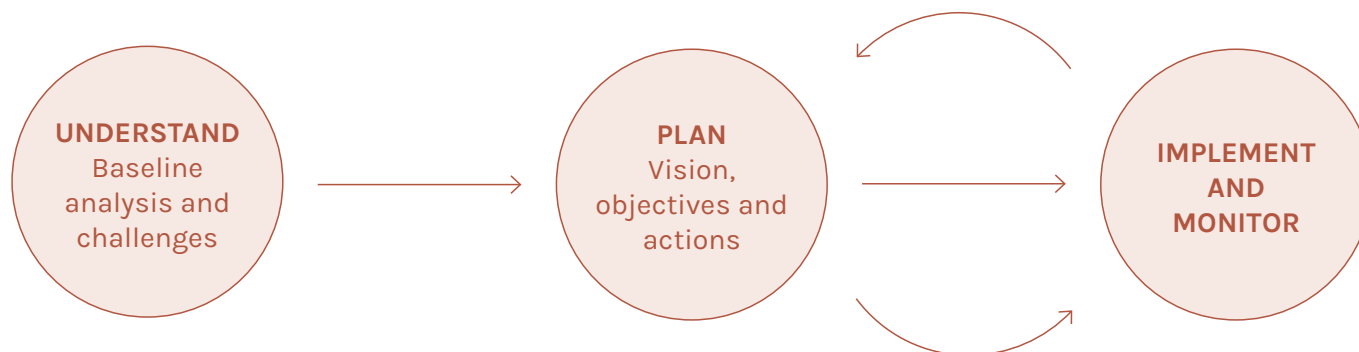


Figure 4.
Preparation Stages of a Green City Action Plan

EBRD Green Cities enables subnational governments to address environmental and climate challenges by integrating infrastructure investments with policy making. Green City Action Plans (GCAPs) are one of the main pillars of EBRD Green Cities. The purpose of GCAPs is to help cities preserve and improve the quality of their environmental assets by using their resources sustainably. By mitigating and adapting to the risks of climate change, cities are improving the resilience of their infrastructure, services, operations and communities against shocks and stresses. EBRD Green Cities also ensures that environmental policies contribute to socio-economic wellbeing of residents in an inclusive and equitable way.

Guelmim-Oued Noun joined the EBRD Green Cities programme in 2024 to accelerate solutions to its most pressing regional challenges: severe water scarcity, rising heat stress, uneven access to essential services, and rapid

urban growth. As a regional entity to join the programme, the Region committed to financing improving drinking water supply in rural areas and upgrade four wastewater treatment plants to enable the reuse of treated water for irrigating green spaces. This investment, financed by EBRD in 2023, marked the beginning of the Region's journey to develop this Action Plan.

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a sustainable and inclusive place, putting the quality of life of its citizens at the heart of its actions.

The Regional Green City Action Plan was prepared in accordance with the standard methodology developed by EBRD Green Cities. The action plan was prepared with the technical support of EBRD experts and funded by the Global Environment Facility, under the MedProgramme ENVITECC support. Following the methodology set out by EBRD, GCAPs have three main stages (Figure 4).

Co-creating the GCAP



Figure 5. Joining event in the Guelmim-Oued Noun region – Workshop activities - February 2025

Stakeholder engagement played a central role in shaping the Guelmim GCAP, beginning with the public joining event and challenge-prioritisation workshop held on 4 February 2025, which gathered 55 participants from regional institutions, technical departments and civil society. These sessions introduced the GCAP programme, methodology and expected contributions, and invited participants to assess urban and environmental challenges using the state-pressure-response framework. Through group discussions, live word-cloud exercises and collaborative prioritisation, stakeholders identified key challenges across sectors and contributed to the creation of an initial long list of potential actions aligned with local aspirations for the region of Guelmim-Oued Noun.

A series of deep-dive interviews (4-5 February 2025) and site visits (6 February 2025) provided further technical insights, engaging 25 interview participants and 20 site-



Figure 6. Action shortlisting and validation workshop in the Guelmim-Oued Noun region – September 2025

visit participants. Experts from water, waste, energy, land use and green spaces, transport, agriculture, blue economy, inclusion and economic development examined the baseline assessment and validated sector-specific needs. Field visits to ongoing infrastructure projects, including the Asif Winder hill dam, desalinated-water distribution works in Mirleft and the Guelmim Wastewater Treatment Plant, enabled stakeholders to contextualise the challenges and opportunities of the region's infrastructure landscape. These technical consultations were complemented by an action-longlist survey (July-September 2025), through which 31 respondents reviewed, scored and refined actions based on urgency, relevance, impact and gender and social inclusion considerations.

The engagement process culminated in the Vision, Objectives and Action Refinement Workshop on 23 September 2025, attended by 56 participants, who

reviewed draft vision elements, agreed on strategic objectives and shortlisted priority actions. Stakeholders then refined the proposed measures, including scope, geography and inclusion components. Additional targeted dialogues, such as gender deep-dive interviews with UN Women and the International Water Management Institute (IWMI) (November-December 2025), helped strengthen gender-responsive elements of the GCAP, particularly regarding water-related challenges. To widen public participation, a social media campaign launched in January 2026 collected comments from the Region's Facebook community on proposed actions across water, energy, buildings, transport, lighting and shade. Together, these activities ensured the GCAP was built through inclusive, iterative and cross-sectoral engagement reflecting the priorities, expertise and aspirations of the Guelmim-Oued Noun region.



Figure 7. Action development workshop in the Guelmim-Oued Noun region – September 2025

2025



2026

4th February	4th-5th February	6th February	July - September	23rd September	21st November - 9th December	January
JOINING EVENT 55 participants in person ♀ 27.3% ♂ 72.7% including regional government, sectoral regional directorates, public agencies and civil society organisations. - Public launch of the GCAP including a presentation of the GCAP programme and introduction to the main stakeholders. - Presentation of the GCAP methodology and process to the stakeholders and of the expected workshops and inputs required from them. CHALLENGE PRIORITISATION WORKSHOP 55 participants in person ♀ 27.3% ♂ 72.7% including regional government, sectoral regional directorates, public agencies and municipal/provincial representatives. - Presentation of the state-pressure response framework. - Group activities aiming at assessing and prioritising pre-identified challenges by importance and identifying any additional challenges. - Group activities aiming at generating a long list of actions to respond the challenges identified. - Blue sky thinking exercise using live word cloud generation to gather aspirations for the region of Guelmim-Oued Noun.	DEEP-DIVE INTERVIEWS 25 participants in person (split in 7 interviews) ♀ 36% ♂ 60% ? 4% including sectoral regional directorates, public agencies and technical service providers. - Presentation of the results of the baseline stage. - Deep-dive discussions on main sectors: water, waste, energy, land use and green spaces, transport, agriculture and blue economy, inclusion and economy.	SITE VISITS 20 participants in person ♀ 30% ♂ 70% including regional and local authorities, technical public agencies and infrastructure/ service operators. - Visit of hill dam under construction in Asif Winder. - Desalinated water distribution network works in Mirleft. - Wastewater Treatment Plant (STEP) in Guelmim city.	ACTION LONG LIST SURVEY 31 respondents including public agencies and enterprises, regional/ provincial and municipal authorities, and civil society organisations. - Review of action longlist by stakeholders, including scope, location and implementation measures. - Scoring of actions by urgency, relevance and impact. - The survey included possibility to suggest additional actions or components.	ACTION VALIDATION AND REFINEMENT WORKSHOP VISION AND OBJECTIVES 56 participants in person ♀ 28% ♂ 72% including regional, provincial and municipal authorities, sectoral public agencies, public enterprises and private-sector representatives. - Presentation of draft vision and objectives components. Discussion on vision and agreement over vision and objectives. - Shortlisting of actions by participants, based on their alignment with vision, objectives, and potential to address priority challenges. - Discussion to refine the short list of actions with stakeholders on scope, location, GESI measures and potential missing actions.	GENDER DEEP-DIVE INTERVIEWS Regional representatives from UN Women and IWMI - Overview and feedback on gender-related actions for integration into gender action plan, focused discussion on the intersection between water-related challenges and gender inclusion. - Identification of synergies with existing gender and economic inclusion programmes.	SOCIAL MEDIA CAMPAIGN Social media users following the Region's Facebook page Collection of comments to 2 posts, each dedicated to a different group of actions and sectors, including water, energy and buildings, transport, lighting and shade.

Table 1 Summary of Stakeholder Engagement Sessions

Understanding the baseline and emerging challenges

NATIONAL	
Nationally Determined Contribution (NDC 3.0) KINGDOM OF MOROCCO	42% GHG reduction by 2030 vs BAU; 52% renewables in electricity mix; water, energy and transport commitments; adaptation investment priorities. Morocco's NDC integrates regional and urban actions as Morocco is a signatory of Coalition for High Ambition Multilevel Partnerships (CHAMP).
National Water Strategy 2050 MINISTRY OF EQUIPMENT AND WATER	Water security, desalination scale-up, wastewater reuse, demand management and rural access targets.
National Waste Strategy MINISTRY OF INTERIOR / MTEDD	Landfill closure, recycling rate targets, CEV development, formalisation of informal sector.
National Climate Plan (Plan Climat Territorial) MTEDD	Climate adaptation and resilience priorities; risk assessment and territorial vulnerability mapping.
National Energy Efficiency Strategy 2030 AMEE / MTEDD	20% energy consumption reduction target by 2030; sector-specific targets for transport (~24%), industry (~22%), buildings (~14%), public lighting (~13%).
Moroccan Solar Plan / Integrated Wind Programme MASEN / ONEE	Large-scale renewable energy deployment targets; MASEN Power-to-X project and Chbika green hydrogen project located in GON region.a
Law 13-09 / 40-19 / 82-21 on Renewable Energy & Self-Generation ANRE / MTEDD	Legal framework for RES grid connection, small-scale self-generation, surplus energy sales, IPP authorisation procedures.
Morocco Offer (Offre Maroc) Green Hydrogen GOVERNMENT / MASEN	MAD 319 billion investment framework for green hydrogen across southern regions; 5 international consortia pre-selected (March 2025) including projects in GON.
REGIONAL	
Regional Development Programme (PDR) 2022-2027 REGIONAL COUNCIL (RGON)	Primary regional planning document covering infrastructure, social services and key economic sectors. GCAP is complementary to and operationalises PDR priorities.
Urban Development Master Plan, SDAU (Sidi Ifni-Guelmim-Tan-Tan coastline, 2018) URBAN AGENCY / RGON	Long-term land use and spatial planning framework; sustainable urbanisation, natural resource management, inter-municipal coordination.
Integrated Development Programme for GON RGON / ROYAL SUPERVISION	265 projects across 14 sectors (MAD ~7.25 billion); accelerates socio-economic inclusion and infrastructure delivery across provinces.
Regional Energy Efficiency & Decarbonisation Plan RGON / AMEE	Regional roadmap for energy decarbonisation; sector-specific efficiency targets and renewable energy integration priorities.
PROVINCIAL	
Provincial Waste Master Plans PROVINCES / MINISTRY OF INTERIOR	Province-level waste management priorities; landfill sites, collection coverage targets, CEV planning for Tan-Tan and Sidi Ifni.

Table 2. Alignment of the GCAP with national, regional and local policies and plans (selection)

ALIGNING WITH POLICY

A review of the socio-economic context, governance arrangements, responsibilities and financial capacity across various sectors in the Guelmim-Oued Noun region was undertaken to provide a comprehensive understanding of the policy context for the GCAP. The results of this exercise are summarised in the Governance and Powers section of this document.

The Regional GCAP must work in synergy with existing local, regional and national policies and programmes on infrastructure and sustainable urban development. During the plan's preparation, these policies were analysed to understand how strategic priorities apply across provinces and urban-rural areas, ensuring the GCAP reflects a multi-centre territory rather than a single urban system. This review positions the GCAP as a complementary tool that reinforces existing commitments, such as the Regional Development Plan (PDR 2022-2027), and supports coherence across sectors including water, land use, transport, waste, energy and buildings.

GCAP actions contribute towards meeting national commitments on GHG emissions (Nationally Determined Contributions 3.0), water security (National Water Strategy), support circular economy and waste-valorisation targets (National Waste Strategy), reinforce climate-adaptation priorities (National Climate Plan). In doing so, the GCAP serves as an integrated delivery mechanism for Morocco's policy ambitions at the regional scale.

A review of the socio-economic context, governance arrangements, institutional responsibilities and financial capacity across key sectors in the Guelmim-Oued Noun region was also undertaken to provide a comprehensive understanding of the GCAP's policy environment. The findings are summarised in the Governance and Powers section of this document.

DEFINING ENVIRONMENTAL CHALLENGES: THE PRESSURE-STATE-RESPONSE FRAMEWORK

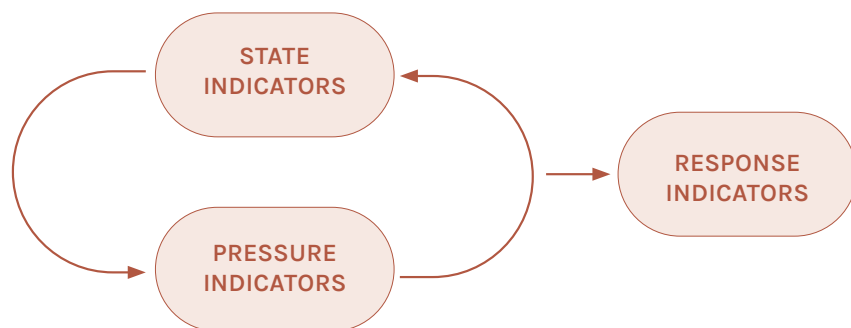


Figure 8. State-Pressure-Response framework

As well as reviewing policies and plans, the baselining phase of the GCAP included gathering data and indicators across the different areas of the Pressure-State-Response analysis framework (Figure 8). The purpose of this phase was to create a rapid yet comprehensive identification of the emerging and most pressing challenges in the Guelmim-Oued Noun.

The assessment of the region's current State included indicators related to air, water bodies, drinking water and water use, soil, green space, biodiversity and ecosystems, GHG emissions and adaptation to natural disaster risks. The data collected also sought to describe the performance of the different regional systems across key sectors (Pressure), including energy, waster, solid waste, transport, land use, buildings, industry and adaptation. The indicators collected were graded using a traffic light system of Red-Amber-Green against ranges provided by EBRD and which are common across all GCAP cities. The traffic light system allows for comparison of trends across time where available, indicating whether the situation is worsening or

improving for each state, pressure and response indicator. More information on these indicators and their definitions can be found in the latest EBRD Green Cities Methodology.¹

The regional scope of the GCAP required a tailored approach, which included the development of analysis both at a regional level, to ascertain common trends, and at a local one, to identify specific priorities. The definition of challenges also sought to differentiate between the different types of development in the region, namely, urban, rural, oases, each of which presents specific vulnerabilities.

Dedicated assessments were undertaken for cross-cutting themes such as risk and vulnerability, gender and social inclusion, and a smart maturity assessment. Qualitative evidence collected during workshops and 1:1 interviews with local department leads complemented the information gathered through secondary sources and helped to create a comprehensive picture of the environmental challenges region is facing.

PRIORITISING ENVIRONMENTAL CHALLENGES

The emerging challenges were prioritised by triangulating evidence from the GCAP baseline, its indicators and findings from stakeholder engagement (including, on-site workshops, interviews and surveys). This combined assessment helped confirm which pressures are driving the most significant changes in environmental conditions, and where stakeholders identified the greatest urgency and service-delivery needs across the region.

Following an initial assessment of the indicators and policy landscape of the Guelmim-Oued Noun region, a list of initial environmental challenges was identified and discussed during a stakeholder engagement workshop held in Guelmim in February 2025. Participants were asked to select relevant challenges for the region out of a long-list, and to prioritise them by sector, urgency and impact. To complement the information collected in the workshop, targeted interviews were undertaken with stakeholders in key sectors such as water (Agence Bassin Hydraulique Draa Oued Noun (ABHDON) and ONEE- Branche Eau), energy (ONEE-Branche Electricite), waste and environment (Regional Directorate of the Environment of Guelmim-Oued Noun).

1. See: https://ebrdgreencities.com/assets/Uploads/EBRD_GCAP_Methodology_ENG_13.03.26_Interactive.pdf

Setting vision and goals

A vision and strategic goals for the GCAP were developed in partnership with the Region representatives and validated with the stakeholders. These build and complement the Regional Development Plan 2022-2027 by adding a strong environmental dimension. The vision sets out the Region's long-term ambitions over a 15-year horizon, while the strategic goals identify the priority strategies to achieve the vision, together with quantifiable targets.

Developing regional GCAP actions

A list of actions was developed to underpin the GCAP vision and strategic goals. Actions were primarily generated from 1) a review of the actions in the Regional Development Plan which could be augmented and enhanced through the GCAP, 2) interviews with sectoral experts from EBRD, Arup and the Region, 3) stakeholder engagement with regional officers, officials, NGOs, private sector, public agencies and civil society. Having multiple sources of actions gave a wide range of scales, sectors and type of actions such

as capital, operational or policy interventions. The actions were refined, including definition of potential components, spatial extent, owners and delivery partners. The refined actions were discussed, validated and prioritised with stakeholders in the Guelmim-Oued Noun region, and provided an opportunity to identify new actions.

The prioritised actions were grouped by main challenge they help address, and further developed by sectoral experts, taking also into account: gender and social inclusion measures, opportunities for economic development and upskilling, digital potential. Job creation potential and GHG emission reduction were quantified, together with a description of climate adaptation benefits. Lastly, capital and operational costs were estimated for each action, indicating potential sources of funding and finance.





DEVELOPING ACTIONS WITH LOCAL STAKEHOLDERS

A key moment for the development of the GCAP actions was the workshop held in Guelmim in September 2025, which gathered more than 50 participants from Regional departments, agencies, municipalities and NGOs. Stakeholders were invited to draw on regional and city maps suitable locations for the shortlisted actions, based on their technical knowledge, and the areas that they considered most in need of intervention. The results from this exercise helped define the spatial extent (province, and area: coastal, rural, urban, or region-wide) of each action. The images above show pictures from the event, and some of the re-designed results of the participants' contributions.



GENDER EQUALITY AND HUMAN CAPITAL

Gender equality and human capital are embedded through a dedicated Gender Action Plan (GAP) developed alongside the baseline and action design. The GCAP drew on direct engagement with UN Women and IWMI and invited gender-specific feedback throughout workshops, deep-dive interviews, and the online survey, ensuring that priorities are evidence-based and grounded in local realities.

Each action therefore includes concise gender and inclusion sub-actions structured around five themes:

1. Inclusive Participation and Co-design

Meaningful roles for women, youth, and underserved groups in site selection, service design, and governance, including opportunities for women to take on facilitation, coordination and leadership roles within community and project-level processes.

2. Universal Accessibility and Safety

Step-free access, clear sightlines and lighting, safe waiting areas, and user-centred layouts that enhance real and perceived safety.

3. Access to Skills and Economic Opportunities

Targeted outreach, gender sensitive training, mentoring, and on-the-job pathways that build a female talent pipeline into green and public service jobs, including progression into supervisor roles, technical leadership and decision-making positions,

supported by inclusive workplace standards in GCAP contracts and across implementation providers (e.g. service providers).

4. Financial Inclusion and Affordability

Lifeline tariffs, simplified connection/application processes, tailored green-finance windows, and support for women- and youth-led SMEs.

5. Awareness and Behaviour Change

Locally tailored campaigns (including local languages and low-literacy formats) on safe reuse, efficient resource use, and user rights, supported by clear feedback channels.

The development of action-specific sub-actions makes gender inclusion systematic (present across actions), actionable (by specifying delivery partners), and verifiable (connected to the GCAP monitoring framework).

Providing a framework for implementation and monitoring

Implementation of the actions will be led by the Region and other local actors such as Société Régionale Multiservices Guelmim-Oued Noun (SRM GON). The implementation of the actions will mostly take place during the first five years of the Regional Green City Action Plan. Collaboration with government agencies, local providers, SMEs and civil society will be crucial to ensure that the actions deliver the best environmental, social and economic outcomes. The monitoring and evaluation of the GCAP is critical to understand the impact delivered by the GCAP actions towards reducing greenhouse gas emission and climate change adaptation in the Guelmim-Oued Noun region. Two types of monitoring will be undertaken:

1. Monitoring of the implementation process, which will focus on how the actions are implemented against the timeframe, budget and components of each of the actions. The aim of the implementation monitoring is to ensure that the actions are delivered in keeping with the original aim of each action, that the right data is collected to ensure further monitoring and that lessons learnt are shared between actions.
2. Monitoring of the results, evaluating whether the implemented actions are bringing the expected benefits. This will be done through the analysis of quantitative and qualitative data collected during and post implementation of the action, and compared with the baseline analysis presented in this GCAP.

02

Region baseline

Geography

Guelmim-Oued Noun is a region in the southern part of Morocco. It is geographically bordered by the Atlantic Ocean to the west, the Souss-Massa region to the north, the Laâyoune-Sakia El Hamra region to the south, and Algeria to the east. The region covers an area of 46,108 km² and includes diverse landscapes such as coastal areas, deserts, and the typically dry lower course of the Draa River running east to west.

The 2017 Regional Land Use Plan (Schéma Régional d'Aménagement du Territoire, SRAT) defined four main character areas, based on similar geographic, socio-economic and urban development features (Figure 9):

- The northern mountain region
- The western coastal strip
- The desertic Saharan region in the south-east
- The central highlands which include the city of Guelmim

The region comprises four provinces: Guelmim, Tan-Tan, Assa-Zag, and Sidi Ifni, with a total of 53 communes. The region is known for its long stretches of pristine beaches along the Atlantic coast and its rich cultural heritage. The development of infrastructure, including ports, airports, and roads, supports its economic activities, which include agriculture, fishing, and tourism.

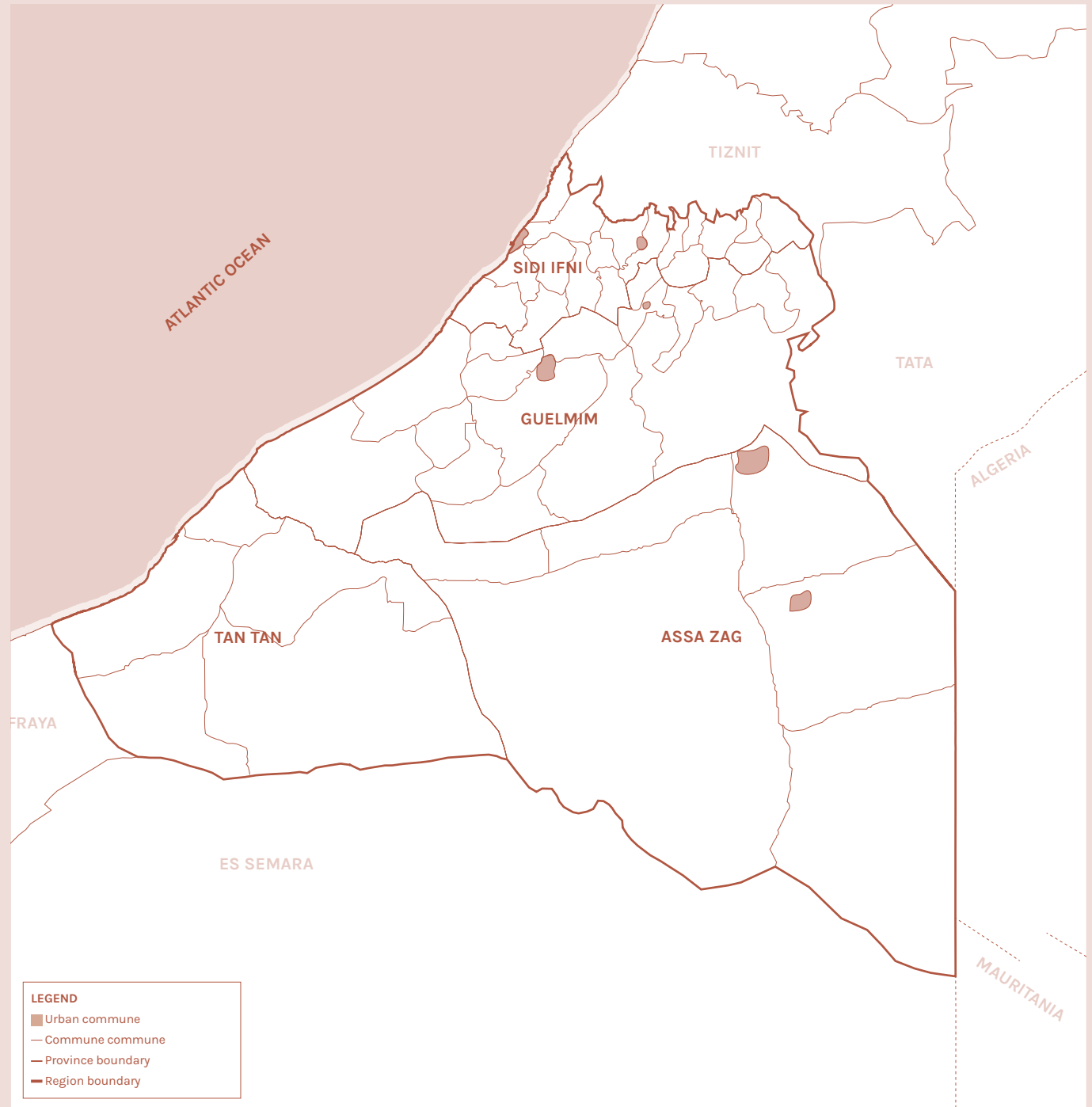


Figure 9
Administrative map of the provinces of Guelmim-Oued Noun, SIREDD, 2025

Governance and powers

LOCAL GOVERNMENT

The Guelmim-Oued Noun Regional Council is responsible for the governance and development of the region, which includes the provinces of Guelmim, Tan-Tan, Assa-Zag, and Sidi Ifni. The council is composed of 38 representatives from the various provinces within the region, 37% of whom are women. These representatives are responsible for making decisions on regional development policies and initiatives. Mbaraka Bouaida is the President of the Council of the Guelmim-Oued Noun Region. Figure 11 illustrates how the Regional Council, municipalities and other entities interact across the region's governance structure.

The Region's mission centres on promoting integrated and sustainable development through effective organisation, coordination, and monitoring of policies within its territory. This involves strengthening territorial attractiveness, enhancing economic competitiveness, and adopting measures that foster entrepreneurship. Guided by the principle of autonomous management, the Regional Council deliberates and implements decisions within the limits of its powers, in accordance with Organic Law No. 11114. In line with Article 140 of the Constitution, the Region exercises its own competencies, shares others with the state, and undertakes additional responsibilities transferred on the basis of subsidiarity.

Its exclusive competencies include regional development and land-use planning, while areas such as economic, rural, and social development, as well as environment, culture, and tourism, are shared with the state.

Transferred competencies cover a broader range of

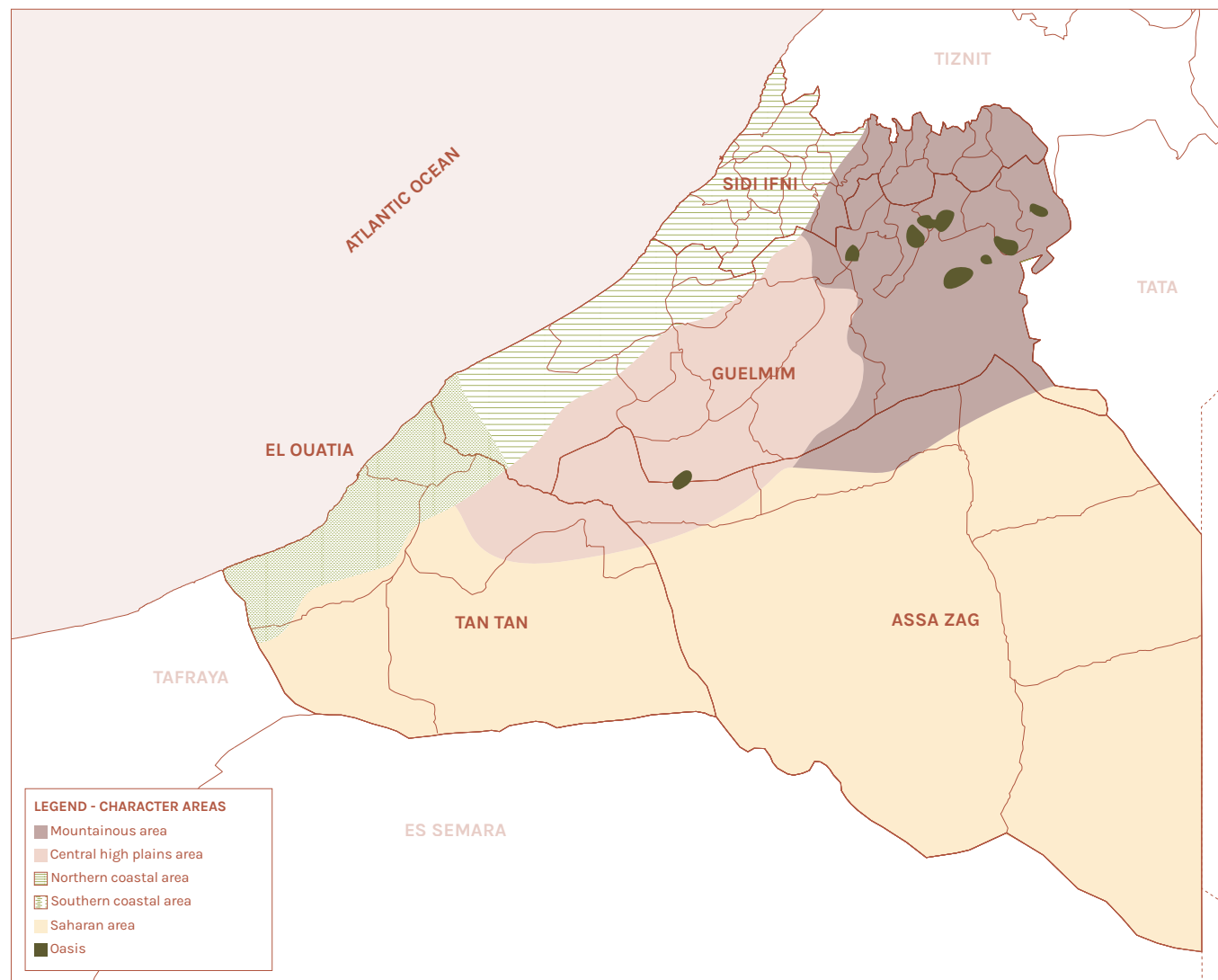


Figure 10. Regional character areas as defined in the Regional Land Use Plan, 2017

sectors, including infrastructure, industry, health, education, trade, sports, energy, and water.

Operating within the advanced regionalisation framework, the Region benefits from financial and strategic autonomy, managing regional revenues and state grants to support the Regional Development Program (PDR). Through the PDR and the Regional Land Use Plan (Schéma Régional d'Aménagement du Territoire, SRAT), the Region guides economic planning, investment promotion, territorial

development, and major infrastructure priorities. It plays a decisive role in supporting entrepreneurship, attracting private investment, and co-financing large-scale and public-private partnership projects.

In public services, responsibilities are progressively regionalised. The Region will assume electricity distribution via the Société Régionale Multiservices (SRM), while ONEE maintains responsibility over production and wider water and wastewater services. The Region also

advances desalination initiatives and works with basin agencies to ensure sustainable water management.

Territorial mobility planning falls under regional leadership, including regional roads, mobility strategies, and partnerships for public transport provision. Municipalities manage local transport, building permits, and waste collection, whereas the Region coordinates major infrastructure, landfill management, and investment zones through inter-municipal mechanisms.

Although education and health facilities remain under national ministries, the Region contributes through coordination and investment efforts, particularly by promoting public-private partnerships to enhance service delivery and strengthen public infrastructure.

SECTOR	OWN AND OPERATE	SET AND ENFORCE POLICIES	BUDGETARY AND REVENUE CONTROL	SET VISION
Finance				
Economic development				
Energy supply and distribution (city network)				
Energy production (municipal buildings)				
Private buildings				
Public buildings				
Public transport				
Road infrastructure				
Urban land use				
Solid waste				
Water production				
Water distribution				
Wastewater				

Not applicable Limited powers² Partial powers Strong powers

Table 3. Power matrix of the Region of Guelmim-Oued Noun by sector

2. Limited power: the municipality has influence through soft power such as advocacy. Partial power: the municipality can influence through statutory means, or official consultations.

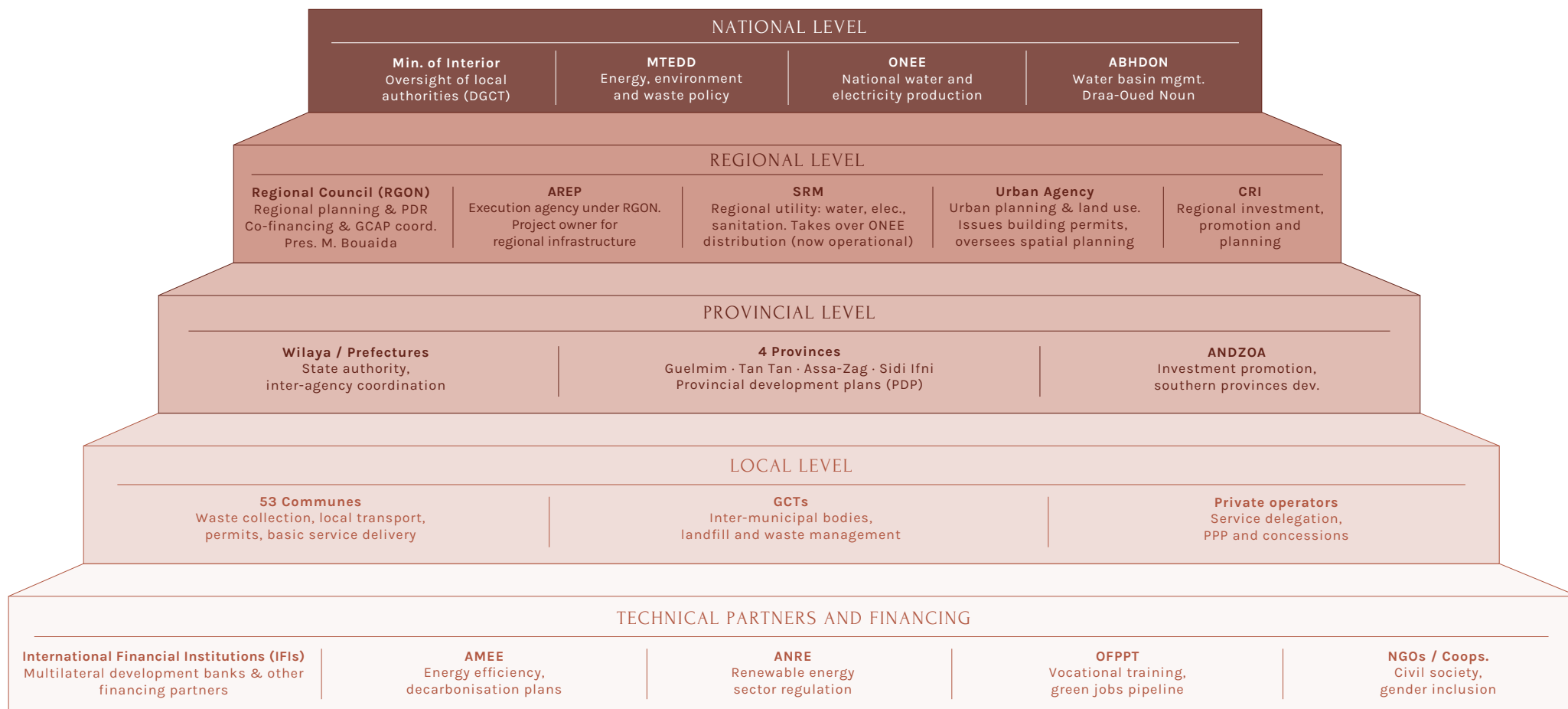


Figure 11. Institutional roles and governance structure of the Guelmim-Oued Noun Region

MAIN REGIONAL URBAN DEVELOPMENT PLANS AND PROGRAMMES

Three regional urban planning and development instruments guide territorial development in the Guelmim-Oued Noun region. They differ in nature and stage of completion, in particular the SDAU, which is awaiting approval.

1. The Regional Development Program (PDR) 2022-2027 for the Guelmim-Oued Noun region. Adopted in 2022, the PDR is an update to the Regional Land Use Plan (SRAT) and constitutes an ambitious roadmap towards achieving sustainable urban development across several sectors in the region. The programme focuses on strengthening economic, social and environmental development, through a set of strategic objectives underpinned by the vision of making the region a national hub for renewable energies, a model for the sustainable and circular economy, a leader in the blue economy, and a destination for sustainable tourism. The programme will require a total investment of around MAD 11.9 billion, with the Region contributing almost MAD 4 billion to deliver the planned projects. It includes the implementation of 96 projects covering 5 strategic axes (Figure 12) focusing on the development of infrastructure, social services, and the development of the region's key economic sectors.

2. The Urban Development Master Plan for the Sidi Ifni – Guelmim – Tan-Tan coastline (2018) is a long-term land use planning framework covering a 25-year horizon. It was developed through a collaborative approach involving various stakeholders and inter-municipal actions and covers issues of sustainable development, natural resources, urban planning, and social diversity.

3. The Integrated Development Programme for the Guelmim-Oued Noun Region is designed to stimulate economic and social growth in the region. The programme is based on a financing agreement and the implementation of major projects to accelerate development and socio-economic inclusion in the region's provinces. It has been placed under the direct supervision of His Majesty King Mohammed VI since 8 February 2016. This programme includes the implementation of 265 projects in 14 sectors, with a total investment of around MAD 7 billion and MAD 248 million.

The GCAP for the Guelmim-Oued Noun region is complementary of the PDR and sits across several pillars of the plan, working in synergy with its projects and initiatives.

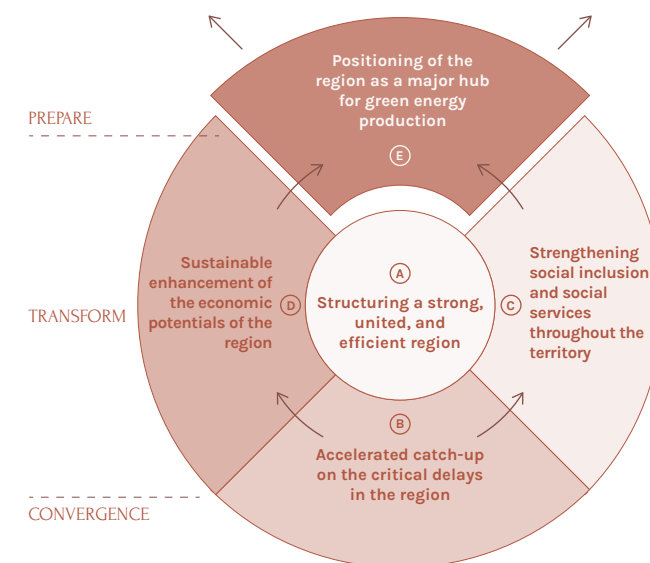


Figure 12. Dimensions and components of the Regional Development Plan (PDR) of Guelmim-Oued Noun 2022-2027, RGON, 2022

Regional finance

Guelmim-Oued Noun's regional finances are structurally stable, with capital expenditure defined by the requirement for a balanced operating budget. The Region has access to borrowing, which has increased since 2022 to finance the delivery of the PDR.

The Region of Guelmim-Oued Noun functions according to the Loi organique n°111-14 relative aux régions adopted in 2015. The budget consists of two parts covering operating and capital expenditure and must be balanced in each of its parts. In the period 2017-2025, revenue exceeded expenditure, with a decrease in revenues during 2020, which can be attributed to the COVID-19 pandemic. The difference between revenues and spend of any year makes the maximum capital expenditure budget for that year. In 2025, the Region recorded total receipts of MAD 3,088 million and total payment orders issued of MAD 1,287 million, resulting in a gross real surplus of MAD 1,801 million. After taking into account carried-forward credits, the net real surplus stood at MAD 49.8 million.

The Region receives most of its revenue from the central government. This can be divided into two categories: share of state taxes and state subsidies. In 2025, operating receipts amounted to MAD 446.9 million. The Region received MAD 353.9 million from its share of state taxes, while state subsidies amounted to MAD 51.5 million. Together, these sources represented the large majority of operating receipts, confirming the Region's continued reliance on national transfers.

The Region is able to take on debt and had borrowing receipts of MAD 128.9 million in 2025. Borrowing therefore remains

an important financing source for the implementation of the PDR, alongside state transfers, partner contributions and accumulated surpluses.

Other operating expenses are the main operating expenditures. Other operating expenses comprise expenditure relating to operation of the regional agency, project implementation, expenditure relating to refunds, reductions and repayments, emergency expenditure and reserves, and financial commitments arising from contracts entered into by the Region. Staff costs have remained stable, reaching MAD 11.8 million in 2025. Excluding the transfer of the operating surplus to the capital section, comparable operating expenditure amounted to approximately MAD 56 million in 2025, remaining broadly in line with recent years. At the same time, capital expenditure has continued to increase, with equipment receipts reaching MAD 2,600 million in 2025 and equipment payment orders issued reaching MAD 837 million, reflecting the ongoing implementation of the PDR Guelmim-Oued Noun 2022-2027.

The 2025 budget execution also shows that the Region has a significant investment envelope, but that implementation capacity remains important to monitor. Total open credits reached MAD 3,127 million in 2025, while committed expenditure reached MAD 1,727 million and payment orders issued reached MAD 1,287 million. The level of carried-forward credits remained high, at MAD 1,752 million, indicating that several programmed or committed investments continue to be implemented over subsequent years.

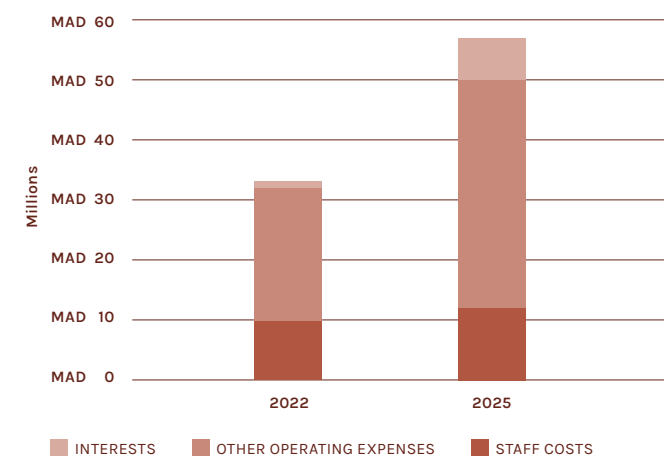


Figure 13. Type of expenses of the Region of Guelmim-Oued Noun for 2022 and 2025, Region Guelmim-Oued Noun, 2025

People

POPULATION

Based on the 2024 census, the Guelmim-Oued Noun region has 448,685 people (49% men and 51% women)³, indicating a modest average annual growth of 0.3% from 2014.⁴ This lies below the national population growth rate of 0.85%. Overall, around 22% of total inhabitants reside in the city of Guelmim.

In 2024, the urbanisation rate in the region was 66.8%.⁵ According to the Haut Commissariat au Plan's 2030⁶ forecasts, urbanisation is projected to grow at a different pace across the provinces. The Sidi Ifni province, with more than half of rural population, is expected to remain so by the year 2030 (50.9% in 2030 compared with 55.2% in 2014), while the province of Assa-Zag, which had an urbanisation rate of 61.9% in 2014, will increase to 68.1% in 2030.⁶ Provinces that had already achieved a high level of urbanisation in 2014 would become predominantly urbanised. This is the case of the province of Guelmim (82.1%) and Tan-Tan province

(96.2%). Based on projections confirmed by the latest census (RGPH 2024), urbanisation has increased by over 5 percentage points (Figure 15). This trend is expected to continue for two main reasons: increased migration to urban areas, and the transformation of rural areas into urban ones through the development of emerging centres, which gradually evolve into semi-urban and eventually fully urban areas.

There is a clear trend of higher population density in the north of the region, where argan tree cover, better climate conditions and agriculture potential attract population. In rural and peri-urban areas of the Guelmim-Oued Noun region, urban infrastructure and services are lacking. This is exacerbated for women, as gender disparities limit their access to essential services such as water, sanitation, transportation and energy.

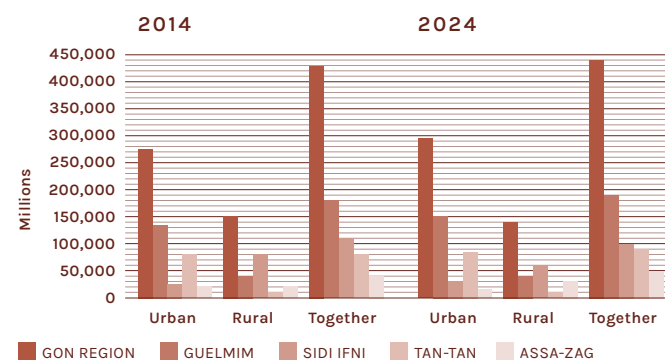


Figure 14. Population count and split between urban and rural population by province, Recensement General de la Population et de l'Habitat (RGPH), 2014-2024

3. Monographie Regionale – Region Guelmim Oued Noun, 2025. Available at hcp.ma/region-guelmim/attachment/2807351/

4. Recensement Général de la Population et de l'Habitat 2024 Principaux résultats, 2024. Available at : hcp.ma/file/242665/

5. Monographie Regionale – Region Guelmim Oued Noun, 2025. Available at hcp.ma/region-guelmim/attachment/2807351/

6. Recensement Général de la Population et de l'Habitat 2024 Principaux résultats, 2024. Available at : hcp.ma/file/242665/

7. Recensement Général de la Population et de l'habitat Région Guelmim caractéristiques démographiques, socio-économiques et conditions d'habitation des ménages, 2016. Available at : hcp.ma/region-guelmim/attachment/874WW7/

8. Monographie Regionale – Region Guelmim Oued Noun, 2025. Available at hcp.ma/region-guelmim/attachment/2807351/

AGE AND FAMILIES

In terms of age distribution, the Guelmim-Oued Noun region experiences a similar acceleration of population ageing to Morocco as a whole. Notably, young people struggle to find jobs in the region, which compels them to relocate to larger urban areas like Agadir or Laayoune. The share of over 60-year-olds has increased across all provinces in the region between 2014 and 2024.⁷ Sidi Ifni, recording the highest proportion of elderly residents, saw the share of 60-year-olds increase from 10.5% to 13.3%. Tan-Tan saw this proportion rise from 4.6% to 6.4% and Assa-Zag from 5.9% to 6.9%. A longer life expectancy may pose challenges for women, who are more likely than men to be widowed at 60, explained by a younger average marriage age and a lower likelihood of remarrying. This may in turn affect women's economic conditions as only 15.8% of older women benefit from a pension, compared to 41.1% of men.

Youth participation in local public life is a key area of development for Morocco as a whole, and in the region the 2024 data indicates that 42% of the population is under 25 years old.⁸ The Human Development National Initiative (INDH) targets young people with training centres and economic inclusion programmes in the region, especially in more rural, isolated areas. Current public policies already include measures to increase the participation of young people in decision-making at both local and national levels. For example, recent national legislation stipulates that 30 of the 395 seats in the Moroccan Parliament are reserved for representatives aged 40 or below, increasing the visibility of youth within national governance structures. Despite recent efforts, marginalisation and unemployment remain key issues for young citizens and regional and local institutions have been encouraged to develop youth programmes to better integrate younger populations to civil society.

EDUCATION

Illiteracy in the Guelmim-Oued Noun region is higher than the national level. In 2024, the region had a 26.2% illiteracy rate amongst 10+ year olds, compared with 24.8% in Morocco. There also remains a wide gap of literacy between genders, 35.5% of women were illiterate, which was double that of men.⁹ This gender disparity is not specific to the region but is more pronounced than at the national level, where 32.4% of women were illiterate as opposed to 17.2% of men. This illiteracy rate can lead to a dependency that exposes these women to violence, with 33% of women experiencing violence in 2019.

In 2014, regional enrolment in schools for children aged 7 to 12 enrolled in school was 96%, with the levels were almost equal between boys and girls. The enrolment rate reached its lowest level among rural girls (89.6%). Fewer girls complete secondary school (collegiate or qualifying) as is observed across the country. Overall, women are more likely to not be in employment, education or training, although there has been a progressive increase in women's educational attainment over the last decade.

In 2024, 4.8% of the Moroccan population, and 4.6% of the region's population lived with a disability. In Sidi Ifni, the prevalence of disability was higher than the national average, at 6.1%.¹⁰ In 2014, almost 9 out of 10 people with disability were economically inactive (86.6%) and 66.5% of people with disability did not have a qualification, against 35.3% amongst people without disability. This rate is higher for women with disability (79.5%) than for men with disability (53.4%). Furthermore, 60% of people with disability had issues accessing public health services and two thirds of them did not have any social protection.

GENDER EQUALITY

In 2022, Morocco had a Gender Inequality Index (GII) of 0.440, an improvement from 2004, when the index was 0.579 (compared to a world average of 0.535). In 2022, Morocco's GII was more unequal than other countries in the region, such as Tunisia (0.237) and Egypt (0.398). Morocco is the 11th country in the world with the lowest economic participation rate for women (20% against 49% as a world average).

Trends worldwide show that women and girls are disproportionately negatively impacted by climate events, being more likely to miss school or be married to support their family in times of scarce household resources. Women in rural or peri-urban areas often shoulder the responsibility of collecting water and as water scarcity and drought intensify, time spent on securing drinking water will limit their ability to participate in economic and educational activities.

Gaps in access to sanitation, transport and energy also affect women's well-being and economic activity in the region, with 30% of rural households lacking access to basic sanitation services, a continued reliance on firewood and other biomass for cooking in some households, and very limited formal public transport (particularly in rural areas). Climate-related challenges reduce women's access to safe and reliable transport options, further restricting access to markets, employment and education.

Empowering women and harnessing the skills and talents of the entire population, including youth and persons with disabilities, can therefore directly support the

green transition by expanding the regional workforce, strengthening service delivery and increasing the social and economic returns of green investments. In this context, integrating gender perspectives is crucial for fostering inclusive and sustainable development.

The Regional Council engaged in two key conventions to promote gender equality and inclusion. The first was conducted with the Ministry of Tourism, Handicrafts, and Social and Solidarity Economy, and the office of cooperation development between 2022 and 2026, to support and finance women cooperatives and build their capacity. The second one (Empowering Women Artisans) was conducted between the Regional Council and the Ministry of Solidarity, Social Inclusion, and Family to strengthen the capacity and employability of women cooperatives between 2022 and 2023. In addition to that, the Regional Council has a consultative commission for gender equality and opportunities, composed of 17 members, representing local, regional and national civil society organisations. These initiatives represent important opportunities to improve women's access to income generating activities, though further gender efforts are needed to expand pathways into green and technical sectors and to strengthen participation in decision-making at the local and regional levels.

9. Haut-Commissariat Au Plan (2024). Focus sur la population fememine de la region de Guelmim Oued Noun. Available at: [Bulletin de conjoncture économique Tanger-Tétouan-Al-Hoceimal](#)

10. Monographie Regionale – Region Guelmim Oued Noun, 2025. Available at [hcp.ma/region-guelmim/attachment/2807351/](#)

Economy

ECONOMIC SECTORS

The economy of the Guelmim-Oued Noun region is mainly service-based, accounting for 54.6% of total employment and most of its GDP. In 2024, services represented 65.5% of urban employment, followed by construction (17.3%) and industry (10.2%), while rural areas showed a more balanced distribution between services and agriculture-related activities. The 2024 census identified around 25,000 establishments in the region, largely small-scale, with 34% in retail, 16% in local services, 7% in industry, and 3% in construction. More than one-third are single-person operations and only 17 firms employ more than 50 workers.

Agriculture remains an important socio-economic activity, although traditional, and occupies about 194,600 hectares mostly in Guelmim and Sidi Ifni. Fisheries are a major sector concentrated in Tan-Tan and Sidi Ifni, with Tan-Tan ranking among Morocco's principal sardine ports and accounting for 73% of regional catches and nearly all fisheries value. Total marine production reached about 160,000 tons in 2019.

Industrial activity is mainly located around the two ports of Tan-Tan and Sidi Ifni, with seafood processing plants, small construction material units, and carpentry workshops. Industrial transactions reached MAD 0.35 billion in 2019. The craft sector plays a strong cultural and economic role, especially for women, with 260 cooperatives in 2019 and ten apprenticeship centres enrolling 609 trainees.

Tourism is a growing sector that benefits from the region's Atlantic coastline, desert landscapes, springs, and heritage sites. Revenues increased to MAD 259 million in 2022. In 2019, the region had 23 classified

hotels with 646 keys and about 66,000 overnight stays. Tourism is mainly coastal, centred on sun, sand, and surfing, with eco-tourism emerging in some oases.



EMPLOYMENT

In 2024, the total working population aged 15 and over in the region amounted to 343,000 people (37.3% of active population compared to 41.6% at national level) including 245,000 in urban areas. The private sector is by far the primary contributor to job creation in the region. In 2024 data from the HCP shows that almost eight out of ten employed individuals worked in the private sector, while just over two out of ten were state employees. The presence of the private sector is even more pronounced in rural areas, with 89% employed in this sector.

The unemployment rate in 2024 was 31.5%, well above the national average of 21.3%. Unemployment affected around 28,000 people. The active population represented 39% of the region's residents aged fifteen and above, while the number of inactive people was around 209,000. Male participation was 63.8% compared to only 12.7% for women. Youth unemployment was particularly high, reaching 58.6% in the 15-24 age group and 38.9% in the 25-34 age group. Graduate unemployment was more severe than at the national level, reaching 30.2% in the region compared with around a quarter of graduates nationally. Among active women, 48.0% were unemployed versus 14.4% of active men.

Gender gaps were substantial. Women in the region are becoming less active, with the activity rate decreasing from 14.8% in 2014 to 12.7% in 2024.¹¹ Of working women, 43.5% are employed in the public sector and only one fifth of permanent employment in for-profit establishment is held by women. In 2014, many women were economically inactive due to domestic responsibilities, with 74% of inactive women in Morocco being housewives or caregivers and 54% reporting household duties as the

main reason for inactivity. Female unemployment was especially high in Assa-Zag at 72% compared to 57% in Guelmim. People with disabilities also faced major barriers, with nearly 9 out of 10 being economically inactive in 2015 and inactivity rates higher among women with disabilities (80%) than men with disabilities (53%).

Women's economic participation is most visible in traditional and locally rooted sectors, particularly agriculture, crafts, and the social and solidarity economy. In rural areas, women are heavily involved in agricultural activities, including subsistence farming and food-related cooperatives. They play a central role in the harvesting and processing of local products such as argan oil and honey, especially in the northern provinces of the region, notably Sidi Ifni. These activities are often organised through cooperative structures, which provide women with opportunities to collaborate, share skills, and access domestic and international markets.

The craft sector represents a significant area of women's economic engagement in the region. Women are actively involved in a range of traditional crafts, including jewellery making, leatherwork, carpet weaving, tent making, and the production of traditional clothing. Women's cooperatives are particularly prominent within this sector and form an important component of the regional economy. As of 2019, the region counted 260 registered craft cooperatives. These cooperatives contribute both to income generation and to the preservation of cultural heritage, while also fulfilling an important social role, particularly for women in rural and semi-urban areas.

By contrast, women's participation in emerging and higher-value sectors remains limited. Women are under-represented in the renewable energy sector, with participation rates remaining very low at national level (less than 10% of all employment in the sector), and with limited access to education and vocational training in green technologies.

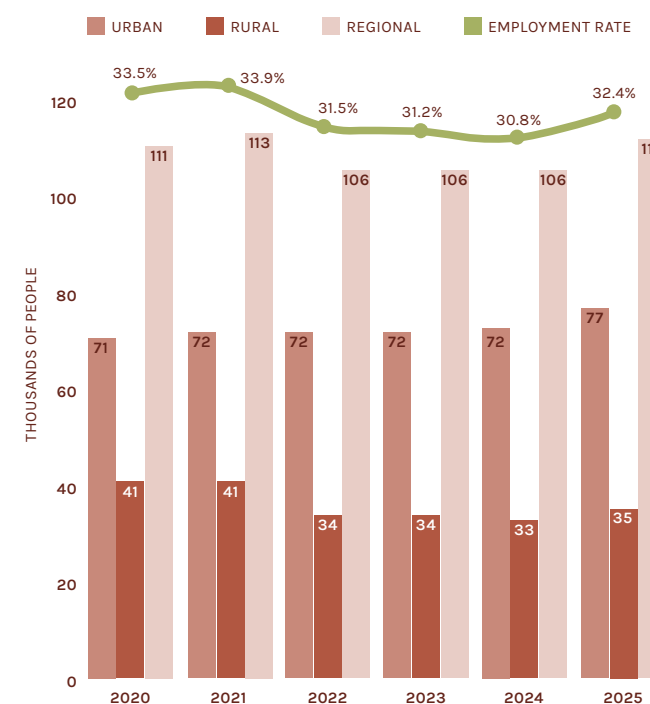


Figure 15. Changes in the employed working-age population (15 years and over) by place of residence and employment rate (in %) between 2020 and 2025, HCP, 2026

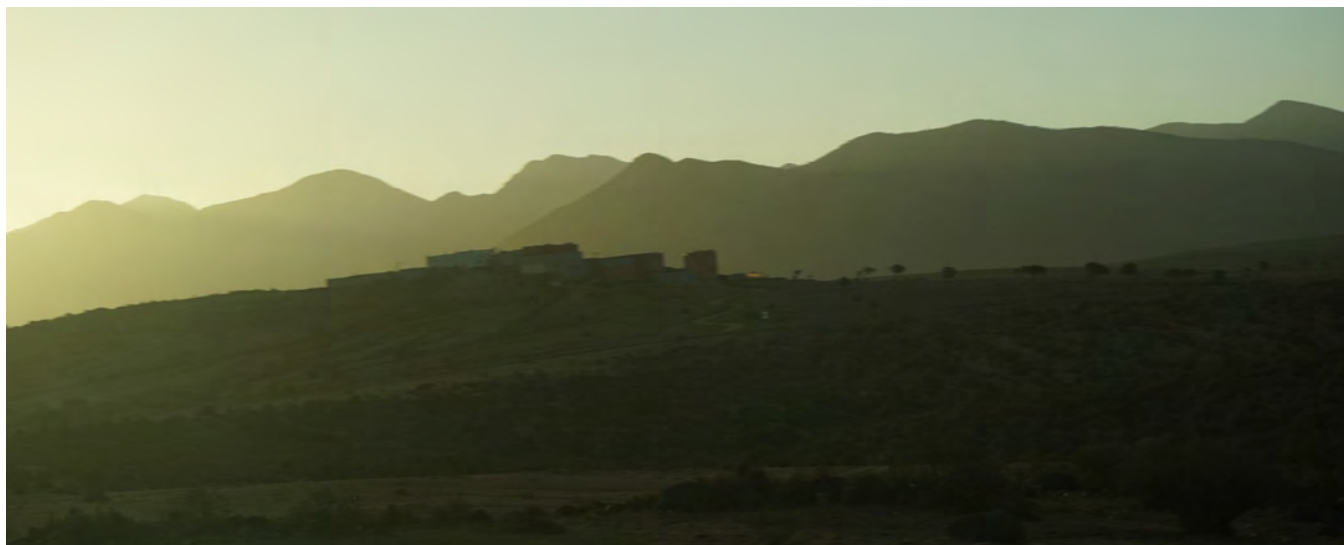
11. Monographie Regionale – Region Guelmim Oued Noun, 2025. Available at hcp.ma/region-guelmim/attachment/2807351/

Environment

THE STATE OF THE ENVIRONMENT IN THE GUELMIM-OUED NOUN REGION

AIR

ID (IDENTIFIER)	1	1.1
INDICATOR	Average annual concentration of PM2.5	Average 24 hour concentration of PM10
LATEST YEAR AVAILABLE	2025	2019
VALUE IN LATEST YEAR AVAILABLE	● 12.5	● 50.00
TREND	N/A	N/A
EBRD-GCAP BENCHMARKS	● < 10 ● 10 – 20 ● > 20	● < 20 ● 20 – 50 ● > 50
UNITS	µg/m3	µg/m3



Air quality in the Guelmim-Oued Noun region is generally good, although slightly lower quality in urban centres due to desert dust, growing industrial activity and an increasing number of highly polluting vehicles, particularly in Guelmim.

In 2019, PM10 levels in Guelmim averaged 50.00 µg/m3, which is the Moroccan health protection limit, while PM2.5 levels in 2025 remained low at 12.5 µg/m3 with daily variation influenced by weather. The Ministry of Energy Transition and Sustainable Development has installed four quality monitoring stations.

Climate and geography play an important role in influencing air quality in Guelmim-Oued Noun. The region's position on the western edge of the Sahara increases exposure to mineral dust, while its location between the Atlantic Ocean and the mountains also reduces dispersion of traffic and industrial emissions. Rapid urban expansion and limited removal of construction waste further

contribute to pollution, with wind carrying dust across municipalities and minimal rainfall allowing particles to remain in the air for long periods.

Transport (high shares of old and polluting vehicles) and industry are considered the main anthropogenic sources of air pollution. Future industrial development outlined in the PDR may raise emissions, particularly in Tan-Tan and Guelmim. Additional pollution comes from quarrying, landfill sites, wastewater treatment plants and heavy vehicles used in mineral transport. Current evidence does not indicate a critical situation, but monitoring remains insufficient.

WATER BODIES

ID	2.1	2.2
INDICATOR	Ammonium NH4 concentration in rivers and lakes (Proxy: Nitrate contamination in Wells)	Bathing waters meeting minimum standards (Proxy: Morocco's beach waters meeting quality standards)
LATEST YEAR AVAILABLE	2020	2023
VALUE IN LATEST YEAR AVAILABLE	● 82.6	● 88.05%
TREND	N/A	● Increasing
EBRD-GCAP BENCHMARKS	● < 150 ● 150 - 200 ● > 200	● > 95 ● 95 - 70 ● < 70
UNITS	µg/m3	%

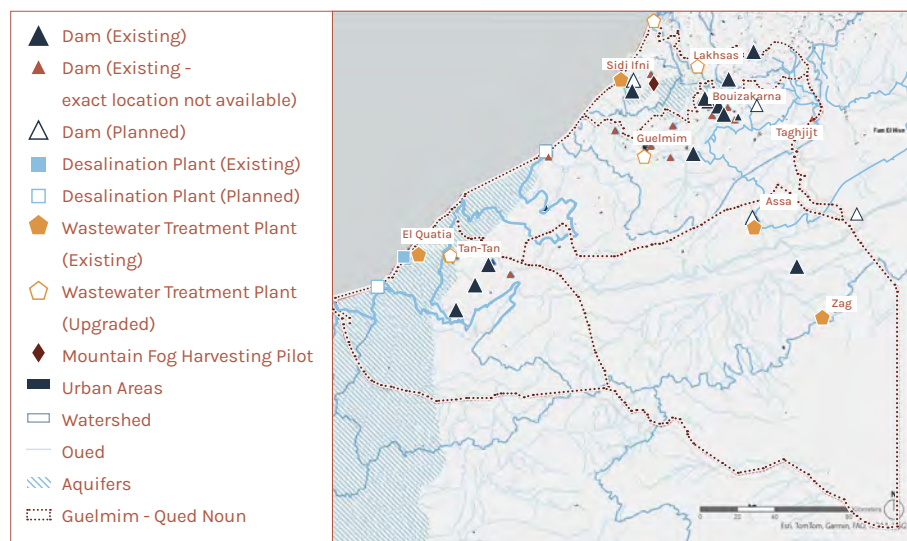


Figure 16. Water systems in the Guelmim-Oued Noun region, Arup, 2025

Water resources in the Guelmim-Oued Noun region face severe stress due to very limited and variable rainfall, frequent droughts and rising pollution from agricultural runoff and untreated industrial discharges.

Most water resources are concentrated in the province of Guelmim, where the hydrographic network consists only of temporary wadis such as the Oued Draa and its tributaries used for subsistence farming and domestic consumption. The region has no permanent water bodies and temporary wadis are often exposed to violent floods caused by heavy rain falling further north.

The Guelmim basin includes the Assaka and Bouissafen catchment areas, which have limited storage and are prone to destructive floods. This could be improved by targeting areas for storage capacity using nature-based solutions, focusing on higher gradient areas notably in the Sidi Ifni province. Additionally, there are seven sub-basins of Oued Assaka covering 6,500 km² with annual inflows of 62M m³. Several hill dams are under construction. Due to the arid climate, the region relies on groundwater, dams, desalination and periodic wadis. Climate change has created a major water deficit in the Draa Oued Noun basins, reaching up to 550 Mm³/year in the worst case. To address this, measures such as artificial aquifer recharge, desalination expansion, wastewater reuse, rainwater harvesting, hill dam construction, and widespread adoption of localised irrigation are planned by the region and local water agencies (ABHDON, ONEE-Branche Eau)¹², aiming to progressively reduce the deficit to as low as 58 Mm³/year.

Groundwater is deteriorating mainly through rising salinity linked to prolonged droughts, erosion and poor aquifer renewal. Tan-Tan's aquifer is fully saline and requires demineralisation. Nitrate and heavy metal contamination are generally not a concern.

Most pollution comes from human activities, including agricultural runoff with pesticide use, urban wastewater and untreated industrial effluents. Accidental pollution is limited in the ABHDON zone. Addressing pollution and high salinity in groundwater is a pressing priority due to growing water scarcity, and improving water quality and availability is essential for ecosystems, residents and the regional economy.

12. Actualisation Du Plan Directeur D'aménagement Integre Des Ressources En Eau Des Bassins De Draa Oued Noun, Agence du Bassin Hydraulique de Draa Oued Noun (2022).

DRINKING WATER/WATER USE

ID	5	NON-EBRD
INDICATOR	Water Exploitation Index	Proportion of households with access to drinking water within a radius of one km
LATEST YEAR AVAILABLE	2022	2014
VALUE IN LATEST YEAR AVAILABLE	● ≥100	● 72.89
TREND	N/A	N/A
EBRD-GCAP BENCHMARKS	● < 20 ● 20 - 40 ● > 40	N/A
UNITS	%	%

Water availability is a major concern in the Guelmim-Oued Noun region, which is highly exposed to water scarcity affecting both the quantity and quality of groundwater.

Drinking water supply is uneven and depends heavily on overexploited aquifers and desalination plants. The only permanent water sources are underground, yet these aquifers show high salinity and require treatment in some areas. According to ONEE Water Division, drinking water production reached 13.8 million m³ in 2019, mainly from groundwater and the Tan-Tan desalination plant, with most supply directed to Guelmim province. In Guelmim municipality, consumption in 2017 was 10 Mm³ based on an annual average of around 220 litres/person/day.

As of 2019, 86% of drinking and industrial water in the Agence du Bassin Hydraulique de Draa Oued Noun (ABHDON) action area (which includes areas outside of Guelmim region) came from groundwater, followed by surface water (dam), as well as desalinated seawater and brackish water. Most basins depend almost entirely on groundwater, except Sidi Ifni, which relies on dam water and a desalination plant opened in 2025. Tan-Tan's plant produced 100 litres per second, meeting more than 60% of local needs. Although 70% of the region's population has access to clean drinking water, rural areas still face major challenges. Women are mainly responsible for water collection, often spending several hours daily, especially during drought, which limits their economic and educational opportunities and increases physical burdens.

Groundwater is overexploited, with studies as early as 2003 indicating abstraction beyond natural recharge rates. Declining water levels are linked to population growth and agricultural expansion, including the shift toward high value-added crops that consume more water. Recent ABHDON studies report recharge deficits of -165.9 Mm³ per year in the Draa Oued Noun basins and -25.9 Mm³ per year in the Guelmim basin, with groundwater levels falling 1 to

2 m per year and flow rates decreasing from 60 litres per second in 2015 to 15 litres per second in 2024. Evaporation also contributes to a loss of around 3 Mm³ per year.

Elsewhere in the region, rapid population growth has pushed water demand in Tan-Tan-El Ouatia beyond 100 litres per second. Sidi Ifni, which lacks groundwater resources, depends on its desalination plant but only 50 to 60% of the population is connected to the distribution network, leaving many reliant on public fountains often located far from homes. Guelmim-Oued Noun is planning to build ten dams for a total estimated cost of MAD 851 million to protect main urban areas from flash floodings, provide direct water supply to local communities notably for irrigation and to enable groundwater recharge. These projects are the result of a partnership between the region and the Ministries of the Interior, Public Works and Water. The combined storage capacity of the dams is expected to be more than 40 million m³ and projects include the Ouadi Sefaoou in Guelmim and Assif Ouinder in Sidi Ifni.

SOIL

The Guelmim-Oued Noun region is particularly vulnerable to erosion and desertification due to its topography, climate and geographic location. Human activities such as rapid urbanisation, inadequate sanitation, and intensive agriculture increase pressure on soils.

The region forms a buffer zone between the Moroccan Sahara and the Souss plain. The region's soils vary along the Bouizakarne - Guelmim axis. The soil is skeletal and stony, with limestone parent rock appearing on the surface. Only the soils of the oases can be considered suitable for intensive agriculture. Cultivable soils are practically non-existent in the south of Tan-Tan and Assa Zag.

The Guelmim basin's uneven topography, diverse lithology, semi-arid and fluctuating climates, proximity

to the desert, strong winds, and sparse plant cover make this region highly vulnerable to erosion and desertification. Aeolian and fluvial erosion drive sediment transport, impacting wadi systems, oases, and groundwater reserves. Desertification is a phenomenon that threatens most of the region's agricultural and urban land. Silting threatens rural settlements, palm groves, roads and irrigated areas, swallowing up dwellings or forcing communities to spend resources clearing sand and hampering overall access.

Agricultural intensification in the Grande Hydraulique area has involved the construction of imposing structures such as dams to irrigate the land and encourage the use of land for agricultural purposes. These activities have mainly developed in the vicinity of Guelmim, accentuating the anthropic pressure on its soils.¹³

Rapid urbanisation has also resulted in the uncontrolled management of liquid and solid waste due to underdeveloped sanitation infrastructure. In informal settlements and douars, domestic effluent is dumped on the ground. In parallel, the region witnesses a loss of fertile agricultural land to the construction of residences for households and tourist establishments.



13. SCHÉMA DIRECTEUR D'AMÉNAGEMENT URBAIN DU LITTORAL DE SIDI-IFNI - GUELIMIM - TAN-TAN, Ministère de l'Aménagement du Territoire National, de l'Urbanisme, de l'Habitat et de la Politique de la Ville, 2018.

GREEN SPACE

ID	6	6.1
INDICATOR	Open green space area per capita	Share of green space areas within urban limits
LATEST YEAR AVAILABLE	2024	2024
VALUE IN LATEST YEAR AVAILABLE	● <10	● <30
TREND	N/A	N/A
EBRD-GCAP BENCHMARKS	● > 10 ● 10 - 7 ● < 7	● > 50 ● 50 - 30 ● < 30
UNITS	m ²	%



Despite some recent efforts in creating and upgrading green spaces across the cities in the region the average provision of green space per citizen remains very low, and requires a sensitive balance between typologies of species with different water-intensity and shading potential. This not only limits the region's capacity to mitigate heat island effects, but also reduces opportunities to strengthen urban biodiversity and deliver wider nature-based resilience benefits.

Based on observations and interviews it is estimated that green space per person in the Guelfim-Oued Noun region is below the recommended values of 10 m² per capita in

main urban areas of the region. The region has diverse urban typologies, from colonial layouts with mixed uses and public spaces to more dense, narrow-street patterns where green spaces are largely absent.¹⁴ The current low provision of green space in urban areas impacts the potential to mitigate heat island effects. In these denser neighbourhoods, the absence of urban greening significantly reduces the potential for nature-based solutions that combine cooling, shading and biodiversity.

The Region is advancing soil and biodiversity protection through reforestation, green belts and new recreational areas, with tree-planting projects active in Tan-Tan, Guelfim and Assa Zag to limit sand encroachment and improve living conditions. These initiatives function as nature-based solutions that simultaneously support adaptation, by buffering heat, wind and flood risks, while enhancing biodiversity. The Regional Development Plan promotes expanding green spaces by using wadis and

natural corridors as open-air recreational areas that also help reduce flood risks. It also supports upgrading rural centres such as Mirleft with new public and green spaces.

The PDR includes further green space expansion in under-equipped areas, alongside public realm and road upgrades, with a budget of MAD 600 million for 2023–2027. Strategic wastewater reuse projects for irrigating green belts in Guelfim, Tan-Tan, Lakhssass and Mirleft are backed by the Ministry of the Interior and include upgrading four wastewater treatment plants to national and EU standards, the latter projects financed by EBRD and supported by GEF grant.

14. SCHÉMA DIRECTEUR D'AMÉNAGEMENT URBAIN DU LITTORAL DE SIDI-IFNI – GUELMIM – TAN-TAN, Ministère de l'Aménagement du Territoire National, de l'Urbanisme, de l'Habitat et de la Politique de la Ville, 2018.

BIODIVERSITY AND ECOSYSTEMS

ID	7.1	NON-EBRD
INDICATOR	Tree canopy cover	Reforested area
LATEST YEAR AVAILABLE	2019	2019
VALUE IN LATEST YEAR AVAILABLE	● 5.37	● 8137
TREND	N/A	N/A
EBRD-GCAP BENCHMARKS	● > 50 ● 50 - 10 ● < 10	● N/A
UNITS	Annual % change	Hectares

The region’s biodiversity is remarkable for its richness, diversity and endemism (20%). However, it is threatened by climate change and overexploitation of wood, increase in intensive agriculture, overgrazing and tourism development.

The Guelmim-Oued Noun region encompasses three distinct geographical zones: the Anti-Atlas mountains to the north and north-east, a central semi-desert plain, and a desert zone to the south. Its 240-km Atlantic coastline, extending from Mirleft to Oued Ouâar, features sandy beaches, rocky shores, and rich marine and bird life. The Anti-Atlas offers cooler climates and biodiversity, while oases support date palms and wildlife. Agriculture

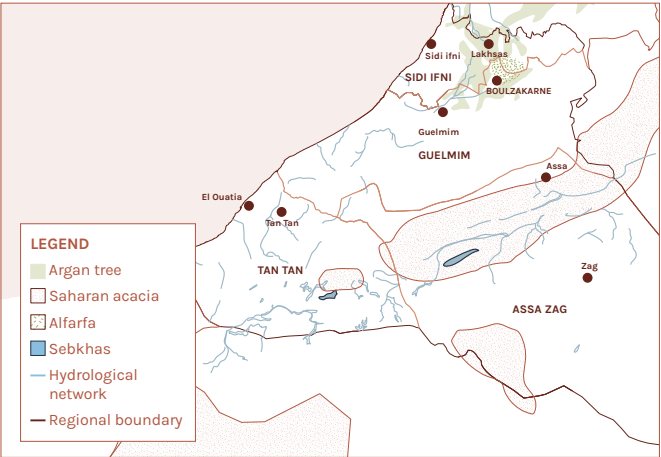


Figure 17. Biodiversity areas in the Guelmim-Oued Noun region, SIREDD, 2025

centres on olives, dates, argan trees, and other drought-adapted species, contributing to both ecological balance and local livelihoods.

The region’s natural forests, dominated by argan trees and acacias, covered nearly 100,000 hectares in 2015, mainly in Sidi Ifni and Guelmim. Adapted to arid conditions, these ecosystems remain highly vulnerable to drought, fires, overgrazing, and land clearance. Beyond their ecological role in combating desertification, forests provide important social and economic opportunities for women, who are key producers of argan oil and honey through cooperatives that play a central role in community life, particularly in Sidi Ifni.

Several Sites of Biological and Ecological Interest (SIBE) host rare Saharan fauna such as gazelles and mouflon. However, environmental degradation caused by climate stress and human pressure (over-exploitation, agricultural expansion, and urban growth) has accelerated forest and oasis loss, increasing erosion and desertification.

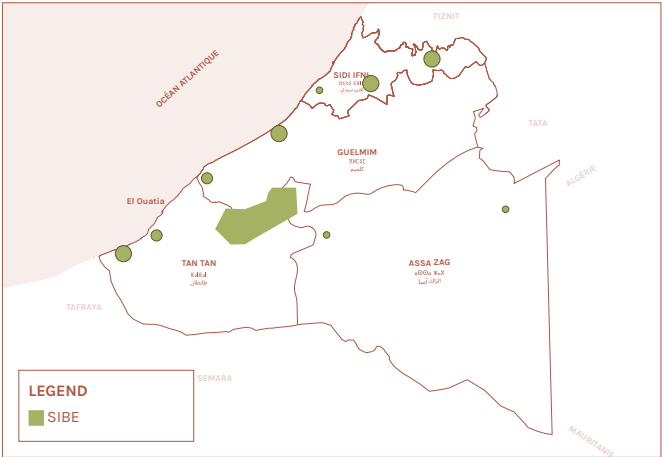


Figure 18. Sites of biological and ecological interest in the Guelmim-Oued Noun region, SIREDD, 2025

Prolonged drought has also weakened resilient crops like cactus and argan, undermining ecosystems and threatening women’s economic integration in agriculture and food cooperatives. The cochineal plague has further devastated cactus cultivation, prompting shifts toward non-endemic varieties.

Coastal tourism and planned real estate development, notably near Plage Blanche and Sidi Ifni, are increasing pressure on fragile coastal and wadi ecosystems that shelter migratory birds. Despite the 2011 Coastal Act, protection remains fragmented. Restoration initiatives, including argan regeneration and forest demarcation, are underway, complemented by the nearby Arganeraie Biosphere Reserve, which aims to conserve argan ecosystems while supporting sustainable local development.¹⁵

15. Ministère de l’Aménagement du Territoire National, de l’Urbanisme, de l’Habitat et de la Politique de la Ville, SCHÉMA DIRECTEUR D’AMÉNAGEMENT URBAIN DU LITTORAL DE SIDI-IFNI – GUELMIM – TAN-TAN, 2018.

MITIGATION OF GHG EMISSIONS

ID	8	8.1
INDICATOR	Annual CO2 equivalent emissions per capita	Annual CO2 emissions per unit of GDP
LATEST YEAR AVAILABLE	2022	2022
VALUE IN LATEST YEAR AVAILABLE	● 3.30	● 0.0007
TREND	● Increasing	N/A
EBRD-GCAP BENCHMARKS	● < 5 ● 5 – 10 ● < 10	● < 0.35 ● 0.35 – 0.8 ● > 0.8
UNITS	Tonne / year / capita	Tonne / USD of GDP



The Guelmim-Oued Noun region's greenhouse gas (GHG) emissions are currently relatively contained, well below the 5 tonnes of CO₂ equivalent (tCO₂e) per capita benchmark but are on the rise, driven by urban traffic growth and industrial development.

Morocco has aligned its climate policies with the 2015 Paris Agreement, committing to limit global warming to 2°C. Between 2010 and 2018, GHG emissions rose by 2.8% annually, largely driven by the energy sector. The country now aims to cut total GHG emissions by 45.5% by 2030, including an unconditional reduction of 18.3% below business-as-usual levels. This ambition reflects Morocco's substantial renewable energy potential. In 2024, national CO₂ equivalent emissions reached 103.1 megatonnes of CO₂ equivalent (MtCO₂e).¹⁶

In urban areas, transport is the principal source of pollution, with emissions rising due to population growth, rapid urbanisation, and increased mobility. In rural areas, women rely on biomass fuels such as firewood and charcoal, contributing to indoor air pollution.

Increasing private vehicle use, combined with an ageing fleet and poor traffic management, has intensified urban

air pollution. In 2022, land transport in Guelmim-Oued Noun relied heavily on fossil fuels, with diesel accounting for 87.6% of consumption. Under a business-as-usual scenario, transport emissions are projected to increase by 29%, from 32 kilotonnes of CO₂ equivalent (ktCO₂e) in 2022 to 42.3 ktCO₂e by 2030.

Industry is another major source of emissions, particularly in Tan-Tan, where agri-food and chemical industries dominate. Electricity represents nearly 89% of industrial energy demand, and continued dependence on fossil fuels is expected to raise emissions from 56 to 81.9 ktCO₂e by 2030. The Regional Energy Efficiency and Decarbonisation Plan, currently under development, aims to reduce emissions while supporting sustainable growth and alignment with national energy efficiency objectives for 2030.

16. Climate Change Tracker, 2025. [Morocco's Greenhouse Gas Emissions | Climate Change Tracker](#)

ADAPTATION RESILIENCE TO NATURAL DISASTER RISKS

ID	9	NON-EBRD
INDICATOR	Estimated economic damage from natural disasters as a share of GDP	Estimated economic damage from natural disasters floods droughts earthquakes etc. (absolute value)
LATEST YEAR AVAILABLE	2014	2014
VALUE IN LATEST YEAR AVAILABLE	● >1	6,000
TREND	N/A	N/A
EBRD-GCAP BENCHMARKS	● < 0.5 ● 0.5 - 1 ● > 1	● N/A
UNITS	%	MAD millions

The Guelmim-Oued Noun region is facing increasing natural disaster risks due to natural hazards and climate change, requiring robust adaptation and resilience strategies.

The region, located in the northern Moroccan Sahara, comprises three main geographical zones: mountainous, semidesert, and desert areas. It lies within an active tectonic boundary shaped by faulting and intracontinental deformation. Climatically, the region is predominantly characterised by a hot desert climate, with a smaller northern area exhibiting cold semi-arid conditions.¹⁷ Annual rainfall is low (80–200 mm), temperatures are extreme, and high evaporation rates are driven by heat, Chergui wind, and Saharan thermal fluxes.

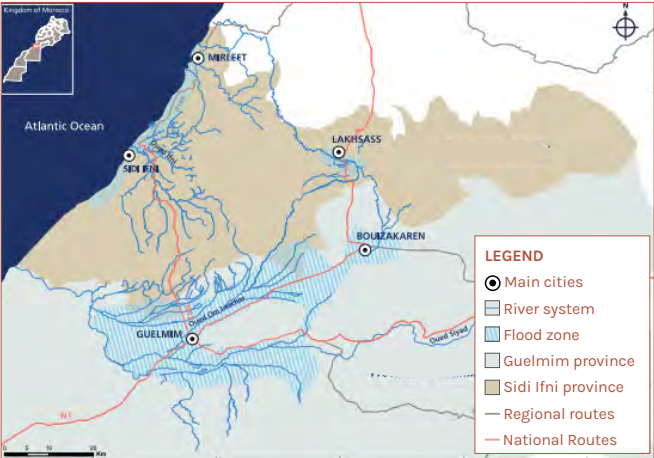


Figure 19. State of flooding in Guelmim-Oued Noun, Targa-AIDE

Although water scarcity is a defining feature, intense rainfall events can trigger flooding, while wind and fluvial erosion affect wadis, oases, and groundwater systems, leaving sites such as the Guelmim and Assa-Zag oases particularly vulnerable.

The region faces increasing climatic extremes, including droughts, floods, and heat stress, alongside term-term environmental pressures. In November 2014, Guelmim-Oued Noun experienced severe flash flooding following several days of intense rainfall, which caused Oued Oum Laachar to overtop a diversion dike and reoccupy its former natural channel through the city. The floods resulted in more than 30 fatalities in Guelmim alone. Urbanisation and population growth have transformed historically beneficial floodwaters into a significant risk to people and infrastructure, particularly in settlements located along Oueds (Figure 20). In Guelmim-Oued Noun, the intensity and duration of rainfall can trigger rapid runoff that funnels downstream and produces high discharges in wadis over short time periods. Observations

since 1990 show rising mean temperatures and growing rainfall variability, trends expected to intensify under all climate scenarios, particularly RCP8.5.¹⁸ The annual average maximum surface air temperature recorded in 2024 was 26.24°C. These climatic and human-induced pressures (resource overexploitation, fragmented planning, and unsustainable urban development) disproportionately affect urban and rural settlements, undermining infrastructure, public health, agricultural productivity, and water availability.

Water security represents the Region’s most critical challenge, as it relies almost entirely on groundwater and unconventional sources such as brackish water and desalination. Declining rainfall and higher temperatures will further strain water resources, reduce groundwater recharge, and compromise access to drinking and irrigation water, especially for rural and low-income communities. This threatens agricultural yields, food security, and economic stability.¹⁹ Despite low adaptive capacity, the Territorial Climate Plan outlines initial measures, including water-saving irrigation, watershed management, flood protection infrastructure through the construction of 10 hill dams, improved transport resilience, and expanded desalination. Strengthening urban planning and building standards will be essential to address prolonged heat stress and enhance long-term climate resilience²⁰.

17. World Bank, Climate Change Knowledge Portal, Morocco - Country Specific Information, 2025. [Morocco - Summary | Climate Change Knowledge Portal](#)

18. World Bank, Climate Change Knowledge Portal, Morocco - Climatology, 2025. [Morocco - Climatology | Climate Change Knowledge Portal](#)

19. Ministère de l’Aménagement du Territoire National, de l’Urbanisme, de l’Habitat et de la Politique de la Ville, SCHÉMA DIRECTEUR D’AMÉNAGEMENT URBAIN DU LITTORAL DE SIDI-IFNI – GUELMIM – TAN-TAN, 2018.

20. Royaume du Maroc, Ministère de la Transition Énergétique et du Développement Durable, DIRECTION DES CHANGEMENTS CLIMATIQUES, DE LA DIVERSITÉ BIOLOGIQUE ET DE L’ÉCONOMIE VERTE (DCCDBEV) - Etude d’Elaboration du Plan Climat Territorial -PCT- de la Région de Guelmim-Oued Noun - Mission 3: Conception et Élaboration d’un Plan d’Adaptation Prioritaire (PAP), 2022.

INFRASTRUCTURE AND THE BUILT STOCK: ENVIRONMENTAL PRESSURE

TRANSPORT

ID	10	10.1	10.3	11	11.2	11.3	11.4	11.5	11.6	12.1	NON-EBRD
INDICATOR	Average age of car fleet total and by type	%age of diesel cars in total vehicle fleet	Share of total passenger car fleet run by alternative energy	Private transport in transport modal share in commuting	Motorisation rate	Average number of vehicles cars and motorbikes per household	Kilometres of road for public transit per 100000 population	Kilometres of dedicated bicycle path per 100000 population	Share of population having access to public transport within 15min	Travel speed of bus service on major thoroughfares (daily average)	GHG emissions from transportation
LATEST YEAR AVAILABLE	2016	2023	2022	2022	2023	2023	2024	2024	2024	2024	2016
VALUE IN LATEST YEAR AVAILABLE	● >12	● 88	● < 1	● >90	● 0.05	● 0.19	● <10	● <15	● <60	N/A	49.42
TREND	N/A	Constant	N/A	N/A	● Increasing	● Increasing	● Constant	● Constant	N/A	N/A	● Increasing
EBRD-GCAP BENCHMARKS	● < 6	● < 20	● > 3	● < 30	● < 0.3	● < 0.5	● > 40	● > 25	● > 80	● > 25	N/A
	● 6 - 12	● 20 - 30	● 3 - 1	● 30 - 50	● 0.3 - 0.4	● 0.5 - 1	● 40 - 10	● 25 - 15	● 80 - 60	● 25 - 15	
	● > 12	● > 30	● < 1	● > 50	● > 0.4	● > 1	● < 10	● < 15	● < 60	● < 15	
UNITS	Years	%	%	Private transport %	Number of vehicles per capita	Number of vehicles per household	km	km	%	km/h	Tonnes CO ₂ e

The transport network in the Guelmim-Oued Noun region has been improving over the past years mainly focusing on main roads and inter-regional connectivity with the opening of a new highway connecting Guelmim to Agadir. However, there is a divide in transport infrastructure between rural and urban areas, with a lower quality secondary road network and a lack of a public transport offer across the region. This leads to a heavy reliance on private vehicles. In urban centres, walking and cycling represent an important share of journeys despite the lack of adequate active travel infrastructure.

The region's road network is organised around the RN1 national expressway, recently upgraded to improve connectivity with Agadir and between Guelmim and Tan-Tan. However, road coverage remains uneven due to geographical constraints and dispersed settlements, with poorly developed and sometimes degraded sections, particularly along the coastline between Sidi Ifni and Tan-Tan. While national roads provide access to major urban centres, many rural communes and douars remain inadequately connected, in some cases relying on wadi-bed tracks that are highly vulnerable to flooding. Climate-induced increases in flood intensity heighten the risk of recurring damage, loss of life, and economic disruption.²¹

Traffic flows are concentrated mainly between Guelmim and Tan-Tan, the region's principal hubs of economic and industrial activity, as well as between Guelmim and

Sidi Ifni for port and tourism-related travel. The vehicle fleet has expanded rapidly, doubling between 2014 and 2023²², with diesel-powered vehicles accounting for the vast majority and no electric vehicles in operation as of 2024. This growth, combined with an ageing fleet, has contributed to rising air pollution and congestion, particularly in Guelmim.

The region lacks a formal public transport system, relying instead on small and large taxis and private coach services for interregional travel, and a limited number of commune-level concession services for students and selected intra-commune routes. This deficiency reinforces isolation and social inequalities, particularly for women and children in rural areas, who often face long walking distances to access services, education, and employment. Reduced shared taxi

services following highway upgrades have further constrained village mobility, while limited transport options were found to significantly affect access to healthcare.²³

Although pedestrian infrastructure is generally adequate, continuity is lacking, and there are no dedicated cycle lanes despite growing use of bicycles and electric scooters. Ongoing and planned initiatives include the introduction of urban bus services in Guelmim, expanded inter-communal routes, school transport projects, airport and road upgrades linked to economic development, and longer-term proposals for rail connectivity (extension of the high-speed line to Marrakech and Agadir) and low-carbon mobility solutions.



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- 21. Ministère de l'Aménagement du Territoire National, de l'Urbanisme, de l'Habitat et de la Politique de la Ville, SCHÉMA DIRECTEUR D'AMÉNAGEMENT URBAIN DU LITTORAL DE SIDI-IFNI – GUELMIM – TAN-TAN, 2018.
 - 22. Agence Marocaine pour l'Efficacite Energetique (AMEE), Elaboration du Plan Regional d'Efficacite Energetique et de Decarbonation – Mission 1, 2024.
 - 23. Jamal Tikouk, Asmaa Ait Boubr, 2024, Transportation and Access to Healthcare in Morocco: An Exploratory Study of Guelmim-Oued Noun Region

ENERGY

ID	14	14.1	14.2	15.1	15.2	15.3	15.4
INDICATOR	Share of population with an authorised connection to electricity	Electrical interruptions	%age of network line losses	Share of households connected to district cooling	Share of district cooling from carbon intensive sources	Share of district cooling from less intensive carbon sources	Share of district cooling from renewable sources
LATEST YEAR AVAILABLE	2014	2024	2019	2024	N/A	N/A	N/A
VALUE IN LATEST YEAR AVAILABLE	● 93.7	● 10 - 13	● 18.00	● 0%	N/A	N/A	N/A
TREND	N/A	● Constant	● Increasing	● Constant	N/A	N/A	N/A
EBRD-GCAP BENCHMARKS	● > 90 ● 90 - 70 ● < 70	● < 10 ● 10 - 13 ● > 13	● < 5 ● 5 - 10 ● > 10	● > 50 ● 50 - 25 ● < 25	● < 10 ● 10 - 30 ● > 30	● > 75 ● 40 - 75 ● < 40	● > 50 ● 50 - 10 ● < 10
UNITS	%	# / year / customer	%	%	%	%	%

Energy provision does not pose particular challenges in the Guelmim-Oued Noun region, despite a need to upgrade and decarbonise the network to accommodate for future growth. While fully reliant on non-renewables, the Region is piloting various initiatives to decarbonise energy focusing on massive investment in renewable energy production based on the high solar and wind potential of the area.

In 2022, total energy consumption in the region reached 140.4 ktoe, driven mainly by the residential sector (40.6%), followed by agriculture and fishing (25.8%), transport (16.3%), and the tertiary sector (13.1%). Energy demand has increased steadily since 2015, with petroleum products dominating the energy mix (68.2%), ahead of electricity (18.4%) and biomass (12.9%), while renewable energy accounts for only 0.44%.²⁴ Under a business-as-usual scenario, energy consumption is projected to rise by 20.5% by 2030, reaching 169.2 ktoe.

Electricity supply relies largely on imports from Agadir and Tiznit, supported by a 115-MW diesel power plant in Tan-Tan and emergency generators in provincial capitals.²⁵ Access to electricity is nearly universal in urban areas and around 80% in rural centres; however, the distribution network is designed to meet only current demand. Transmission losses remain limited (2–4%), but power outages persist in rural douars, with 65% of households experiencing 1–3 outages per year, around one-third facing up to 12 interruptions, and durations generally under 24 hours. Harsh climatic conditions are further accelerating network degradation, reinforcing the need for grid upgrades.

Despite outstanding renewable energy potential, deployment remains limited. High solar irradiation is largely underexploited, with rooftop solar contributing less than 1% of residential energy use, although new photovoltaic plants are planned and solar pumping in agriculture is expanding. Wind capacity remains modest despite favourable conditions, with wind farms in Tan-Tan and larger projects under study.

The Region is positioning itself as a renewable energy and green hydrogen hub through large-scale solar and wind investments, green hydrogen projects in Tan-Tan, and strategic initiatives such as the Sustainable Energy and Energy Efficiency Development Programme and the “Relance Verte” programme (2025–2027). These efforts aim to reduce energy consumption and emissions while strengthening institutional capacity, inclusive value chains, and skills development in support of the regional energy transition.

24. Ministère de l'Aménagement du Territoire National, de l'Urbanisme, de l'Habitat et de la Politique de la Ville, SCHÉMA DIRECTEUR D'AMÉNAGEMENT URBAIN DU LITTORAL DE SIDI-IFNI – GUELMIM – TAN-TAN, 2018.

25. Agence Marocaine pour l'Efficacité Energetique (AMEE), Elaboration du Plan Régional d'Efficacité Energetique et de Decarbonation – Mission 1, 2024.

BUILDINGS

ID	19.4	19.5	NON-EBRD	NON-EBRD	NON-EBRD
INDICATOR	Share of new buildings with green certification	Share of buildings with energy performance certificates (EPC)	Share of electricity in the residential energy mix	Share of renewable energy in the residential energy mix	Share of energy consumption attributed to heating and cooling
LATEST YEAR AVAILABLE	2024	2024	2022	2022	2022
VALUE IN LATEST YEAR AVAILABLE	● <25	● <25	20	1	32.8
TREND	● Constant	● Constant	N/A	N/A	N/A
EBRD-GCAP BENCHMARKS	● > 50 ● 50 - 25 ● < 25	● > 50 ● 50 - 25 ● < 25	N/A	N/A	N/A
UNITS	%	%	%	%	%

The Guelmim-Oued Noun region's housing and energy consumption patterns reveal significant urbanisation and modernisation efforts, alongside challenges with aging and substandard housing. Energy consumption in both residential and tertiary sectors has increased, with a notable reliance on petroleum products and firewood, highlighting the need for sustainable practices and infrastructure improvements.

The region comprises approximately 105,400 households, nearly 70% of which are located in urban areas. The housing stock is dominated by modern Moroccan houses (80.3%) and rural dwellings (16.6%), while apartments and villas remain marginal, indicating limited real estate transformation. Housing renewal has slowed in Guelmim and Tan-Tan, while Sidi Ifni and El Ouatia have seen a recent increase in newer dwellings. A large share of housing (46%) is between 20 and 49 years old, above the national average, particularly in rural communes. Urban areas also face challenges related to informal and substandard housing. Neglected ksour and kasbahs further limit opportunities for residential reuse or tourism development.

Residential energy consumption increased from 45.4 ktoe in 2015 to 57.1 ktoe in 2022, accounting for the largest share of regional energy use. Consumption is largely dominated by LPG (63.6%), followed by electricity (20.2%) and coal (9.7%), reflecting a focus on basic household needs. Cooking represents the largest end use (44.7%), followed by domestic hot water (19%), highlighting significant potential for solar water heating. While cooling demand remains limited, rising

temperatures and living standards are expected to drive future increases, whereas heating needs are likely to remain low. The uptake of green building standards and energy performance certification is still at an early stage.²⁶

The tertiary sector consumed 18.3 ktoe in 2022, up from 13.8 ktoe in 2015, driven by growth in tourism, health, education, and traditional hammams. Public buildings account for less than 3% of total regional energy consumption. Firewood dominates the tertiary energy mix (51.5%), largely due to hammam operations, which are energy intensive and often rely on inefficient equipment. Electricity represents 48.3% of consumption, while LPG use remains marginal. Regional priorities under the Development Plan include rehabilitating historic urban fabric, integrating climate considerations into construction, and reducing building energy consumption by 15% by 2025 and 35% by 2035.

26. Agence Marocaine pour l'Efficacite Energetique (AMEE), Elaboration du Plan Regional d'Efficacite Energetique et de Decarbonation – Mission 1, 2024. Data and projections used throughout this section come from this report.

INDUSTRIES

ID	NON-EBRD	NON-EBRD
INDICATOR	Share of total energy demand by industry	Share of industrial energy consumption from renewable energy
LATEST YEAR AVAILABLE	2022	2022
VALUE IN LATEST YEAR AVAILABLE	5.6	0
TREND	N/A	N/A
EBRD-GCAP BENCHMARKS	N/A	N/A
UNITS	%	%

Despite relatively low contribution to the national economy, the Guelmim-Oued Noun region shows significant potential for industrial growth focused on food processing, ports activity and green hydrogen. The nascent tourism industry represents both an opportunity for development and a potential challenge in terms of resource management, specifically in relation to water scarcity.



The region has the lowest regional GDP in Morocco, estimated at MAD 20 billion in 2022 (1.5% of national output). Despite this, the industrial sector recorded strong growth between 2021 and 2022, with turnover increasing by an average of 40%, largely driven by seafood processing. Industrial activity is concentrated around the ports of Sidi Ifni and Tan-Tan (El Ouatia), across five main industrial zones. A further five industrial zones are planned across the region, including one currently under finalisation (El Ouatia) and four that have completed feasibility studies and are progressing towards construction. The agri-food sector dominates almost entirely, accounting for more than 99% of industrial turnover (MAD 2.93 billion in 2022), reflecting the region's dependence on fishing and fish-processing activities.^{27,28}

Industrial energy consumption reached 5.8 ktoe in 2022, with 82.3% attributable to food processing. These activities are both water- and pollution-intensive. Significant untreated domestic and industrial wastewater discharges in El Ouatia and Sidi Ifni have led to coastal pollution, posing risks to marine ecosystems, environmental heritage, and seaside tourism.

Tourism development remains limited compared to national levels, but future growth could exacerbate water scarcity, particularly in oases and rural heritage areas, while increasing solid and liquid waste beyond current infrastructure capacity. Coastal tourism expansion also risks habitat degradation through land-use change and pollution.

To support industrialisation and sustainable growth, the Region is developing economic activity zones in partnership with the Ministry of Industry and advancing large-scale renewable and green hydrogen projects. Notably, the Chbika project plans to install 1 GW of solar and wind capacity to produce green hydrogen and 200,000 tonnes of green ammonia annually for export, marking the first phase of a programme to establish a world-class green hydrogen hub.

27. Ministère de l'Aménagement du Territoire National, de l'Urbanisme, de l'Habitat et de la Politique de la Ville, SCHÉMA DIRECTEUR D'AMÉNAGEMENT URBAIN DU LITTORAL DE SIDI-IFNI – GUELMIM – TAN-TAN, 2018

28. Agence Marocaine pour l'Efficacité Energetique (AMEE), Elaboration du Plan Régional d'Efficacité Energetique et de Decarbonation – Mission 1, 2024. Data and projections used throughout this section come from this report.

WATER

ID	25	NON-EBRD	25.1	NON-EBRD
INDICATOR	Domestic water consumption per capita	Annual water deficit	Non-revenue water	Sludge safely treated disposed of or safely used
LATEST YEAR AVAILABLE	2019	2019	2024	2024
VALUE IN LATEST YEAR AVAILABLE	● 75 to ● 219	● 7	● 30	● 0
TREND	N/A	N/A	N/A	N/A
EBRD-GCAP BENCHMARKS	● N/A120 - 200 ● 80 - 120, 200 - 250 ● < 80, >250	N/A	● < 30 ● 30 - 45 ● > 45	N/A
UNITS	L / day / capita	Mm ³ /year	%	%

The water sector in Guelmim-Oued Noun region faces increasing pressures due to arid conditions, water scarcity, and the overexploitation of limited resources. Climate change, declining precipitation, and inefficient irrigation infrastructure exacerbate these challenges, impacting both drinking water supply and agricultural irrigation.

Per capita water consumption varies significantly across Guelmim-Oued Noun, reaching 219 litres/day in Guelmim city compared to just 75 litres/day in Sidi Ifni, well below the national urban average. Water supply efficiency in Guelmim stands at around 70%, with non-revenue water losses of 30% due to leaks and unbilled use. Household water supply is generally reliable (around 90%), yet many rural areas, particularly in Sidi Ifni, remain partially or fully unconnected. This fragmentation increases pressure on existing infrastructure, leading to perpetual, incidence-based O&M. While industrial water use is currently limited, demand is expected to rise with the expansion of food-processing activities in Sidi Ifni and Tan-Tan.

Agriculture is the dominant source of water stress, accounting for 85–87% of total regional consumption, mainly for traditional crops, intensive farming (3,000 ha) and livestock. Irrigation relies heavily on groundwater abstraction through boreholes, further exacerbated by inefficient irrigation systems and new well drilling.

Measures to reduce pressure include the expansion of drip irrigation to 6,000 ha, with plans to reach 10,000 ha by 2030, and a targeted reduction in agricultural demand from 3.5 to 2.9 billion m³/year.

The Guelmim aquifer (the largest) is constantly depleting due to population growth and agricultural needs. In view of the anticipated rise in population in the four main urban centres (the urban population is expected to be multiplied by 1.25 by 2030, up to 350,000 people living in urban areas from 280,000 in 2014), and assuming that the entire population of the main communes is connected to the drinking water distribution network, substantial investment will be required to supply the current and projected population with water. Population growth, combined with the projected increase in water recharge deficit, means that the current systems of potable water provision will not be able to respond to demand. According to data provided by ONEE - Water Division, the region's drinking water production reached 13.8 million m³ in 2019, primarily sourced from groundwater and the Tan-Tan desalination plant. Recent studies by the Agence Bassin Hydraulique Draa Oued Noun (ABHDON) are showing a recharge deficit of -165.9Mm³/year in the Draa Oued Noun basins, and -25.9Mm³/year in the Guelmim basin., with water levels declining of 1–2 m/year, and water flows declining from 60 litres/second in 2015 to 15 litres/second in 2024. Evaporation also leads to the loss a significant quantity of water, up to 3 Mm³ /year. Additionally, there is limited awareness among the urban population of the need for sustainable water usage and communication and awareness campaigns would need to be put in place.

Projects of additional desalination plants are on-going

or under study in Tan-Tan, Ouatia and Sidi Ifni (opening in May 2025 with initial flow rate of 100L/s to be increased to 200L/s in the future) to increase water availability in the region. In Sidi Ifni province, local communities are connected to desalinated water free of charge. A major additional desalination plant is programmed at Plage Blanche site (MAD 2.2 billion to be funded through Public Private Partnerships) which will be used for agriculture needs and green hydrogen projects. At a local scale, there is a notable example of an experimental mountain fog harvesting pilot implemented in the region by the Moroccan NGO Dar Si Hmad (DSH) and received the UN's international award for "United Nations Action on Climate Change".²⁹ National initiatives such as the National Water Strategy, the National Water Plan, and the Integrated Water Resources Development Master Plans guide efforts to secure long-term water availability.

Wastewater management remains insufficient, with 67% of urban households connected to sewers and much lower coverage in rural areas. Domestic wastewater discharge contributes significantly to pollution loads, particularly in urban basins and coastal areas. National and regional programmes aim to achieve full wastewater treatment by 2030, expand treatment plants, and promote reuse, up to 80% for irrigation. Notable initiatives include the Guelmim wastewater reuse network and lagoon-based treatment in Sidi Ifni. Innovative solutions, such as fog harvesting projects led by local NGOs, demonstrate the potential for community-based, gender-inclusive approaches to tackling water scarcity.³⁰

29. Ministère de l'Aménagement du Territoire National, de l'Urbanisme, de l'Habitat et de la Politique de la Ville, SCHÉMA DIRECTEUR D'AMÉNAGEMENT URBAIN DU LITTORAL DE SIDI-IFNI – GUELIMIM – TAN-TAN, 2018.

30. Agence du Bassin Hydraulique de Draa Oued Noun, ACTUALISATION DU PLAN DIRECTEUR D'AMÉNAGEMENT INTÉGRÉ DES RESSOURCES EN EAU DES BASSINS DE DRAA OUED NOUN, 2022.



SOLID WASTE

ID	29	NON-EBRD	NON-EBRD	30	31	31.1	31.2	NON-EBRD	NON-EBRD
INDICATOR	Total municipal solid waste generation per capita	Recycling rate (Guelmim Province)	Share of household waste recovered	Share of the population with weekly municipal solid waste (MSW) collection	Municipal solid waste treated in sorting, processing and treatment plants	Municipal solid waste disposed in open dumps	Municipal solid waste disposed in EU-compliant/equivalent sanitary landfills	Number of illegal dumps	Number of illegal landfills remediated
LATEST YEAR AVAILABLE	2024	2024	2019	2024	2024	2024	2024	2019	2017
VALUE IN LATEST YEAR AVAILABLE	● ≈210	● 3%	● 0%	● 60-70%	● 0%	● 100%	● 0%	● 58	10
TREND	● Increasing	N/A	● Constant	● Increasing	● Constant	● Constant	● Constant	N/A	● Increasing
EBRD-GCAP BENCHMARKS	● < 300 ● 300 - 500 ● > 500	● > 35 ● 35 - 15 ● < 15	N/A	● > 90 ● 90 - 80 ● < 80	● > 75 ● 75 - 25 ● < 25	● < 10 ● 10 - 20 ● > 20	● > 90 ● 90 - 80 ● < 80	N/A	N/A
UNITS	kg / capita /year	%		%	%	%	%	Number	Number

Solid waste management in the Guelmim-Oued Noun region is characterised by fragmented waste collection and sometimes uncontrolled disposal, presenting a risk of harm to human health and pollution of the environment via leachate runoff due to harmful waste dumping.

Municipal solid waste (MSW) generation in the region has risen slowly from about 207 kg per capita per year in 2014 to 210 kg in 2024, remaining below the acceptable threshold of 300 kg per capita. Generation rates are higher in Guelmim (218 kg/capita/year) and Tan-Tan (250 kg/capita/year). Organic waste represents 60-70% of household waste, yet segregation and recycling remain very limited, at around 3% in Guelmim and negligible levels in rural communes. With population growth and rising living standards, MSW volumes are expected to increase, increasing pressure on

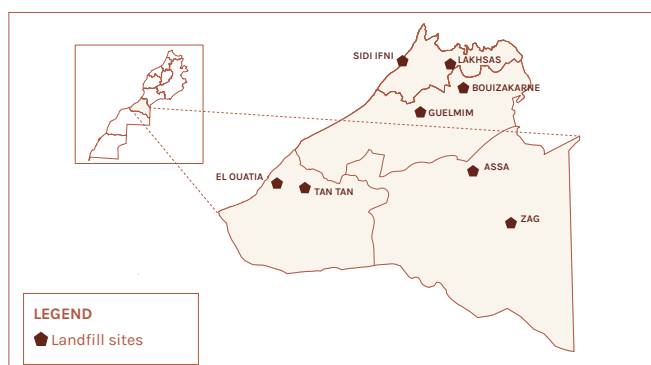


Figure 20. Map of landfill sites in Guelmim-Oued Noun region, SIREDD, 2025

waste management systems.³¹

Waste collection coverage varies significantly across the region. Assa-Zag, Sidi Ifni and Tan-Tan report regular urban collection. Guelmim achieves full collection in the urban core but less than 50% in surrounding communes. The private operator Ozone, active since 2014, manages door-to-door collection in urban areas, while disposal in rural zones remains largely informal. The Region relies on a single controlled landfill in Guelmim, while there are several unmanaged and illegal

dump sites across the provinces, particularly in Assa-Zag, which pose environmental and public health risks.

To address these shortcomings, Regional Master Plans aligned with the National Waste Strategy (2019-2030)³² promote the development of Environmental Valorisation Centres to recover value from recyclables in Sidi Ifni and Tan-Tan, with environmental impact assessments approved in 2021 and 2023 respectively. The Region also prioritises the remediation of illegal dumps and the formalisation of disposal through transfer stations. Provincial plans set progressive targets for improved collection and recycling, including achieving up to 20% waste recovery by 2030, expanding inter-communal collection systems, and developing new EU-compliant sanitary landfill infrastructure, notably in Sidi Ifni.

31. Royaume du Maroc, Haut-Commissariat au Plan, Direction Régionale de Guelmim, Monographie Régionale Guelmim-Oued Noun, 2022. https://www.hcp.ma/region-guelmim/docs/docs/monographie_regionale_2022.pdf

32. Royaume du Maroc, Ministère de la Transition Énergétique et du Développement Durable, Stratégie Nationale de Réduction et de Valorisation des Déchets, 2019. [Stratégie Nationale de Réduction et de Valorisation des Déchets](https://www.hcp.ma/region-guelmim/docs/docs/monographie_regionale_2022.pdf)

LAND USE

ID	NON-EBRD	NON-EBRD	NON-EBRD
INDICATOR	Population density	Average distance to nearest paved road in rural areas	Average annual growth rate of urban population
LATEST YEAR AVAILABLE	2024	2014	2024
VALUE IN LATEST YEAR AVAILABLE	7.7	2.72	1.4
TREND	N/A	N/A	Increasing
EBRD-GCAP BENCHMARKS	N/A	N/A	N/A
UNITS	Residents/km ²	Km	%

Urban growth in the Guelmim-Oued Noun region is uneven across its provinces, with planning efforts struggling to keep pace with rapid urbanisation in core cities. The urban expansion characterised by both extension and densification is putting pressure on existing infrastructure and services.

In 2024, urbanised land accounted for just 0.2% of the Guelmim-Oued Noun region, with the region dominated by rangelands (66%) and bare ground (29%). Despite this, the main urban centres have expanded substantially since 1990, particularly Guelmim (+172%) and Tan-Tan (+73%), with more moderate growth in Sidi Ifni (+27%).

The urban area of Guelmim is predominantly residential with mixed-use areas and a dense built-up environment. Growth has mainly taken place through expansion of the urban footprint, by building new residential neighbourhoods, rather than densification of the existing ones. This has occurred primarily in the northeastern part of the territory along the Rocade, which serves as a bypass. Wadis and mountains have constrained land expansion, but urbanization now continues on the other side of the Oum Laâchar wadi, along national roads 1 and 21. In the southern part of Guelmim, urban expansion has continued along National Road 12 and now reaches the Oued Seyad.³³ Based on observations from site visits, these new developments often lack basic infrastructure such as roads and sidewalks while there is a significant prevalence of unfinished build up plots. This lack of infrastructure can create additional pressure on the environment through soil erosion, poor drainage, dust and potential waste accumulation notably from construction.

Sidi Ifni's location between the mountains and the ocean, and the amount of land held for military purposes (approximately 70% of total municipal extent), significantly constrained its growth over the last decades. To the south, industrial and port activities also act as a barrier. As a result, the part of the commune located south of Route Nationale 12 has undergone little change since 2004, apart from some marginal growth towards the mountain range and in Al Mohite district.³⁴ The centre of Tan-Tan commune

is composed of mixed housing, with commercial activities clustered along the main thoroughfares. Urban growth in Tan-Tan has mainly taken the form of several separate new neighbourhoods built on the fringe of the urban core, mostly along Route Nationale 1.³⁵

Despite recent growth, and driven by an ongoing migration to urban centres, the cities of Guelmim and Tan-Tan are facing increasing housing demand, with an estimated provision of respectively 1,000 and 500 new homes a year to keep up with population growth.³⁶ This is leading to an increase in illegal housing and gaps in terms of basic infrastructure and superstructure facilities linked to services in these urban areas. A coordinated approach to the planning and expansion of urban centres has been hindered by the absence of a municipal or regional land reserve, while fragmented property and ad-hoc new developments make control on density and infrastructure delivery more challenging. Green belts on public land, such as the one in Guelmim, are being used as a mean to constrain sprawl, and increase green space provision. Insights gathered from interviews with stakeholders highlighted that densification is also not culturally well accepted, with the local population aspiring to individual housing ownership based on the traditional Moroccan house model.

33. Ministère de l'Aménagement du Territoire National, de l'Urbanisme, de l'Habitat et de la Politique de la Ville, SCHÉMA DIRECTEUR D'AMÉNAGEMENT URBAIN DU LITTORAL DE SIDI-IFNI – GUELMIM – Tan-Tan, 2018.

34. Ministère de l'Aménagement du Territoire National, de l'Urbanisme, de l'Habitat et de la Politique de la Ville, SCHÉMA DIRECTEUR D'AMÉNAGEMENT URBAIN DU LITTORAL DE SIDI-IFNI – GUELMIM – Tan-Tan, 2018.

35. Ministère de l'Aménagement du Territoire National, de l'Urbanisme, de l'Habitat et de la Politique de la Ville, SCHÉMA DIRECTEUR D'AMÉNAGEMENT URBAIN DU LITTORAL DE SIDI-IFNI – GUELMIM – Tan-Tan, 2018.

36. Ministère de l'Aménagement du Territoire National, de l'Urbanisme, de l'Habitat et de la Politique de la Ville, SCHÉMA DIRECTEUR D'AMÉNAGEMENT URBAIN DU LITTORAL DE SIDI-IFNI – GUELMIM – Tan-Tan, 2018.

The Guelmim-Oued Noun region faces significant environmental challenges due to rapid and uneven urban growth, which has led to increased pressure on natural resources and the environment. Key initiatives, such as the Coastal Law No. 81-12 and the Urban Development Master Plan (SDAU – Phase 1), aim to mitigate these impacts by protecting coastal areas and promoting sustainable urban development. Future actions should

focus on enhancing green infrastructure, improving waste management systems, and fostering community engagement in environmental preservation efforts.

To address these challenges, the Regional Development Programme 2022-2027 has invested more than MAD 3.5 billion in urban upgrading and regeneration, including the preservation of Guelmim's medina and

renewal projects in Assa, Zag, and Sidi Ifni. Along the coast, increasing development pressure linked to tourism, ports, and fisheries has prompted the adoption of a dedicated Urban Development Master Plan, which proposes construction-free coastal buffers and inland setbacks to protect sensitive sites and curb urban sprawl.³⁷

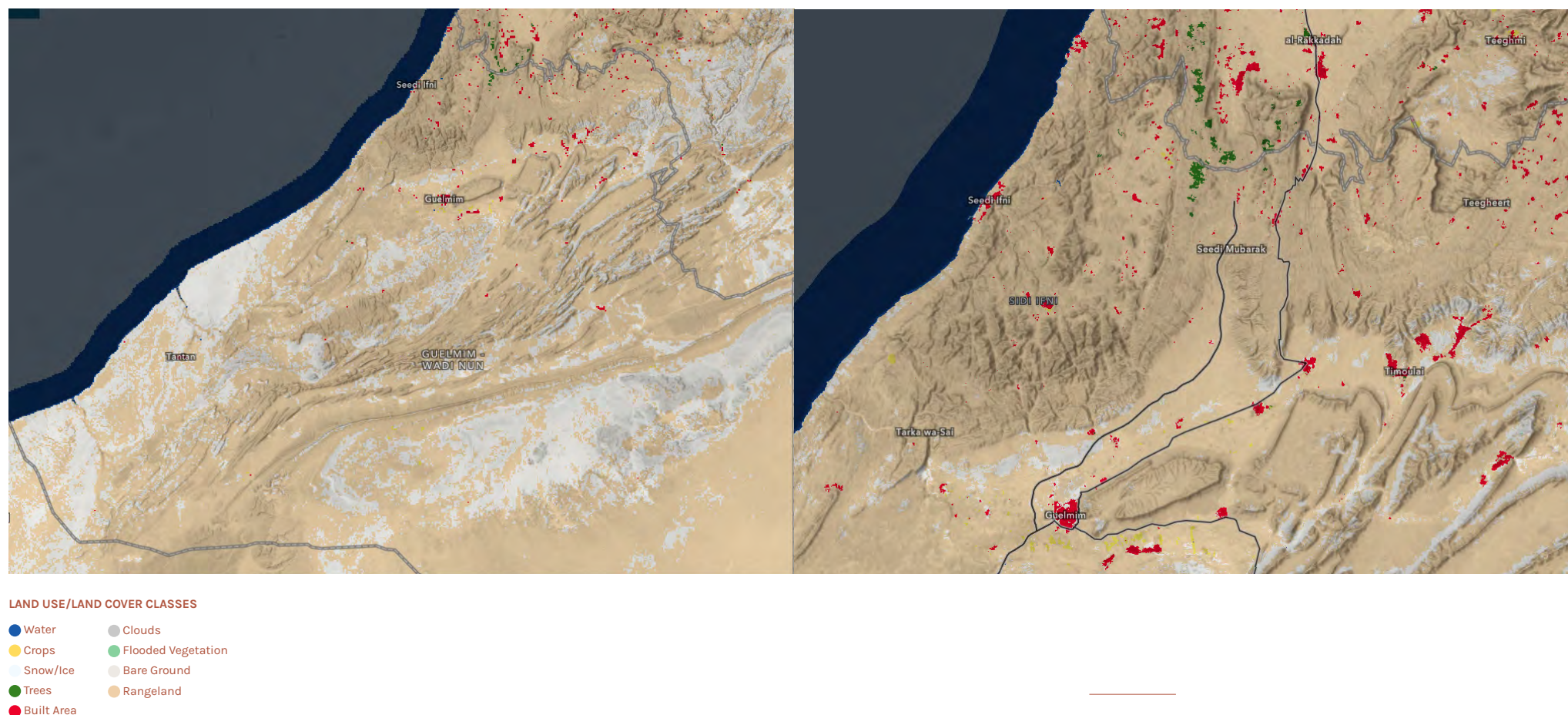


Figure 21. Map of Guelmim-Oued Noun region's land use (left) and close-up (right), ESRI Sentinel-2 Land Cover Explorer, 2024

37. Ministère de l'Aménagement du Territoire National, de l'Urbanisme, de l'Habitat et de la Politique de la Ville, SCHÉMA DIRECTEUR D'AMÉNAGEMENT URBAIN DU LITTORAL DE SIDI-IFNI – GUELMIM – TAN-TAN, 2018.

DIGITAL MATURITY

The Guelmim-Oued Noun region is still at an early stage in its smart development and digital transformation journey.

While some digital initiatives are emerging, they remain fragmented, mostly driven by national programs or external actors, and there is currently no dedicated governance structure within the Regional Council tasked with leading or coordinating smart integration (SI) or digital transformation (DT).

Unlike some other regions or cities in Morocco that have created commissions or digital governance units, the region does not yet have an office or formal mechanism specifically dedicated to steering the Region's digital agenda. There is no designated department, strategic roadmap, or cross-sectoral coordination body at the regional level to integrate digital transformation into governance or service delivery systems. Digital advancement remains largely driven by isolated projects or national platforms.

In terms of budgeting, there is no specific regional budget line exclusively allocated to digital or smart development. A few development projects include digital components, such as the digitalisation of investment services at the Regional Investment Centre (CRI), or the development of digital platforms by the Regional Tourism Council. However, these remain limited in scope and are neither coordinated under a single strategy nor tied to a comprehensive funding framework for regional digital transformation.

The internal IT function within the Regional Council is primarily focused on routine technical support and administrative operations, including maintaining digital interfaces with national platforms (e.g. GID system for state-region coordination, HR systems, and document workflows). It plays a largely reactive and support-oriented role, rather than actively participating in the design or implementation of smart initiatives.

Some nascent ambitions do exist at the political and administrative levels, particularly in connection with the Region's territorial marketing efforts. Discussions are underway around positioning the region as a more attractive destination for investors and tourists through future digital platforms and open data initiatives. However, as of now, these ideas remain at the conceptual stage, with no formal governance, funding, or implementation mechanisms in place.

At the same time, digital solutions present clear opportunities to address several of the Region's core challenges. These include the use of digital tools for:

- Groundwater and aquifer monitoring to support water security
- Smart energy management systems to optimise the integration of renewable energy sources
- Smart irrigation technologies to improve water-use efficiency
- Demand-responsive transport solutions to improve mobility and service access across sparsely populated and dispersed settlements

To fully unlock these opportunities, digital transformation must be matched by equitable access across the region. The HCP 2024 census shows regional internet usage at 62.8% (slightly above the national average of 59.6%) but

this masks disparities. Around 33% of residents live in rural areas, where internet usage drops to 40.4% compared to 70.2% in urban areas. Household-level data from the ANRT 2023–2024 ICT survey shows a similar divide, with access reaching 93.2% of urban households but only 78% of rural households. While women represent 55% of internet users nationally, this signals an opportunity to expand digital participation, particularly given low female economic activity in the region (37.3%). These gaps highlight that digital transformation must advance alongside improved connectivity and inclusion; without this alignment, communities cannot fully benefit from new smart services.

EMERGING CHALLENGES AND THEIR INTERDEPENDENCY WITH ENVIRONMENTAL IMPACTS

The Guelmim-Oued Noun region is facing a number of inter-connected challenges which exacerbate impacts on its environment. Table 4 summarises the findings from the literature and data collected as part of the baseline, and insights from the stakeholder engagement undertaken throughout the preparation of the GCAP.

ENVIRONMENTAL IMPACTS		WATER BODIES		WATER AVAILABILITY AND USE		SOIL			GREEN SPACES		BIODIVERSITY AND ECOSYSTEMS			AIR QUALITY		MITIGATION (GHG EMISSIONS)			ADAPTATION		
SECTORAL CHALLENGES (PRESSURE)		Declining quality of ground water - High salinity and conductivity levels	Contamination	Water stress / declining reservoir filling rate and aquifer recharge rates	Disparity between water access in Guelmim-Oued Noun Region	Desertification, erosion and stiltng of oases	Declining quality of soils	Contamination	Low green space provision in towns and villages	Desertification of oases	Decline in number of species (trees, birds)	Degradation of coastal ecosystems	Degradation and decline of traditional crops	Pollution due to particulate and dust	Odour	Rising emissions from buildings and energy	Rising emissions from transport	Rising emissions from waste	Low resilience to water stress	Increased risk of stormwater flood	Increased heat stress, indoors and outdoors
WATER	Overexploitation of groundwater, particularly by agriculture																				
	Lack of efficient sewage system																				
	Uneven connection to water distribution network																				
	Infiltration and pollution of groundwater notably by fertilisers																				
	Limited usage of treated wastewater for irrigation of green spaces and other uses																				
	Moderate non-revenue water rates (30%)																				
ENERGY	High reliance on fossil fuel																				
	Energy grid unable to accommodate future growth																				
	Lack of current exploitation of renewables potential																				
TRANSPORT	Lack of public transport and high dependency on cars																				
	Low provision of active travel infrastructure, limited to urban centres																				
	Lack of measures to support electric or low carbon mobility																				
LAND USE	Rapid growth of main urban centres																				
	Fragmented private ownership of land outside consolidated urban centres																				
	Growing tourism development in coastal areas																				

Table 4. Sectoral challenges and environmental impacts in the Guelmim-Oued Noun region

ENVIRONMENTAL IMPACTS		WATER BODIES		WATER AVAILABILITY AND USE		SOIL		GREEN SPACES		BIODIVERSITY AND ECOSYSTEMS			AIR QUALITY		MITIGATION (GHG EMISSIONS)			ADAPTATION		
SECTORAL CHALLENGES (PRESSURE)	Declining quality of ground water - High salinity and conductivity levels	Contamination	Water stress / declining reservoir filling rate and aquifer recharge rates	Disparity between water access in Guelmim-Oued Noun Region	Desertification, erosion and stilting of oases	Declining quality of soils	Contamination	Low green space provision in towns and villages	Desertification of oases	Decline in number of species (trees, birds)	Degradation of coastal ecosystems	Degradation and decline of traditional crops	Pollution due to particulate and dust	Odour	Rising emissions from buildings and energy	Rising emissions from transport	Rising emissions from waste	Low resilience to water stress	Increased risk of stormwater flood	Increased heat stress, indoors and outdoors
	No sorting and recycling facilities																			
	Minimal waste segregation at source																			
	Fragmented waste collection rates																			
	Uncontrolled waste disposal																			
	Lack of treatment of domestic effluents in rural areas																			
	Solid waste leaching to groundwater																			
BUILDINGS	Increasing energy consumption in buildings from non-renewable sources																			
	Poor water management and water efficiency in buildings																			
	Poor quality and aging building stock																			
INDUSTRY	Intensive use of boreholes and water from industry (fisheries processing)																			
	Discharges of untreated industrial effluent																			
	High reliance on fossil fuel																			
CLIMATE HAZARD	Decreasing rainfall combined with extreme downpours																			
	Increasing frequency of heatwaves																			

03

Regional
vision and
strategic
goals

The Guelmim-Oued Noun region will leverage its natural and cultural assets to build resilient communities and a thriving green economy, supporting Morocco's green and inclusive transition.

Through sustainable water, energy, waste and land management, the Region will create jobs, raise living standards, and drive innovation in renewable energy and circular economy. Guided by inclusive governance and community participation, the Guelmim-Oued Noun region will become a model for climate adaptation and sustainable development in the face of rising temperatures and water stress.



Seven strategic goals (SG) underpin the vision for the Guelmim-Oued Noun region, and they guide the development of actions in addressing the region's environmental challenges. The goals have a 10-year time horizon and will also inform the monitoring and review of progress on the actions towards achieving the vision of a sustainable, attractive and thriving region.

GOAL NAME	GOAL DESCRIPTION	TARGETS
 SG1 Ensure sustainable, equitable, and resilient water management across the region.	The Region will adopt integrated water resource management to secure reliable supply for all communities while protecting ecosystems. This includes modernising distribution networks, reducing non-revenue water, and promoting efficient irrigation. The Region will strengthen resilience to drought and flooding through nature-based solutions and innovative technologies such as fog harvesting and wastewater reuse. This goal ensures that water remains a shared equitable sustainable resource supporting health, livelihoods, and climate adaptation.	In line with national objectives under NDC 3.0 and PNAEPI, the Region will expand piped drinking-water access so that all 55 communes reach at least 50% coverage by 2028, while strengthening water security through the integration of approximately 49.6 Mm³/year of desalinated water capacity by 2031. In parallel, the Region will scale up wastewater treatment and reuse, targeting 100% treatment of urban wastewater by 2031 and contributing to the national ambition of reaching 100 Mm³/year of reused wastewater by 2030, particularly for agriculture and public-space irrigation.
 SG2 Ensure universal access to clean and affordable energy and become a national leader in renewable energy and green hydrogen production.	The Region will achieve universal energy access while positioning itself as a hub for clean energy. The Region will invest in renewable generation, including solar and wind, and develop green hydrogen capacity to support Morocco's energy transition. By modernising grid infrastructure and promoting decentralised solutions, this goal ensures reliable supply, reduces emissions, and creates opportunities for economic growth through sustainable energy leadership.	Supporting Morocco's NDC 3.0 and ONEE Equipment Plan 2025–2035, the Region aims to reduce electricity distribution losses to below 10% by 2031, while contributing to the national target of 52% renewable energy in installed capacity by 2030, through grid modernisation, regional renewable integration projects, and decentralised solutions such as energy communities and agrivoltaics.
 SG3 Transition to a circular economy with zero uncontrolled dumping and high resource recovery.	The Region aims to eliminate uncontrolled waste disposal and establish a comprehensive system for sorting, recycling, and resource recovery. Investments will focus on modern waste treatment facilities, extended producer responsibility, and community awareness programmes. By fostering circular practices, the Region will reduce environmental impacts, create green jobs, and transform waste into valuable resources, contributing to a cleaner and more resilient regional economy.	In line with the NDC 3.0 and SNRVD, the Region will close and remediate at least four non-sanitary dump sites by 2030, while increasing material recovery to 20% recycling and 10% energy valorisation of municipal solid waste, eliminating uncontrolled dumping as the dominant disposal practice.
 SG4 Build an inclusive, low-carbon, and accessible transport system connecting all communities.	This goal promotes a shift towards sustainable mobility through expanded public transport, active travel infrastructure, and progressive electric vehicle integration. The Region will prioritise connectivity between urban and rural areas, ensuring equitable access for all residents. Intelligent transport systems and intermodal hubs will enhance efficiency, while micro-mobility and shared services will reduce emissions. The result will be a safer, inclusive, and low-carbon transport network that supports social and economic integration.	Aligned with EBRD Green Cities methodology benchmarks and SNEE, the Region aims to ensure that at least 80% of the urban population has access to public transport within 15 minutes by 2031, while reducing transport-related GHG emissions over the same period, contributing to the national objective of reducing transport energy demand by 24% by 2030.
 SG5 Promote green, and climate-adaptive urban development while protecting ecosystems.	Urban growth and upgrading will be shaped by clear sustainability and climate resilience principles. The Region will use green infrastructure and high-quality public space as core tools to manage heat, water, and risk, rather than as add-ons. Planning will actively reduce exposure to flooding and extreme heat, particularly for vulnerable communities. Protecting ecosystems and biodiversity will be embedded in how development decisions are made, ensuring growth strengthens – rather than erodes – the natural systems the Region depends on. This approach supports inclusive, liveable places that work within environmental limits.	In line with the EBRD Green Cities methodology benchmarks and the Regional Development Plan, the Region aims to increase the provision of public green space to at least 10 m² per inhabitant in provincial capitals by 2031, alongside the creation or rehabilitation of a minimum of 20 inclusive public spaces that reduce heat stress and flood risk while improving urban liveability.
 SG6 Retrofit and build climate-resilient, energy-efficient infrastructure for all.	This goal focuses on upgrading existing buildings and constructing new infrastructure to meet high standards of energy efficiency and climate resilience. Measures include deep renovation, passive cooling, and integration of renewable energy systems. Public assets will serve as pilots, driving adoption across residential and commercial sectors. By reducing energy demand and enhancing durability, the Region will lower emissions, improve living conditions, and safeguard assets against future climate risks.	In line with the NDC 3.0 and the SNEE, the Region aims to retrofit at least 50 public buildings by 2031, integrating energy-efficiency measures and on-site renewables, and to contribute to a 14% reduction in building-sector energy consumption by 2030.
 SG7 Build a more gender-inclusive Region.	The Region will embed gender equality across all sectors, ensuring that women and men benefit equally from investments and opportunities. Actions will include gender-sensitive planning, capacity-building programmes, and support for female participation in decision-making and green jobs. By addressing barriers and promoting inclusion, this goal strengthens social equity and harnesses the full potential of the region's population for sustainable development.	Through implementation of the Gender Action Plan, the Region aims for women to account for at least 50% of paid traineeships and beneficiaries of green finance and start-up support under GCAP actions by 2031.

Table 5. Guelmim-Oued Noun Regional GCAP seven strategic goals and descriptions

04

Regional green city actions

Overview

There are 29 actions in this GCAP, representing the activities prioritised by the Region to achieve the vision of a resilient and inclusive Guelmim-Oued Noun region (Figure 24). These build on the different dimensions and pillars of the Regional Development Plan (PDR) 2022 – 2027 to ensure a coordinated approach to infrastructure investment in the region. The GCAP prioritises sustainable water management through integrated solutions that enhance supply security, reduce losses, and improve resilience to drought and flooding. Actions include modernising networks, promoting reuse, and deploying nature-based approaches to safeguard ecosystems. Waste management is another priority for the plan, with actions driving the creation of a comprehensive sorting and recycling system for the region. Improving transport follows closely, with measures to improve road infrastructure, develop active travel networks, and expand public transport provision making mobility safer and more sustainable. Land use interventions aim to modernise and upgrade urban and rural areas, develop green infrastructure and preserve natural areas while supporting eco-tourism. Finally, the plan advances clean energy by expanding renewable generation, modernising grids and preparing for future growth and needs.

Gender inclusion and equality are integrated across all interventions, ensuring equal access to services, meaningful participation in decision-making, and targeted training for women in green and emerging sectors. By consolidating gender-responsive measures into a single, coordinated framework, the Gender Action Plan (GAP) brings together actions related to participation,

safety, accessibility, skills development, financial inclusion and awareness-raising, ensuring that gender considerations are applied consistently throughout the GCAP. This structured approach strengthens alignment with Strategic Goal 7 and enables the Region to deliver inclusive and equitable urban development in a systematic, measurable and scalable manner.

This ambitious GCAP equals a total potential CAPEX investment of an estimated MAD 18.3 billion (EUR 1.7 billion) over a time horizon of 10 years. It is estimated that the OPEX of the actions combined will reach MAD 5 billion (EUR 485 million) over the next five years. The estimates of costs presented in the document are intended to show the potential scale of investment which could be deployed in each sector and for each of the actions. It is estimated that more than 5,900 direct jobs will have the potential to be created within the local economy, and the actions represent a significant opportunity to nurture innovation, supporting local startups as well as involving local craftsmanship.

The actions will significantly contribute to increasing the region's urban and climate resilience. 16 actions will help reduce water stress, adapting Guelmim-Oued Noun's natural and built environment to the impacts of both drought and extreme weather events such as floods. An estimated MAD 2.7 billion (EUR 250 million) is earmarked for actions that will mitigate heat risk in urban and rural areas, these include an urban greening programme in all provinces and deep renovations of public buildings, including rooftop solar photovoltaic panels, and solar thermal systems. While responding to the region's

most pressing challenges, the plan aims at preventing infrastructure failure and obsolescence, through a context-sensitive upgrade and expansion of all water, waste, transport and energy networks.

This Regional GCAPs also represents an important opportunity to decarbonise Guelmim-Oued Noun's infrastructure and urban systems in line with the goals of the Paris Agreement and Morocco's NDC 3.0 commitments. The region's emissions are projected to grow from around 3.3 MtCO₂eq per capita in 2019 to 3.7 MtCO₂eq per capita in 2050 under a business-as-usual emissions scenario. Based on its GHG emissions and national income status in 2019, Guelmim-Oued Noun was assigned the Paris-aligned the Late Peak trajectory, which involves a 2% reduction from baseline emissions by 2030 before full decarbonisation in 2050. GCAP actions are expected to save around 730,000 tCO₂eq per annum assuming they are all implemented in full, which represents 65% of the required emissions reductions between business-as-usual and Paris alignment pathways.

SOCIAL MEDIA CAMPAIGN INSIGHT



Residents stressed that rural communities must be included and that development should be shared fairly across the region. The GCAP responds through a regional, place-based approach, with actions differentiated by territory (urban, rural, coastal and region-wide) and a clear focus on improving equitable access to essential services and opportunities.

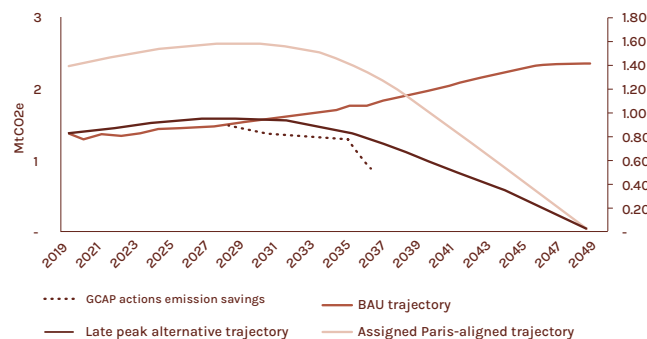


Figure 22. Summary of GHG emission trajectories

Alignment with national targets is reflected in the targets associated with individual GCAP actions, which are aligned with Morocco's national commitments, including the Nationally Determined Contribution (NDC), and reflect the level of ambition required to support the country's long-term climate and sustainability objectives. In several cases, the scale of national targets exceeds what can be delivered through the GCAP actions alone within the plan's timeframe and mandate. The GCAP should therefore be understood as a key regional contribution to these national objectives, rather than their sole delivery mechanism. GCAP actions are designed to make a meaningful and measurable contribution towards national targets, while operating alongside wider national programmes, sectoral investments and private-sector initiatives that together will be required to achieve the full ambition set out in the NDC.

QUANTIFYING ACTION COSTS AND BENEFITS METHODOLOGY APPROACH

OVERVIEW

The investment and impact figures in this Regional GCAP are designed to give a clear sense of the scale of opportunity ahead. They highlight the level of ambition required to close infrastructure gaps, improve essential services, and help Guelmim-Oued Noun achieve its sustainable development vision.

These high-level estimates provide a strong starting point for planning and prioritising climate action. Informed by available benchmarks, they offer an initial view the investment required to deliver and operate the actions of the plan, as well as their impact potential. As projects move into detailed design and preparation, more refined costings will be developed, alongside appropriate contingencies to account for economic and geopolitical uncertainties.

COSTS

Capital, operating costs and benefits estimates were developed using a combination of standard market indicators, industry benchmarks, publicly available documentation from international financial institutions, tender documentation, strategic and planning documents from Region, information from the regional and national levels of government, including relevant ministries, as well as scientific literature. In addition, selected assumptions were informed by the judgement of sectoral experts where data gaps remained.

To ensure a robust and context-sensitive approach, cost benchmarks were applied according to a geographical hierarchy, prioritising data at the level of:

1. Guelmim-Oued Noun,
2. Morocco,
3. North Africa,
4. the Middle East and North Africa (MENA),
5. Europe, and
6. the rest of the world where more local benchmarks were unavailable.

Where assumptions were required for critical cost items, these were applied transparently and conservatively in order to reflect data limitations and avoid either overstating or understating investment needs.

It should be noted that some of the proposed services and solutions may not be available in Morocco or Africa. Therefore, the costs will be similar to those indicated in the reference.

All cost estimates presented have been quoted in MAD and EUR and indexed to 2025 using the annual inflation rate provided by the World Bank. Costs associated with creating new infrastructure and purchasing necessary equipment were calculated outside Morocco and indexed using the OECD's PPP (Power Purchase Parity) index to reflect Morocco's level of economic development. Exceptions include activities related to preparing pre-investment documentation (e.g., feasibility studies and technical documentation preparation) and purchasing high-tech equipment in the digital sector (e.g., electric buses and smart meters). Operating costs have also been indexed

to reflect local labour and material costs more accurately. The GCAP was prepared based on up-to-date data obtained during its development and internal expert analyses.

CO₂ EMISSION REDUCTION

CO₂ reduction estimates were developed using the best available data, relevant scientific literature, and national as well as international benchmarks derived from comparable completed investments.

CO₂ emission trajectory tool is developed by Arup for the EBRD, it is intended to support the preparation and review of Green City Action Plans by generating two city-level emissions pathways to 2050:

- **A business as Usual (BAU) trajectory and**
- **A Paris-aligned trajectory**

The BAU trajectory represents the expected evolution of emissions in the absence of additional climate action and is based on the Kaya Identity approach, which reflects key emissions drivers such as population and income growth, while accounting for typical improvements in energy and carbon intensity.

The Paris-aligned trajectory defines the level of emissions reduction required to align with a 1.5°C pathway and achieve net zero emissions by 2050, using an approach based on Deadline 2020 and Science Based Targets principles.

The model differentiates pathways according to city-level per capita emissions and national income level, thereby

reflecting differences in capacity and responsibility to decarbonise. Within the GCAP process, the tool serves as a strategic benchmarking instrument, enabling comparison between the emissions reductions expected from planned actions and the scale of decarbonisation required.

As a forward-looking model, its results are indicative and depend on the quality of input data, assumptions, and external information available at the time of assessment.

EMPLOYMENT IMPACTS

The estimate of new jobs potentially created through implementation of the GCAP is based primarily on the study “Infrastructure and Employment Creation in the Middle East and North Africa” (International Bank for Reconstruction and Development / World Bank, 2013), which analyses the relationship between infrastructure investment (expressed in USD billions) and direct job creation across ten sectors in oil-importing countries in the MENA region. Where no suitable reference benchmark was available, job creation values were estimated based on expert judgement.

This methodology provides a consistent approach in assessing and comparing the employment effects of GCAP actions at the regional level. The estimates include direct jobs generated during the construction, implementation and initial operational phases, including associated roles in operations and maintenance and supporting services.

During its first five years of implementation, the Regional GCAP is expected to directly support the creation of new

jobs through infrastructure delivery, service provision, and related economic activity.

Beyond direct employment effects, GCAP investments are also expected to generate broader socio-economic benefits by strengthening local supply chains, improving access to services and mobility, and enhancing the Region’s overall attractiveness for private investment.

TARGETS

The targets associated with individual GCAP actions are aligned with Morocco’s national commitments, including the Nationally Determined Contribution (NDC), and reflect the level of ambition required to support the country’s long-term climate and sustainability objectives. In several cases, the scale of national targets exceeds what can be delivered through the GCAP actions alone within the plan’s timeframe and mandate. The GCAP should therefore be understood as a key regional contribution to these national objectives, rather than their sole delivery mechanism. GCAP actions are designed to make a meaningful and measurable contribution towards national targets, while operating alongside wider national programmes, sectoral investments and private-sector initiatives that together will be required to achieve the full ambition set out in the NDC. In absence of a suitable NDC targets, values were sourced from other available policies and plans, such as the PDR, or the EBRD Green City Indicators.

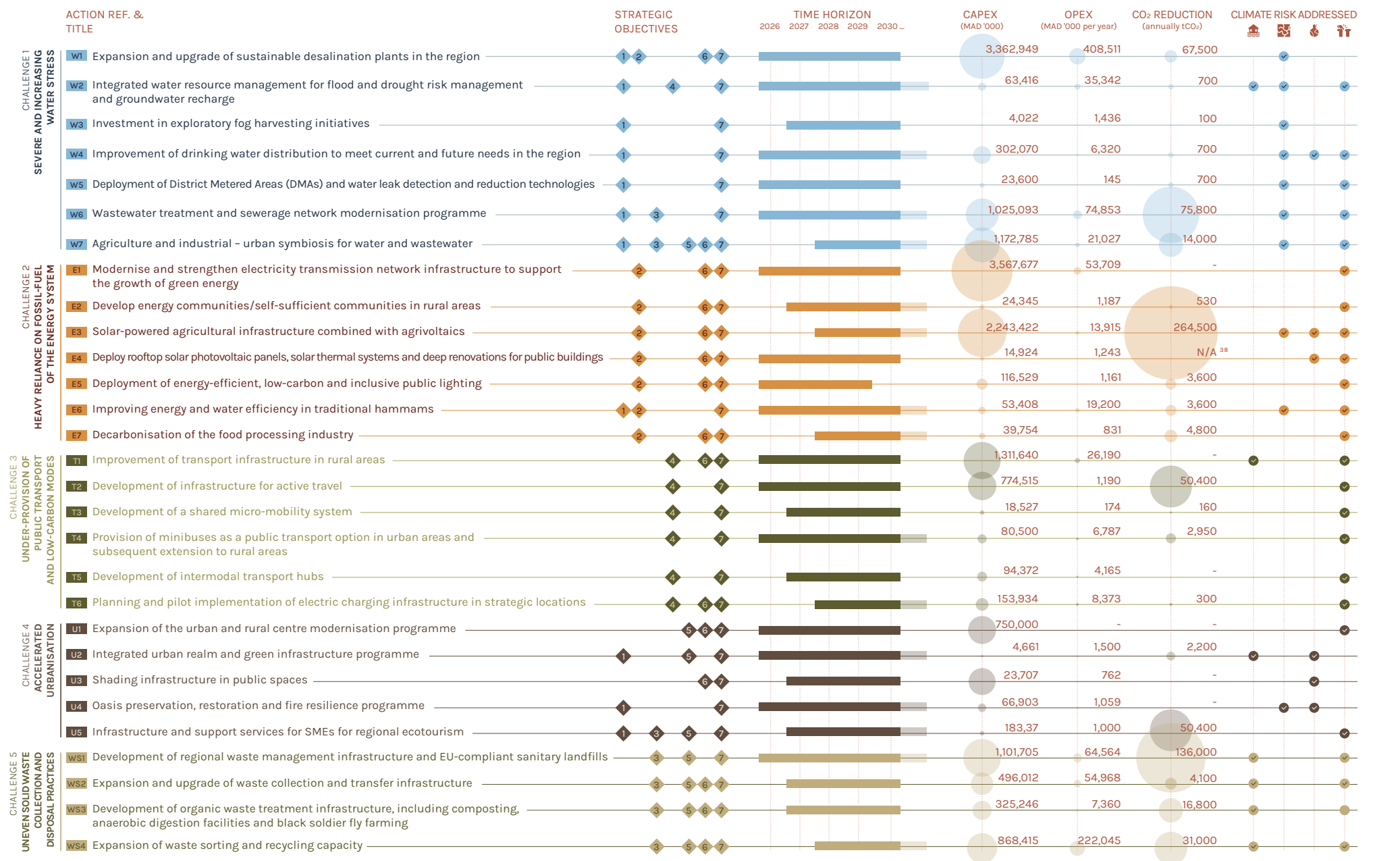


Figure 23. Summary of Regional Green City actions





38. The action comprises a technical and commercial assessment, the development of a photovoltaic programme and the creation of a dedicated fund. Any potential reduction in CO₂ emissions could only arise indirectly, for example through measures to renovate buildings. However, as information on the type, scale and number of buildings is unavailable, it is not possible to produce a reliable emissions savings estimate at this stage.

An aerial, high-angle photograph of a large circular water treatment tank. The tank is filled with water, showing some swirling patterns. A walkway with railings encircles the tank. To the right of the tank is a large, modern building with a corrugated metal roof. The entire image has a blue tint.

CHALLENGE 1

Severe and increasing water stress

CHALLENGE 1

Severe and increasing water stress

The Guelmim-Oued Noun region faces acute and worsening water stress, driven by its arid climate, low and variable rainfall (80–200 mm/year), and rising temperatures. Groundwater resources are overexploited, with a recharge deficit of 25 million m³ per year, and drinking water production reached 13.8 million m³ in 2019, mainly from groundwater and desalination plants. Climate change, declining precipitation, and inefficient irrigation infrastructure further exacerbate these pressures, impacting both drinking water supply and agricultural productivity. The region also lacks an efficient sewage system and wastewater recovery capacity, resulting in missed opportunities for water reuse and increased pollution risks.

Several entities are already engaged in addressing these water challenges. The Agence du Bassin Hydraulique de Draa Oued Noun (ABHDON) and the Office National de l'Electricité et de l'Eau Potable (ONEE) oversee water resource management, monitoring, and supply. The Regional Development Plan (PDR) 2022–2027 includes major investments in dam construction (ten dams planned, MAD 851 million), desalination plants (notably in Tan-Tan and Sidi Ifni), and the expansion of water-efficient irrigation systems. These initiatives are complemented by national programmes such as the PNAEPI and local pilot projects like fog harvesting in Sidi Ifni led by women's cooperatives.

Building on these foundations, the GCAP introduces a comprehensive package of actions to secure water resources,

enhance resilience, and promote equitable access. The following actions will be undertaken as part of the GCAP:

- To advance the **sustainability programme for desalination plants** [W1](#), efforts will focus on fast-tracking new capacity while integrating renewable energy sources into operations.
- **Integrated water resource management for flood and drought risk management and groundwater recharge** [W2](#) will involve implementing digital monitoring tools, early warning systems, and ensuring a coordinated response to both droughts and floods.
- Water supply actions will be complemented by expanding **investment in exploratory fog harvesting** [W3](#) means developing additional fog collection infrastructure in mountainous coastal regions to capture untapped water resources.
- The **improvement of drinking water distribution** [W4](#) will require extending and modernising supply networks, with a particular emphasis on rural and underserved communities.
- This will be supported by the **renovation and extension of water distribution networks** [W5](#), deploying smart metering and leak detection technologies which will help reduce non-revenue water and improve efficiency.
- The plan will also focus on water reuse, by modernising **wastewater treatment** [W6](#) through upgrading and

expanding treatment plants and sewerage networks to enable safe and sustainable water reuse.

- This will be completed by piloting **agriculture and industrial – urban symbiosis for water and wastewater** [W7](#) which will allow industries to collaborate on joint facilities that reduce pollution and support water reuse for both agriculture and industrial processes.

Together with a total investment of MAD 5,953,935,000 (EUR 555,207,000), these actions are estimated to directly support the creation of more than 2,000 jobs and help strengthen water security, support sustainable growth, and improve quality of life for all residents of the Guelmim-Oued Noun region.

Agricultural resilience and oasis preservation will be supported primarily through treated wastewater reuse, irrigation modernisation, and nature-based solutions for soil and moisture management. Any future use of desalination for agriculture should be seen as exploratory and dependent on clear technical, financial and environmental feasibility. Desalinated water is therefore recommended to be prioritised for potable and critical municipal uses.

In the long term, there is also potential for the Region to explore deployment of a network of shaded drinking water fountains [W8](#), modernisation of irrigation systems [W9](#), and techniques and implementation of water efficiency measures at the property level [W10](#).

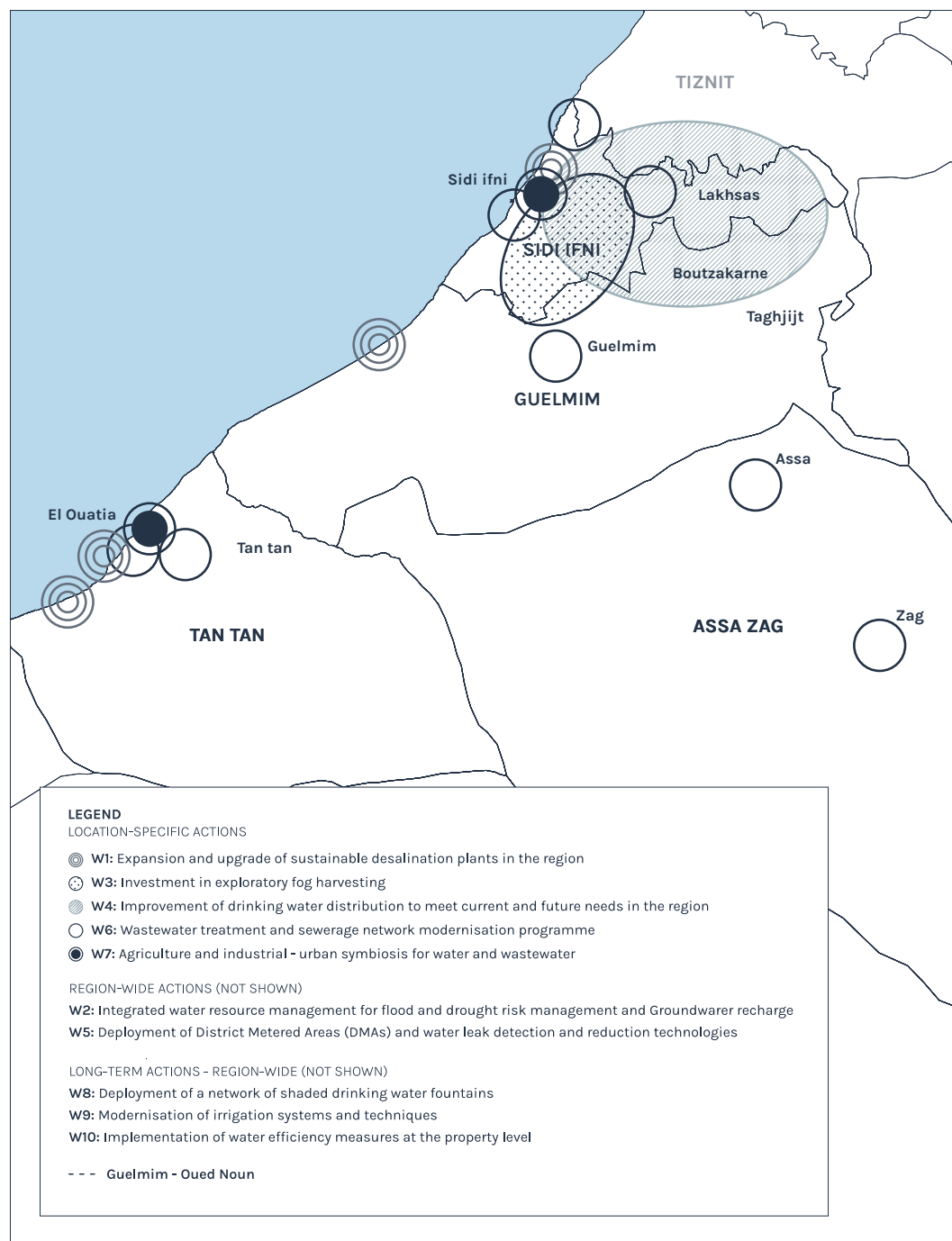


Figure 24. Proposed location plan of Challenge 1 actions

ACTION FUNCTION	ACTION REF.	ACTION TITLE	PROVINCE	SPATIAL EXTENT			
				URBAN	RURAL	COASTAL	REGIONAL
SUPPLY Actions that add new sources or recover water back into the system	W1	Expansion and upgrade of sustainable desalination plants in the region	Tan-Tan, Sidi Ifni, Guelmim				
	W2	Integrated water resource management for flood and drought risk management and groundwater recharge	All provinces				
	W3	Investment in exploratory fog harvesting initiatives	Sidi Ifni				
DISTRIBUTION Actions that ensure water reaches people effectively	W4	Improvement of drinking water distribution to meet current and future needs in the region	Sidi Ifni				
	W5	Deployment of District Metered Areas (DMAs) and water leak detection and reduction technologies	All provinces				
TREATMENT Actions that reduce pressure on water resources	W6	Wastewater treatment and sewerage network modernisation programme	All provinces				
	W7	Agriculture and industrial - urban symbiosis for water and wastewater	Sidi Ifni and Tan-Tan				

Table 6. Function and location matrix of Challenge 1 actions

W1

Expansion and upgrade of sustainable desalination plants in the region

AT A GLANCE

Upgrading existing and planned desalination plants under the National Water Plan to achieve sustainable desalination through the use of renewable energy. This will include planning and commissioning of a new desalination plant with a capacity of up to 49.6 Mm³/year to meet future population and economic growth.



SECTORS
Water, Energy and Buildings



SPATIAL EXTENT
Coastal areas in Tan-Tan, Sidi Ifni and Guelmim provinces



POLICY SYNERGIES

PDR

PDR D.2.1.1 - Management and commercialisation of the 5,000 ha irrigated perimeter supplied by seawater desalination in Chbika

NDC 3.0

ADAPTATION NDC 7: National seawater desalination programme
MITIGATION NDC 6: National solar PV and BESS storage programme to 2035

RELATED GCAP ACTIONS

W2

W7

STRATEGIC GOALS



SG1

Ensure sustainable, equitable, and resilient water management across the region



SG2

Ensure universal access to clean and affordable energy and become a national leader in renewable energy and green hydrogen production.



SG6

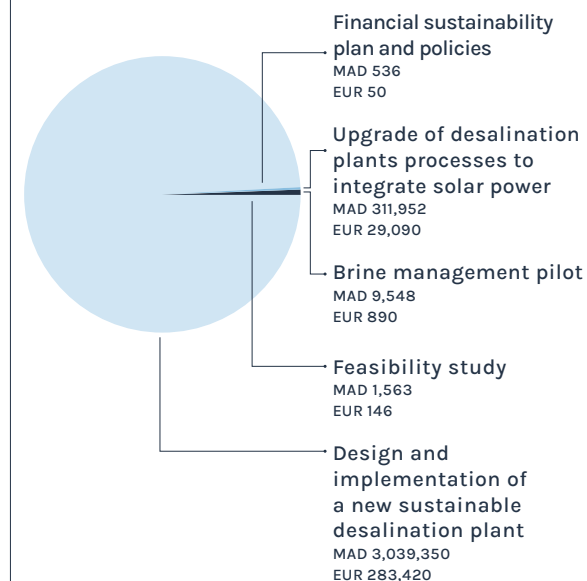
Retrofit and build climate-resilient, energy-efficient infrastructure for all.

SCHEDULE OF IMPLEMENTATION

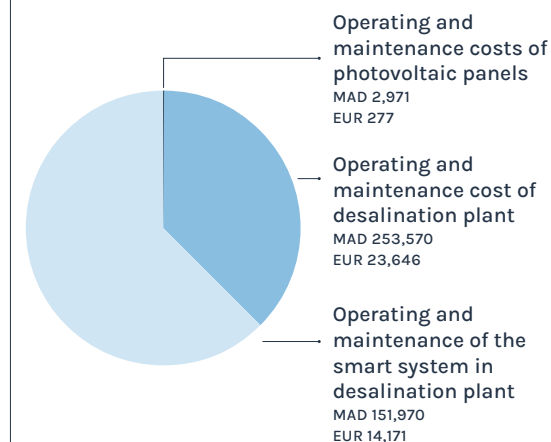
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Feasibility study						
Design and implementation of a new sustainable desalination plant						
Financial sustainability plan and policies						
Brine management pilot						
Upgrade of desalination plants processes to integrate solar power						

DETAILS ON IMPLEMENTATION³⁹

CAPEX (MAD/EUR'000)

MAD 3,362,949**EUR 313,596**

OPEX (MAD/EUR'000)

MAD 408,511 / year**EUR 38,094 / year**

ACTION OWNER**Ministry of Equipment and Water (or PPP SPV if new plant)****DELIVERY PARTNERS****PPP private operators**

Plant construction & operations

RGON

Advocacy & regional alignment

OFPP & women's**cooperatives**

Training for plant roles – per GAP

MASEN

RE integration for solar-powered desalination

Ministry of Energy, Mines and Environment

Validation

AREP

Regional project execution

ABHDON

Hydrological planning & aquifer protection

AMEE

Validation

SRM GON

Water distribution connection – operational since Oct 2025

CRI

Validation

Ministry of Interior

Approvals & coordination

ACTION DESCRIPTION**OVERVIEW**

The Guelmim-Oued Noun region faces persistent water scarcity, with a heavy dependence on groundwater sources. To address this issue, there is an urgent need to diversify water supplies and reduce pressure on conventional freshwater resources. Desalination capacity is currently being enhanced or planned in areas such as Tan-Tan, Sidi Ifni, and Plage Blanche, as part of Morocco's goal to generate 50% of its water needs from desalination plants by 2030. However, the expansion of desalination infrastructure comes with significant energy demands and environmental impacts, as illustrated by the existing plant in Mirleft currently powered by fossil fuels. The region's considerable renewable energy potential and the availability of innovative approaches offer promising alternatives. There is also potential for synergy with the five new industrial zones currently under finalisation and planned across the region, helping to anticipate future water demand

and ensure alignment with sustainable resource management principles from the outset, alongside the H2 valley initiative.

This action will develop a new sustainable desalination plant for the region, powered primarily by renewable energy and designed to leverage economies of scale for lower unit water costs compared to multiple smaller plants. It will also upgrade existing desalination processes to integrate solar power. The action will be supported by a feasibility study to identify location, feasibility of solar-powered desalination and financial sustainability. It will also look to implement smart operation and maintenance of the plants.

This can help achieve more resilient and sustainable water management in this highly stressed environment, while also improving access to clean water for underserved communities. Furthermore, such initiatives can foster inclusive employment opportunities for local communities, particularly in operation of the plants or emerging industries like the production of Sodium-Ion batteries from brine reuse.

Desalinated water will not be allocated to agriculture: agricultural uses will rely on treated wastewater reuse (W6,W7) and irrigation modernisation (W9).

ACTION COMPONENTS**FEASIBILITY STUDY**

Prior to implementation, a study will assess feasibility of solar-powered desalination, suitability in the region's context and necessity of developing additional desalination capacity within the region, recognising that despite other water sources are available, given the region's development potential and severe droughts, such infrastructure could be necessary for economic, social and environmental resilience.

A preliminary study will also be conducted to evaluate the feasibility of integrating solar power into desalination processes, including land availability.

This assessment will analyse the energy volumes required

for effective plant operation, considering regional climatic conditions and the technological requirements of solar-powered desalination. The study will also outline the necessary implementation procedures and establish an appropriate governance framework to ensure the successful realisation and long-term management of the project.

DESIGN AND IMPLEMENTATION OF A NEW SUSTAINABLE DESALINATION PLANT

The new desalination plant (assumed to be able to treat 49.6 Mm³/year, sized against the National Water Plan and PDR demand projections) will likely fast-track an already planned facility, with the addition of sustainability considerations within planned operation. The design will start by identifying possible locations for the water intake, brine discharge and plant, considering marine and environmental conditions, existing desalination plant projects at Plage Blanche or Chbikah (and the possibility of accelerating the implementation of an existing project) and the availability of electricity and other logistical means. The action will also identify appropriate energy sources and supply strategy, e.g. if renewable energy is to be used, determine whether it will be supplied by the grid or by a dedicated source.

Smart operation and maintenance of the desalination plant will use advanced digital monitoring, automation, and predictive maintenance tools. These technologies enable real-time performance tracking, early fault detection, and maintenance scheduling based on actual equipment condition, minimising downtime and improving efficiency. Together, they will ensure reliable, cost-effective, and sustainable water production.

FINANCIAL SUSTAINABILITY PLAN AND POLICIES

Desalination is generally more costly than other sources of water and a plan will be required to ensure it is as cost-effective as possible but also to ensure that water use tariffs (and potentially other income) are sufficient to make the plant financially viable. The plan should not be treated as a one-off action, but as a continuous process.

BRINE MANAGEMENT PILOT

Implement a pilot (proof of concept) only, testing discharge design and beneficial-use options (e.g., salt recovery) before any scaling decisions. Conduct a marine works study to design (length, location, anti-entrainment, etc.) the water intake and brine discharge (if no other alternative for brine reuse is identified). Environmental permitting will require hydrodynamic modelling of brine dispersion (both nearfield (immediate mixing around the outfall) and farfield (wider marine circulation)) alongside compliance monitoring to ensure salinity and water quality remain within regulatory limits during the pilot. As the pilot is delivered, opportunities for innovative brine management and salt reuse will be evaluated alongside traditional brine management solutions.

UPGRADE OF DESALINATION PLANTS PROCESSES TO INTEGRATE SOLAR POWER

The construction of two dedicated on-site solar energy systems of approximately 42 MWp is proposed in the region, supply around 60% of the plants' annual electricity from renewables, reducing reliance on the grid, lowering GHG emissions and mitigating potential energy supply constraints. Grid arrangements will be explored with MASEN/utility to balance cost and reliability. The initiative aims not only to support the operational needs of the desalination plants but also to enhance the overall sustainability and resilience of the region's water and energy infrastructure.

GENDER EQUALITY AND HUMAN CAPITAL



Targeted outreach, recruitment, training and mentoring

Partner with OFPPT (Office de la Formation Professionnelle et de la Promotion du Travail), INDH platforms, women's cooperatives, and municipal job centres to recruit women (including young women from rural communes) into paid traineeships across O&M, lab/quality control, brine-pilot monitoring,

and control-room support. Deliver short, technical modules (with ONEE/SRM/OFPPT) on desalination basics, digital operation and maintenance systems, HSE and compliance; provide transport stipends/shift options to accommodate care responsibilities; and pair each trainee with a technical mentor and a female peer mentor with a clear conversion pathway to entry-level roles. Outline pathways for further advancement, including education funding, for selected young women with interests past entry-level roles.



Safe, inclusive workplaces and procurement

Require contractors and operators to implement anti-harassment policies, provide gender-appropriate PPE/facilities, and ensure safe transport for night shifts; apply Safe Cities principles (adequate LED lighting, sightlines, signage/CCTV) on external access routes and stops; embed these in bid/contract clauses that score women's recruitment/training plans, mentoring schemes, workplace safety measures, and gender-disaggregated reporting.



Affordability

Include social tariffs or lifeline volumes for low-income households in the financial plan and, where feasible, provide community water access points governed with municipalities and social services; co-design service communications with women's groups and disseminate via SMS/radio in accessible formats.

ECONOMIC DEVELOPMENT

400 FTE jobs

DIGITAL

Smart operation and maintenance, including the use of digital monitoring systems

CLIMATE MITIGATION⁴⁰
67,500 tCO₂/year

RESILIENCE CO-BENEFITS
Drought

IMPACT INDICATORS

Desalinated water production capacity installed in the region (Mm³/year)

Baseline: 8 Mm³/year total regional production⁴¹

Target: 49,6 Mm³/year new capacity operational by 2031+ (NDC A-7)

Share of desalination capacity powered by renewable energy (%)

Baseline: 0%

Target: 70% RE-powered at commissioning

39. Feasibility study – USD 403,785, based on the City of Oceanside Water Reuse, Recycling and Seawater Desalination Feasibility Study; desalination plant – EUR 200 million for a 35 MGD seawater desalination plant, based on an EBRD desalination project in Morocco; brine management pilot – USD 2,467,232, based on the Rancho California Water District Regional Recycled Water and Groundwater Recharge Study; solar integration – USD 800,000/MWp, derived from a 2.5 MWp solar rooftop project in Casablanca costing USD 2 million; PV O&M – EUR 7,800–14,500/MW/year (average EUR 11,150/MW/year), based on BloombergNEF; desalination plant O&M – USD 1.3/l for a large-scale reverse osmosis system, selected supporting costs (e.g. financial sustainability planning and smart-system O&M) were based on Arup internal projects.

40. It was estimated assuming integration of a 10 MWp solar installation with the desalination plant, using seasonal solar yields for Agadir of 8.06 kWh/kW/day (summer), 5.68 (autumn), 4.44 (winter) and 7.37 (spring), giving an average of 6.3875 kWh/kW/day; this results in estimated annual electricity generation of 23,314,375 kWh, which was converted into avoided emissions using a Moroccan grid emission factor of 689 tCO₂/GWh

41. The baseline figures are taken from either the GCAP baseline or the PDR, unless otherwise indicated. The targets are based on the NDCs, unless otherwise stated.



W2

Integrated water resource management for flood and drought risk management and groundwater recharge

AT A GLANCE

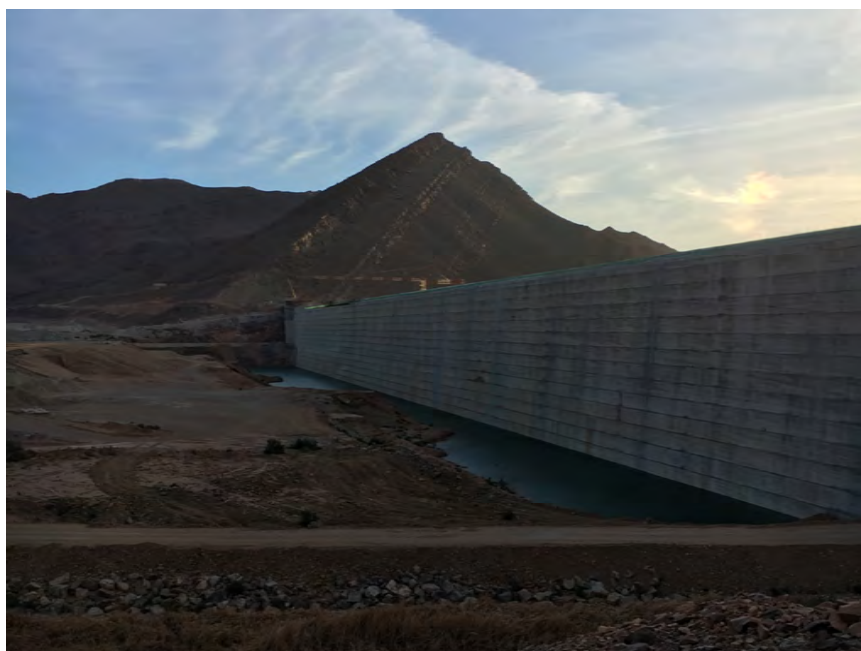
Implement integrated water resource management (IWRM) through the development of digital and data collection infrastructure to optimise water use and management in the region. Strengthen drought and flood resilience in the Guelmim-Oued Noun region by implementing a comprehensive water risk management framework. The action will focus on three interdependent pillars: vulnerability assessment, preparedness planning, and monitoring and early warning.



SECTORS
Water, Land Use



SPATIAL EXTENT
Regional



POLICY SYNERGIES

PDR

PDR C.3.1.1 – Construction of 10 hill dams (small-scale reservoirs)

PDR C.3.1.2 – Artificial recharge of the Guelmim aquifer

PDR C.3.7.1 – Flood protection programme

NDC 3.0

Adaptation NDC 3: Integrated and sustainable groundwater management.

Adaptation NDC 12: Prevention & management of floods and extreme events.

Adaptation NDC 14: National Water Information System (SNIE).

RELATED GCAP ACTIONS

W1

W3

W4

W5

STRATEGIC GOALS



SG1

Ensure sustainable, equitable, and resilient water management across the region



SG4

Promote green, and climate-adaptive urban development while protecting ecosystems



SG7

Build a more gender-inclusive region

SCHEDULE OF IMPLEMENTATION

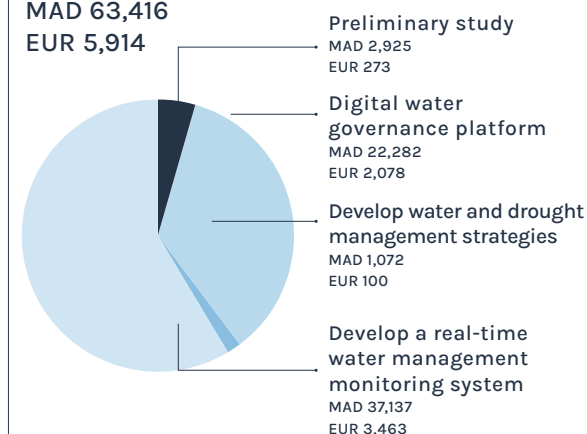
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Preliminary study						
Digital water governance platform						
Develop water and drought management strategies						
Develop a real-time water management monitoring system						
Train local institutions in data interpretation and response protocols						

DETAILS ON IMPLEMENTATION⁴²

CAPEX (MAD/EUR'000)

MAD 63,416

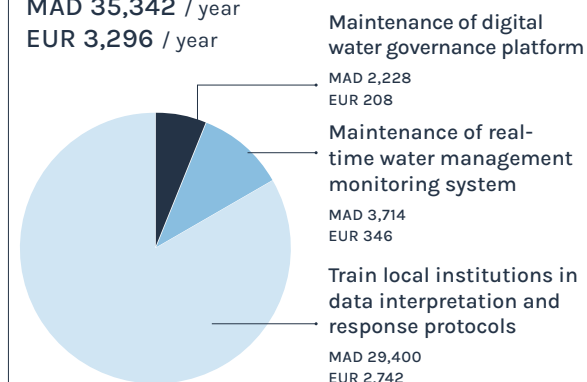
EUR 5,914



OPEX (MAD/EUR'000)

MAD 35,342 / year

EUR 3,296 / year



ACTION DESCRIPTION

OVERVIEW

The Guelmim-Oued Noun region faces severe water pressures from droughts and destructive flash floods, including the 2014 event causing MAD 6 billion in damages and

subsequent episodes. Water scarcity is worsening, with water exploitation index exceeding 100% and a 25 Mm³ annual groundwater deficit, leading to aquifer depletion. Limited data on drought impacts hampers planning, making improved anticipation and stakeholder awareness critical. Current actions include building ten hill dams and installing drip irrigation, but efforts lack coordination. Fragmented data across agencies such as AREP, ONEE-BO, and ABHDON prevents a unified strategy for managing water resources and resilience.

This action will deploy integrated water management approaches to enhance the region's resilience to climate extremes, safeguard both current and future infrastructure, and promote sustainable water availability. This will be supported by a digital water governance platform and a real-time water management monitoring system which will improve water security for underserved communities by enabling timely, data-driven responses to drought and facilitating long-term resilience planning. Importantly, these measures will also strengthen institutional collaboration and empower local stakeholders with the necessary tools and knowledge to anticipate, prepare for, and mitigate the effects of droughts and floods.

ACTION OWNER

ABH Draa-Oued Noun
Basin Agency

DELIVERY PARTNERS

AREP

Regional project execution & investment packaging

Ministry of Interior – DRI/DGCT

Civil protection & flood response

ONEE–Water Branch

Water supply infrastructure

SRM GON

Water distribution

Ministry of Equipment & Water – Hydraulic Directorates

National water policy

RGON

Regional coordination & co-financing

DELIVERY PARTNERS CONT.

Municipalities

Local flood protection

CRI

Implementation

Women, youth & local representatives

Inclusive water committees – per GAP

ACTION COMPONENTS

PRELIMINARY STUDY

Conduct feasibility and demand forecasting studies for the regional water supply system through the deployment of remote sensing and data collection infrastructure. Identify the most exposed populations, sectors and ecosystems by conducting participatory assessments with communities, mapping drought-prone areas and socio-economic vulnerabilities, and drawing on historical data on drought and its impacts. Integrate gender and social equity dimensions into vulnerability profiling.

DIGITAL WATER GOVERNANCE PLATFORM

Deploy a digital water governance platform to map water resources, drought-prone areas, stakeholders and interventions, enabling real-time coordination, transparency and adaptive management.

DEVELOP WATER AND DROUGHT MANAGEMENT STRATEGIES

Develop proactive integrated drought and water management strategies and contingency plans with responsible agencies. Activities will include promoting water-efficient technologies and climate-resilient agricultural practices, development of stormwater management infrastructure in major cities through green and grey infrastructure considering the area is dry most of the time, establishing emergency response protocols and resource mobilisation mechanisms.

DEVELOP A REAL-TIME WATER MANAGEMENT MONITORING SYSTEM

Establish a regional real-time monitoring system for surface and groundwater levels, water quality, drought and flood risks, integrated with early warning capabilities by deploying remote sensing tools and collecting meteorological data. The action aims to create a digital platform to disseminate alerts to farmers, municipalities and civil society.

TRAIN LOCAL INSTITUTIONS IN DATA INTERPRETATION AND RESPONSE PROTOCOLS

To support effective regional water management, local institutions will be trained in data interpretation and response protocols. This training will provide staff with the skills needed to analyse information from remote sensing tools, digital platforms, and monitoring systems, enabling timely interventions during droughts or floods. It will also cover emergency response procedures and resource mobilisation, empowering local actors to coordinate effectively, issue early warnings, and strengthen community resilience to climate variability.

GENDER EQUALITY AND HUMAN CAPITAL



Inclusive decision-making and risk planning

Basin and commune water committees will be updated to formally include women, youth, and local representatives (especially from high-risk communes) so local knowledge shapes drought, flood, and recharge decisions. Members will be recruited via municipal/INDH channels, inducted through a short plain-language training on IWRM and roles, and supported with practical enablers (e.g. transport reimbursement and meeting times compatible with care responsibilities).



Gender-responsive early-warning and contingency systems

Co-designed with women's cooperatives to produce simple, actionable alert messages and disseminated through multiple channels, including geo-targeted SMS, local radio, mosque and market announcements, and pictogram-based materials for low-literacy settings. Systems will be tested through regular drills and rapid phone surveys to refine timing, content and reach, particularly for women-headed households.



Women and youth as local crisis relays

Municipal emergency plans will formalise a "Local Crisis Relay" role for women and youth, with clear tasks (e.g. disseminate alerts, check on vulnerable households). Relays will receive a one-day micro-training, basic gear and phone credit during events, and recognition/stipends to support retention. Rotate opportunities so multiple young women gain experience.



Awareness-raising and practical skills for water stewardship

Targeted 90-minute micro-modules, delivered through cooperatives, INDH platforms, and schools in hotspot communes, will build practical skills on efficient household use, low-cost drought-resilient farming, soil-moisture retention, basic runoff control, and safe non-potable reuse where appropriate. Pair sessions with on-site demonstrations and follow-up calls to see which practices were adopted, to adapt content accordingly.

ECONOMIC DEVELOPMENT

45 FTE jobs

CLIMATE MITIGATION⁴³

700 tCO₂/year

RESILIENCE CO-BENEFITS

Flood/landslide, Drought,
Infrastructure failure/obsolescence

DIGITAL

- Adopt advanced monitoring: real-time data, predictive models, satellite imagery
- Improve transparency with flood risk maps and groundwater use tracking

IMPACT INDICATORS

Rise in Guelmim aquifer water table level

Baseline: Current level TBC from ABHDON monitoring

Target: Stabilisation by 2028, measurable rise by 2031+ (NDC A-3)

42. Floodplain mapping / preliminary study - USD 150,000-300,000, based on the Fayette County floodplain mapping feasibility study; digital water governance platform - USD 2.4 million, based on analogous advanced environmental monitoring solutions in Douala, Cameroon and Dakar-Plateau & Thies, Senegal; water and drought management strategies - EUR 100,000, based on Arup internal projects; real-time water management monitoring system - USD 4.0 million, based on a comparable smart water management benchmark (including the Al Ain, UAE example); control room - USD 9,000-12,000 (average USD 10,500), based on Xybix benchmark pricing; training in digital transformation / data interpretation - GBP 3,995 per course, based on The Hague Academy for Local Governance; selected O&M costs for digital systems were assumed at 5-10% of Capex, based on Arup internal projects.

43. It was estimated based on the assumption that improved water management and monitoring systems would reduce emissions associated with water losses, using the regional population of 448,000, an average household size of 4, and therefore 112,000 households; it applies a benchmark equivalent to 0.01926 tCO₂ reduction per household, and assumes that one-third (together with W4 and W5) of the total potential savings is attributable to this actions.



W3

Investment in exploratory fog harvesting initiatives

AT A GLANCE

Develop fog harvesting infrastructure in mountainous areas near the ocean (mainly in the province of Sidi Ifni) as an alternative water source through feasibility studies, investments in fog harvesting infrastructure, and capacity building for women-led cooperatives that manage and benefit from improved access to water.



SECTORS
Water, Land Use



SPATIAL EXTENT
Coastal mountainous areas in Sidi Ifni province

POLICY SYNERGIES

PDR

PDR C.3.1.2 – Artificial recharge of the Guelmim aquifer

NDC 3.0

Adaptation NDC 10: Promotion of rainwater harvesting and stormwater collection/valorisation.

Adaptation NDC 3: Integrated and sustainable groundwater management.



RELATED GCAP ACTIONS

W2

W4

STRATEGIC GOALS



SG1
Ensure sustainable, equitable, and resilient water management across the region



SG7
Build a more gender-inclusive region

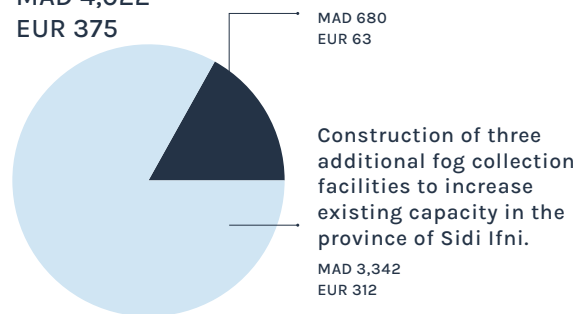
SCHEDULE OF IMPLEMENTATION

ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Scoping study						
Construction of three additional fog collection facilities to increase existing capacity in the province of Sidi Ifni						
Training and upskilling programme						

DETAILS ON IMPLEMENTATION⁴⁴

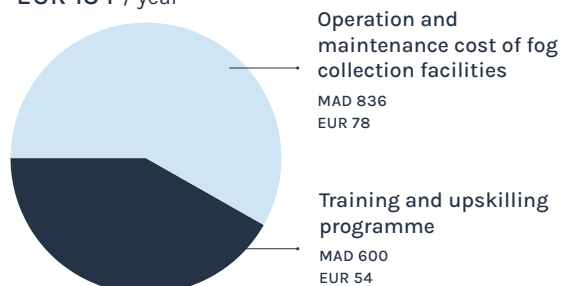
CAPEX (MAD/EUR'000)

MAD 4,022
EUR 375



OPEX (MAD/EUR'000)

MAD 1,436 / year
EUR 134 / year



ACTION OWNER

AREP RGON NGOs

DELIVERY PARTNERS

Local water user associations – AUEA
Community water governance

Municipalities
Local coordination & site access

Dar Si Hmad / specialised fog harvesting NGOs
Model replication

MTEDD
Environmental compliance

ABHDON
Hydrological monitoring

Local cooperatives – especially women-led
Operation & maintenance

Women-led cooperative governance
Building on Dar Si Hmad model – per GAP

Universities and research centres
Technical advice and monitoring

ACTION DESCRIPTION

OVERVIEW

Water scarcity is a significant challenge across the region, particularly in the remote and mountainous rural areas of Sidi Ifni province, where access is difficult and water distribution infrastructure remains limited. Only around half of rural households in the province are connected to water distribution networks, forcing many rural communities to depend on distant or unsafe water sources. To address this issue, fog harvesting has been successfully piloted in five villages of Ait Baamrane (Sidi Ifni province), with operations run by women-led cooperative Dar Si Hmad. Fog harvesting provides a low-cost, climate-resilient water source to isolated communities, significantly benefiting women and children, who traditionally shoulder the responsibility of water collection.

This action will build up to three additional fog collection facilities to increase existing capacity in the north of the region where the geological and climatic conditions offer promising potential for further expansion of this initiative. The action will be supported by a feasibility study and further training and upskilling programmes to ensure economic inclusion of beneficiaries.

ACTION COMPONENTS

FEASIBILITY STUDY

Study to determine the potential volume of water collected (m³/day), for daily uses and potential groundwater recharge and to identify optimal sites for infrastructure expansion. This will take into consideration meteorological data on fog frequency, liquid water content (LWC), wind speed and direction, and seasonal variations, typically gathered over 6-12 months. The study will also explore synergies with other nature-based solutions in terms of location and water management potential to increase resilience against seasonal variability, such as the creation of slow-forming terraces on mountainsides to reduce flood flows in periods of episodic storms that can also be used to recharge groundwater.

CONSTRUCTION OF THREE ADDITIONAL FOG COLLECTION FACILITIES TO INCREASE EXISTING CAPACITY IN THE PROVINCE OF SIDI IFNI

If additional potential is identified through the feasibility study, three additional fog collection facilities will be constructed on-site and new villages will be connected to the grid. Based on the existing fog harvesting facilities led by Dar Si Hmad, 35,000 litres are collected every day during six month of the year, covering water needs of more than 1,000 people. The additional facilities fog-trapping nets if of a similar size will capture an average of 105,000 litres of water/day, enough to service 3,000 residents.

TRAINING AND UPSKILLING PROGRAMME

Once the infrastructure is installed, support will be provided for women-led cooperatives responsible for infrastructure management and for women benefiting from easier access to water through training and skills development for economic integration.

GENDER EQUALITY AND HUMAN CAPITAL



Women-led governance and ownership of fog harvesting systems

Build on the Dar Si Hmad model by creating or strengthening women-led cooperatives to manage each fog harvesting site, with formal roles in operation, maintenance, water allocation, and reporting. Cooperative members will be selected in partnership with village assemblies and local authorities, prioritising women from beneficiary communities, and supported with basic governance training (record-keeping, transparent decision-making, and liaison with municipalities).



Targeted technical training and local maintenance capacity

Provide on-site, community-based technical training for women and youth from beneficiary villages on fog-net operation, routine maintenance, basic repairs, storage management and water-use optimisation. Training will be delivered through a series of hands-on demonstrations and supervised practice at the fog-harvesting sites, aligned with local literacy levels and supported by visual aids, pictorial manuals and colour-coded controls. This approach builds practical skills for day-to-day operation and troubleshooting, reduces reliance on external technicians, and supports continuity of service.



Digital tools and community monitoring led by women

Equip female cooperative members with mobile phones and simple reporting tools to monitor water volumes, system performance, and maintenance needs, and to communicate issues to technical partners. This formalises women's long-standing role in water management while strengthening data collection and accountability for rural water services.

ECONOMIC DEVELOPMENT

5 FTE jobs

CLIMATE MITIGATION⁴⁵

100 tCO₂/year

IMPACT INDICATORS

Number of fog collection facilities operational

Baseline: 1 existing pilot (Boutmezguida / Ait Baamrane)

Target: 3 additional fog collection facilities

DIGITAL

- Use weather data and sensors for real-time collection optimisation.
- Using mobile phones to report on the fog water system

RESILIENCE CO-BENEFITS

Drought

44. Feasibility study / project documentation – average USD 73,102, derived from four tender offers for the development of green-blue infrastructure on the Market Square in Krosno; fog harvesting infrastructure – USD 2,400 per mesh net, based on the FogQuest Morocco case study; operation and maintenance of fog collection facilities – USD 600 per mesh net per year, based on an OAS reference for fog collection systems; and training / awareness activities – MAD 100,000 for a building-user awareness project and MAD 500,000 for a school awareness programme, based on Arup internal project's benchmarks.

45. It was estimated based on avoided desalinated water production, using an assumed energy intensity of 4.5 kWh/m³ for water produced by desalination in Morocco, a grid carbon intensity of 551 gCO₂/kWh, and an annual fog water yield of 38,325 m³/year from the new harvesting facilities during the six-month collection period; this gives an avoided electricity use of 172,462.5 kWh/year.

W4

Improvement of drinking water distribution to meet current and future needs in the region

AT A GLANCE

Improvement of drinking water distribution throughout the region by extending the water supply network to achieve near 100% coverage. The action will mainly target rural areas in the province of Sidi Ifni and will be based on an assessment of drinking water supply. Monitoring and evaluation of the network's effectiveness.



SECTORS
Water



SPATIAL EXTENT
Rural areas in Sidi Ifni province

POLICY SYNERGIES

PDR

PDR B.3.3.1 – Drinking water supply programme for urban centres and rural douars in the 4 provinces

PDR B.3.1.2 – Upgrading programme for rural centres in the provinces (Phase 2)

PDR B.2.1.1 – Upgrading programme for provincial cities (Phase 2)

PDR B.5.1 – Emergency programmes for the 4 provinces (Guelmim, Tan-Tan, Sidi Ifni, Assa-Zag)

NDC 3.0

Adaptation NDC 8: Improving the performance of potable and industrial water distribution networks.

Adaptation NDC 14: National Water Information System (SNIE).

RELATED GCAP ACTIONS

W1

W2

W3

STRATEGIC GOALS



SG1
Ensure sustainable, equitable, and resilient water management across the region



SG7
Build a more gender-inclusive region

SCHEDULE OF IMPLEMENTATION

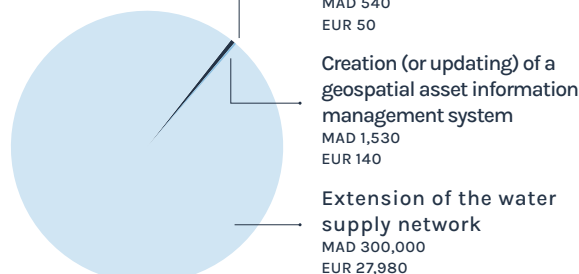
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Study on current and projected drinking water coverage						
Extension of the water supply network						
Monitoring and evaluation of network efficiency						
Creation (or updating) of a geospatial asset information management system						

DETAILS ON IMPLEMENTATION⁴⁶

CAPEX (MAD/EUR'000)

MAD 302,070

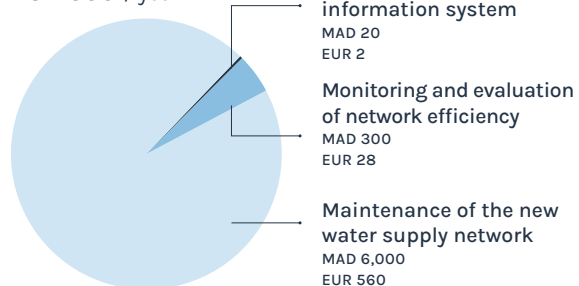
EUR 28,170



OPEX (MAD/EUR'000)

MAD 6,320 / year

EUR 590 / year



ACTION OWNER

SRM GON

Société Régionale Multiservices
Guelmim-Oued Noun

RGON

DELIVERY PARTNERS

AREP

Regional project execution

Municipalities

Local coordination and network access

Ministry of Interior – DGCT

Regulatory oversight and approvals

ABHDON

Aquifer & water resource planning

ONEE–Water Branch

Technical support & legacy system knowledge transfer

Women-headed households and nomadic communities

Prioritised network extensions – per GAP

ACTION DESCRIPTION

OVERVIEW

In the Guelmim-Oued Noun region, particularly Sidi Ifni Province, water scarcity and unequal access to safe drinking water remain major challenges, especially in rural areas where up to half of households still lack piped water and rely on public fountains. While efforts such as expanding supply networks and building a desalination plant in Sidi Ifni have improved access, coverage is far from complete. As a result, many rural residents, especially women spend significant time fetching water, limiting their participation in economic activities and reinforcing social and economic inequalities.

This action focuses on improving the distribution of drinking water by modernising outdated infrastructure and extending the network coverage to enhance water security and reduce associated health risks in the region. These improvements are expected to foster fairer access to safe water for all residents, while supporting greater economic participation and inclusion of women. Ultimately, such measures will not only address immediate water access challenges but also contribute to broader social and economic development in the rural areas of Sidi Ifni and beyond.

ACTION COMPONENTS

STUDY ON CURRENT AND PROJECTED DRINKING WATER COVERAGE

The study on current and projected drinking water coverage will assess existing supply infrastructure and service levels, focusing on rural and underserved communities. Building on work by the ABH and national plans such as the PNAEPI 2020-2027, it will identify areas lacking adequate piped water, analyse population growth, and forecast future demand. The findings will guide investment priorities, ensuring network extensions target equitable, sustainable access. The study will also evaluate the impact of recent initiatives, including the new desalination plant, on improving coverage and reducing urban-rural disparities.

EXTENSION OF THE WATER SUPPLY NETWORK

The extension of the water supply network will focus on the comprehensive implementation of the PDR's investment plan, with the objective of achieving nearly 100% regional coverage. This will involve both extending the reach of existing distribution networks and modernising outdated infrastructure in areas currently identified as underserved or lacking piped water.

MONITORING AND EVALUATION OF NETWORK EFFICIENCY

Monitoring and evaluation will apply only to the new and modernised water supply network. This will be fully integrated with W5 to enhance distribution efficiency, ensuring the expanded system delivers reliable and equitable service to all targeted communities.

CREATION (OR UPDATING) OF A GEOSPATIAL ASSET INFORMATION MANAGEMENT SYSTEM

The creation or updating of a geospatial asset information management system will help streamline the management of the region's water infrastructure. By providing accurate, up-to-date data on the location and condition and maintenance history of pipes, pumps and other key assets, this system

will make easier to plan maintenance, monitor performance and allocate resources efficiently. It will also support better commercial planning and financial forecasting through robust evidence, and by giving decision-makers a clear view of operational needs and future investment priorities. Ultimately, this approach will help ensure the continued reliability and sustainability of the water supply network, benefiting rural communities and supporting broader development goals.

GENDER EQUALITY AND HUMAN CAPITAL



Targeted prioritisation of network extensions

Use the coverage study to prioritise pipeline extensions to villages with higher shares of women-headed households, nomadic communities, and remote rural settlements. Selection criteria will be documented and validated with municipalities and social services to ensure extensions address time poverty, health risks, and unequal service access.



Inclusive water user committees and local monitoring

Formalise committees for newly served areas and reserve membership for women, with clear roles in reporting service issues, monitoring standposts/household connections, and liaising with utilities. Committee members will receive basic training on service standards, consumption tracking, and complaint escalation to ensure participation translates into influence.



Accessible outreach and awareness in local languages

Conduct targeted awareness campaigns on safe water use, billing, and service rights using local languages, and multiple channels (community meetings, radio, commune offices). Outreach will be timed and located to reach women with care responsibilities and marginalised groups, including nomadic households, reducing information barriers to connection and use.



Affordability and simplified access

Apply social tariffs or minimum lifeline volumes and simplify household connections (reduced fees, phased payments, targeted subsidies) so low-income and women-headed households can transition from public fountains to safe, reliable in-home water access.

ECONOMIC DEVELOPMENT

200 FTE jobs

CLIMATE MITIGATION⁴⁷

700 tCO₂/year

IMPACT INDICATORS

Population with access to improved drinking water source (%)

Baseline: 79.3% regional; Sidi Ifni 52%, Assa-Zag 66%
Target: ≥95% by 2030 (PNAEPI)

Number of rural centres and douars gaining access to piped drinking water

Baseline: 17/55 communes at 10–50% access; 7/55 communes <10% access; rural access 74.4% average
Target: All 55 communes >50% access by 2028 (PDR B.3.3 and NDC 3.0)

DIGITAL

Creation (or updating) of a geospatial asset information management system to improve operation and maintenance, commercial planning and financial forecasting.

RESILIENCE CO-BENEFITS

Drought, Extreme temperatures, Infrastructure failure/obsolescence

46. Study on current and projected drinking water coverage – EUR 50,000, based on Arup internal projects; extension of the water supply network – MAD 300 million, based on the PDR 2022–2027 programme, with 50% of the investment assumed to be covered under the GCAP; maintenance of the new water supply network – 2% of Capex, based on Arup internal projects; monitoring and evaluation of network efficiency – based on 2 FTEs using an average Moroccan public-sector salary benchmark of USD 1,000/month; creation/updating of a geospatial asset information management system – USD 165,000, based on the ESRI Utility Network Migration, Portal Install, and ArcGIS Enterprise Upgrade benchmark; and software subscription / system O&M – USD 1,898/year, based on the ArcGIS CityEngine Single Use Annual Subscription benchmark.

47. It was estimated based on the assumption that improved water management and monitoring systems would reduce emissions associated with water losses, using the regional population of 448,000, an average household size of 4, and therefore 112,000 households; it applies a benchmark equivalent to 0.01926 tCO₂ reduction per household, and assumes that one-third (together with W2 and W5) of the total potential savings is attributable to this actions.

W5

Deployment of District Metered Areas (DMAs) and water leak detection and reduction technologies

AT A GLANCE

Deployment of water leak detection technologies and pressure management solutions along with establishing District Metered Areas (DMAs) in urban centres, combined with property-level water efficiency upgrades and use of pipe internal re-lining, to reduce leakage and improve the efficiency of water distribution networks and minimise leaks.



SECTORS
Water



SPATIAL EXTENT
Urban areas in all provinces

POLICY SYNERGIES

PDR

PDR C.3.2.1 – Rehabilitation and extension of sewerage/water networks

NDC 3.0

Adaptation NDC 8: Improving the performance of potable and industrial water distribution networks.

Adaptation NDC 14: National Water Information System (SNIE).

RELATED GCAP ACTIONS

W4

STRATEGIC GOALS



SG1

Ensure sustainable, equitable, and resilient water management across the region



SG7

Build a more gender-inclusive region

SCHEDULE OF IMPLEMENTATION

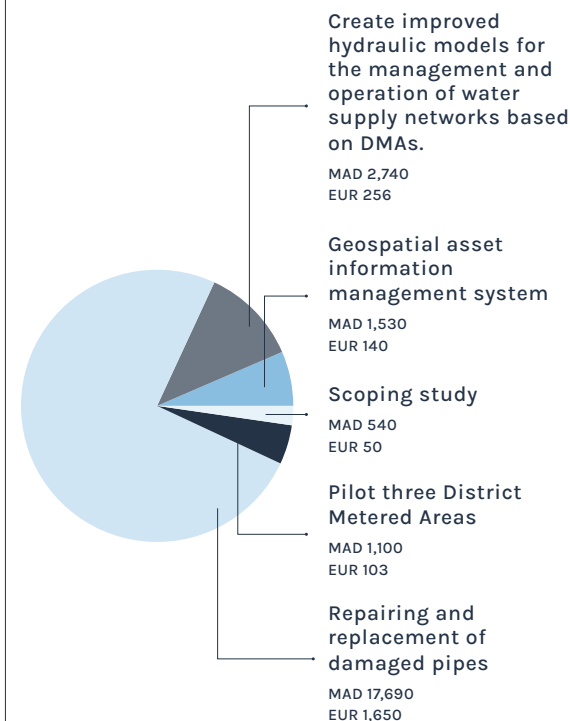
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Scoping study						
Pilot three District Metered Areas						
Property-level water efficiency programme						
Repairing and replacement of damaged pipes						
Create improved hydraulic models for the management and operation of water supply networks based on DMAs						
Geospatial asset information management system						

DETAILS ON IMPLEMENTATION⁴⁸

CAPEX (MAD/EUR'000)

MAD 23,600

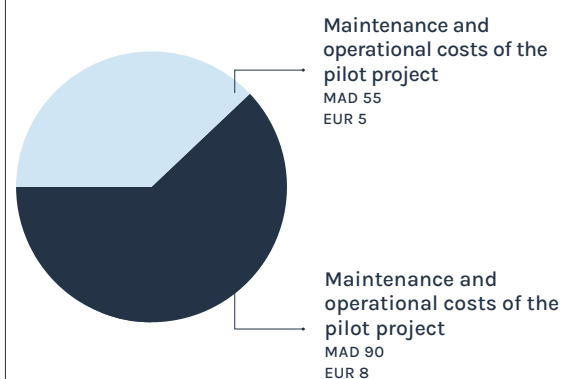
EUR 2,199



OPEX (MAD/EUR'000)

MAD 145 / year

EUR 3 / year



ACTION OWNER	
SRM	RGON
DELIVERY PARTNERS	
ONEE Technical support and legacy data sharing	Regional Council Co-financing and performance monitoring
Municipalities Local coordination and neighbourhood access	Marginalised neighbourhoods and informal settlements Fair targeting of DMA pilots – per GAP
Private leak-detection contractors Specialist technology	

ACTION DESCRIPTION

OVERVIEW

The region struggles with about 30% non-revenue water (NRW) due to combination of factors that include but not limited to ageing infrastructure, leaks, illegal connections and inefficient distribution, an issue made worse by rapid urban growth. Data gaps on leaks and infrastructure quality due among other things to lack of water meters, particularly outside urban areas, hinder targeted solutions resulting in notable water losses amid ongoing scarcity and drought risks.

This action focuses on reducing NRW to improve potable water availability, aiming to lower leakage and contamination, and enhance reliability through network upgrades such as District Metered Areas (DMAs). Addressing these issues will support long-term water sustainability, with targeted upgrades expected to minimise losses and provide a more dependable supply to the fast-growing region.

ACTION COMPONENTS

SCOPING STUDY

Conduct a study to understand the existing network, identify critical loops and segments of the network that can be effectively monitored, and determine key areas for infrastructure repair and modernisation.

PILOT THREE DISTRICT METERED AREAS

Regulate pressure to reduce damage by trialling three permanent district metering zones in separate hydraulic sectors (in urban and rural districts) with flow and pressure monitoring. The district metering zones will isolate pressure zones and adjust pressure settings for each zone based on elevation and demand.

PROPERTY-LEVEL WATER EFFICIENCY PROGRAMME

Introduce a short-term programme to accelerate domestic water efficiency in DMA pilot areas, including installation of low-flow fixtures, dual-flush toilets and smart meters. Establish a cooperative financing mechanism with ONEE/ SRM and ABHDON to reduce upfront costs for households (e.g., on-bill financing or voucher schemes for low-income users). Prioritise vulnerable households and fast-growing neighbourhoods to maximise equity and impact. Supplement the programme with educational and awareness raising campaign about water efficiency in schools and media (e.g. social media, radio, television and billboards).

REPAIRING AND REPLACEMENT OF 50 KM OF DAMAGED PIPES

Replacing damaged pipes, or repairing them using sewer pipe lining, a cost-effective technique for rehabilitating existing pipelines, will help to significantly reduce water losses and prevent contamination. These upgrades will not only enhance the structural integrity and reliability of the water and sewer networks but also minimise maintenance costs and disruptions, ensuring a more secure and sustainable water

supply for the region. The cost and pace of repairing and replacement will depend on the condition of the assets which will be assessed as part of the scoping study.

CREATE IMPROVED HYDRAULIC MODELS FOR THE MANAGEMENT AND OPERATION OF WATER SUPPLY NETWORKS BASED ON DMAS.

Enhanced hydraulic models tailored to District Metered Areas (DMAs) will be developed, enabling more precise management and operation of water supply networks. By leveraging detailed flow and pressure data from DMAs, the models will support the identification of inefficiencies, detection of leaks, and optimisation of network performance. This proactive approach will facilitate more effective decision-making for upgrades and maintenance, contributing to reduced water losses and improved reliability of potable water supply across the region.

GEOSPATIAL ASSET INFORMATION MANAGEMENT SYSTEM

Implementing a geospatial asset information management system will enable real-time mapping and tracking of network assets, supporting efficient maintenance, quick fault response, and informed decisions for upgrades. By combining spatial and operational data, this system will enhance business planning and financial forecasting through improved visibility of asset condition and investment needs. Ultimately, this data-driven approach will help ensure the long-term resilience and sustainability of water and sewerage services across the region.

GENDER EQUALITY AND HUMAN CAPITAL



Fair targeting, inclusive planning, and transparent reporting

Use NRW diagnostics and the geospatial asset system to prioritise DMA pilots and pipe rehabilitation in marginalised, low-income neighbourhoods, informal

settlements, and rural villages where outages and contamination risks are highest; validate the upgrade sequence with municipalities and social services to ensure fairness and transparency. In parallel, involve women, persons with disabilities, and trained civil-society members in community mapping of high-loss areas, and operate accessible leak-reporting channels (SMS/WhatsApp, call centres, commune offices) with clear feedback loops on repair actions.



Affordable use and targeted communication

Apply fair tariffs alongside DMA deployment, and communicate clearly how metering, pressure management, billing, and property-level efficiency measures affect households. Outreach will be delivered through short neighbourhood meetings/pop-ups (with separate women-focused briefings at convenient times), door-to-door engagement in priority areas, and simple printed and SMS/radio messages in local languages, supported by clear helpdesk and reporting channels during network changes.



Skills and local job pathways linked to smart networks

Establish local water councils and train youth (including young women) in basic maintenance, leak detection, meter reading and digital monitoring tools associated with DMAs and asset management systems. Graduates of the training can progress into paid roles (e.g., junior DMA technicians, or community leak-detection agents) through placement agreements with ONEE/SRM, municipal utilities, or O&M contractors engaged on the programme. In parallel, involve women, persons with disabilities, and trained civil-society members in community mapping of high-loss areas, and operate accessible leak-reporting channels (SMS/WhatsApp, call centres, commune offices) with clear feedback loops on repair actions.

ECONOMIC DEVELOPMENT	CLIMATE MITIGATION⁴⁹
5 FTE jobs	700 tCO ₂ /year

DIGITAL

- Integrate IoT sensors for real-time leak detection.
- Create a geospatial asset information management system that can be used to improve operations and maintenance, business planning, and financial forecasting.

IMPACT INDICATORS

Number of District Metered Areas (DMAs) established and operational

Baseline: 0 DMAs

Target: 3 pilot DMAs (Guelmim, Tan-Tan, Sidi Ifni) by 2028 (NDC A-8)

Reduction in non-revenue water (NRW) in monitored network segments (%)

Baseline: National NRW ~35–40%.

Target: <20% NRW in DMA-monitored segments by 2030. (Estimation from NDC and EBRD Benchmarks)

RESILIENCE CO-BENEFITS

Drought

Infrastructure failure/obsolescence

48. Scoping study of the existing network and priority segments – EUR 50,000, based on Arup internal projects; smart water meters – EUR 4,000 per unit, based on Arup internal projects; SCADA telemetry system – EUR 45,000, based on Arup internal projects; data management system – EUR 10,000; operating cost of new smart water meters – 5% of Capex, based on Arup internal projects; sewer pipe lining / pipe replacement – USD 91.44/m, based on the CurrentCost.org benchmark; hydraulic network modelling study and concept design – USD 295,000 in total, based on Arup internal projects; geospatial asset information management system – USD 165,000, based on the ESRI Utility Network Migration, Portal Install, and ArcGIS Enterprise Upgrade benchmark; and annual software subscription / system O&M – USD 1,898/year, based on the ArcGIS CityEngine Single Use Annual Subscription benchmark.

49. It was estimated based on the assumption that improved water management and monitoring systems would reduce emissions associated with water losses, using the regional population of 448,000, an average household size of 4, and therefore 112,000 households; it applies a benchmark equivalent to 0.01926 tCO₂ reduction per household, and assumes that one-third (together with W2 and W4) of the total potential savings is attributable to this actions.



W6

Wastewater treatment and sewerage network modernisation programme

AT A GLANCE

Implementation of a regional programme to modernise 11 wastewater treatment plants (in addition to the four already undergoing modernisation), expand and rehabilitate sewerage networks, and deploy infrastructure for water separation systems to extend the use and quality of treated wastewater effluent for agricultural or urban irrigation beyond green belts and green spaces.



SECTORS
Water, Land Use, Waste



SPATIAL EXTENT
Urban areas in all provinces

POLICY SYNERGIES

PDR

PDR C.3.2.1 – Rehabilitation and extension of urban and rural sewerage networks

PDR C.3.3.1 – RReuse of treated wastewater in the Guelmim-Oued Noun region

NDC 3.0

Adaptation NDC 1: National programme for wastewater reuse (PNAM).

Adaptation NDC 11: Domestic & industrial depollution programme

RELATED GCAP ACTIONS

W7

STRATEGIC GOALS



SG1
Ensure sustainable, equitable, and resilient water management across the region



SG3
Transition to a circular economy with zero uncontrolled dumping and high resource recovery.



SG7
Build a more gender-inclusive region

SCHEDULE OF IMPLEMENTATION

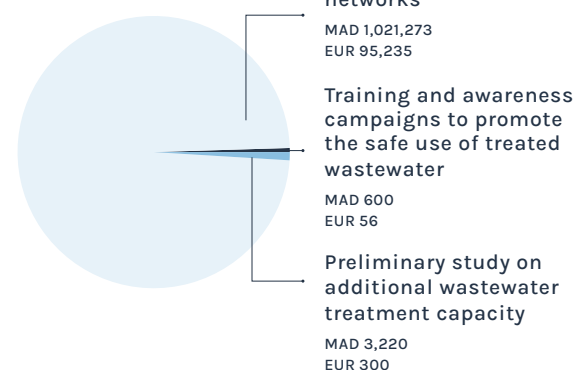
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Preliminary study on additional wastewater treatment capacity						
Extension and rehabilitation of urban and rural sewerage networks						
Monitoring and managing wastewater quality						

DETAILS ON IMPLEMENTATION⁵⁰

CAPEX (MAD/EUR'000)

MAD 1,025,093

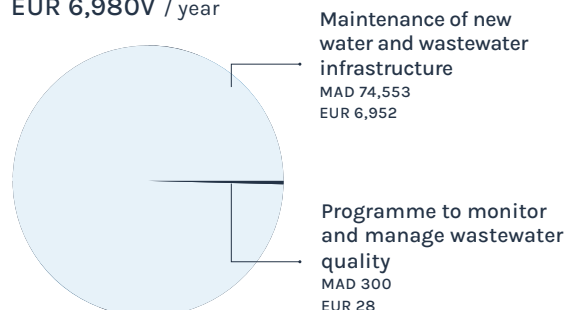
EUR 95,591



OPEX (MAD/EUR'000)

MAD 74,853 / year

EUR 6,980V / year



ACTION DESCRIPTION

OVERVIEW

Insufficient wastewater treatment in the region results in significant pollution, with half of domestic wastewater discharged into watercourses or the ground, adding 2,357 tonnes of BOD5 annually to the Guelmim Basin. Industrial and domestic effluents also contaminate groundwater and coastal areas. Limited treatment capacity means very low water reuse for irrigation, despite agriculture consuming 85–87% of available water from shrinking groundwater sources. This exacerbates pressure on scarce resources, which could be eased through reuse. However, cultural aversion to treated water limits uptake, even though urban centres and agricultural areas in Guelmim and Sidi Ifni provinces around Lakhsas, Bouizakarne, and Guelmim City offer strong reuse potential.

This action will strengthen wastewater management by conducting a preliminary study on additional treatment capacity and identifying reuse opportunities, particularly in construction. It will extend and rehabilitate urban and rural sewerage networks, upgrade treatment plants for wider reuse, and build on the ongoing EBRD/GEF project. The programme will also monitor and manage wastewater quality, provide operator training, and deliver awareness campaigns to promote safe reuse such as agriculture irrigation or non-potable domestic use, with a focus on engaging women through community workshops and media outreach.

ACTION OWNER	
SRM	RGON
DELIVERY PARTNERS	
MTEDD Regulatory oversight & environmental compliance	ONEE–Water Branch Technical support & legacy system knowledge
Municipalities Local wastewater governance & site coordination	OFPPPT Modular training for women & youth in WWTP roles – per GAP
ABHDON Discharge & reuse implications	Local communities Caretaker, sampling & monitoring roles – per GAP

ACTION COMPONENTS

PRELIMINARY STUDY ON ADDITIONAL WASTEWATER TREATMENT CAPACITY

Conduct a study to map the spatial extent of wastewater collection and sewerage systems, understand the feasibility of advanced treatment technologies for higher quality effluent, and define uses for treated water (particularly in the construction sector). Further investigation into how industrial players could invest in municipal wastewater treatment plants to reuse effluent for their own purposes.

EXTENSION AND REHABILITATION OF URBAN AND RURAL SEWERAGE NETWORKS, AND TREATMENT PLANTS

Extension and rehabilitation of urban and rural sewerage networks such as decentralised treatment units for isolated communities (possibly operated by the private sector), upstream/downstream infrastructure necessary for water separation systems in buildings, and advanced treatment technologies for wider reuse (landscape irrigation, domestic non-potable uses, industrial use (action W7), agricultural use) in 11 wastewater treatment plants in the region. In the case of isolated communities, where the preliminary study should assess that extension of sewerage network is not viable, decentralised solutions such as eco-sanitation could be considered. This action builds on an ongoing EBRD/GEF project (MAD 130 million loan and \$1 million grant) to

upgrade four wastewater treatment plants and promote water reuse. Modular storage capacity (tanks or ponds) will be added at upgraded plants to buffer daily and seasonal flows and provide emergency reserves to strengthen resilience. Nature-based solutions (e.g., constructed wetlands, reed beds) will be integrated for polishing effluent.

PROGRAMME TO MONITOR AND MANAGE WASTEWATER QUALITY

Implementation of a programme to monitor and manage the quality of water from municipal wastewater treatment to ensure operational performance, supported by training and capacity building for operators in the use of chemicals and waste management.

GENDER EQUALITY AND HUMAN CAPITAL



Skills and local roles in wastewater management

Include women and youth in modular, on-site training for roles that match W6's mix of WWTPs and decentralised units (e.g., caretakers for village systems (routine checks, screens/pumps cleaning, chlorine dosing), sampling and field-testing agents, lab runners, and community liaison/complaints officers) with pathways to junior WWTP operator or network maintenance assistant where larger plants exist. Recruitment will target nearby communities through INDH platforms, women's cooperatives and commune job centres, and will be delivered with utilities/OFPPPT/existing operators using short modules on HSE & PPE, safe greywater/effluent reuse messaging, and simple digital tools for reporting.



Accessible decentralised systems for remote users

Design and locate decentralised wastewater solutions for isolated and nomadic communities with community co-selection of locations (near schools/markets/water points used by women), using modular, low-O&M units, off-grid power (solar where feasible), and gender-sensitive access (safe paths, lighting, clear signage). Provide basic user guidance in local languages with pictograms to ensure ease of use for low-literacy households.



Awareness and acceptance of safe reuse

Deliver locally tailored campaigns using small community workshops, local radio, and visible demonstration sites near WWTPs or reuse areas. Train women from cooperatives and farmer groups as peer communicators to explain safeguards, quality standards, and appropriate non-potable/agricultural uses. Workshops will be held where people already gather (e.g., schools, cooperative offices, and market/souk areas) and, where reuse is demonstrated.

ECONOMIC DEVELOPMENT	CLIMATE MITIGATION ⁵¹
1,000 FTE jobs	75,800 tCO ₂ /year

IMPACT INDICATORS

Rate of population connected to public sewerage network (%)

Baseline: 55.16% regional (RGPH 2014); rural rate 0.6%.
NDC A-1 (PNAM) target 90% urban connection by 2030.
Target: 80% regional by 2030. Estimation: NDC 3.0

Number of rural commune centres equipped with sewerage network and STEP

Baseline: 8 communes 0% coverage; 30 communes <1% coverage
Target: 15 rural STEPs operational by 2030 (NDC A-1)

Volume of municipal wastewater treated before discharge (m³/year)

Baseline: <10% treated
Target: 100% urban wastewater treated by 2031+ (NDC A-1)

DIGITAL	RESILIENCE CO-BENEFITS
N/A	Drought, Infrastructure failure/obsolescence

50. Preliminary study on additional wastewater treatment capacity – USD 300,000, based on a wastewater treatment plant feasibility study benchmark; extension and rehabilitation of sewerage networks / treatment infrastructure – USD 10 million per medium-scale plant (40k m³/day), based on an internal benchmark, applied to 11 wastewater treatment plants; wastewater treatment O&M – USD 0.05/m³, based on Arup internal projects; wastewater quality monitoring – based on 2 FTEs using an average Moroccan public-sector salary benchmark of USD 1,000/month; and training / awareness activities – MAD 100,000 for a building-user awareness project and MAD 500,000 for a school awareness programme, based on internal benchmarks.

51. It was estimated based on improved wastewater treatment performance, using an assumed daily wastewater flow of 40,000 m³/day, equivalent to 160.6 million m³/year, and an emissions factor for water treatment of 0.708 kgCO₂/m³; this gives baseline treatment-related emissions of 113,704.8 tCO₂/year for 11 plants, of which it assumes 66.7% can be avoided through the proposed improvements.

W7

Agriculture and industrial – urban symbiosis for water and wastewater

AT A GLANCE

Construction of shared water and wastewater treatment systems in main industrial clusters of Sidi Ifni or El Ouatia, allowing industries, agricultural users, and communities to reuse treated effluent and optimise resources for mutual benefit.

SECTORS
Industry, Waste, Land Use

SPATIAL EXTENT
Coastal areas in Sidi Ifni and Tan-Tan provinces

POLICY SYNERGIES

PDR

PDR C.3.3.1 – Reuse of treated wastewater in the region
PDR D.1.4.2 – Development of port support services (cold chain, logistics)
PDR D.2.2.1 – Support for agricultural product conditioning & valorisation units

NDC 3.0

Adaptation NDC 11: National de-pollution programme for domestic & industrial wastewater.

Adaptation NDC 1: National wastewater reuse programme (PNAM).

RELATED GCAP ACTIONS

W6 WS3

STRATEGIC GOALS

- SG1**
Ensure sustainable, equitable, and resilient water management across the region
- SG4**
Promote green, and climate-adaptive urban development while protecting ecosystems recovery
- SG7**
Build a more gender-inclusive region

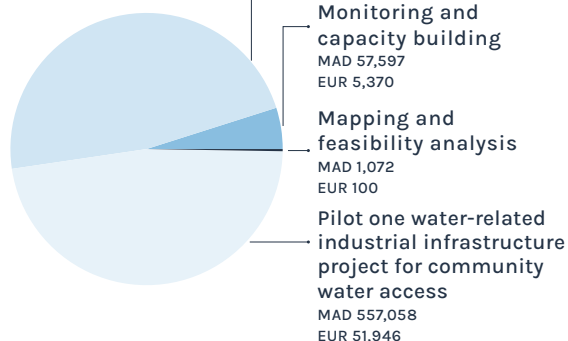
- SG3**
Transition to a circular economy with zero uncontrolled dumping and high resource
- SG6**
Retrofit and build climate-resilient, energy-efficient infrastructure for all

SCHEDULE OF IMPLEMENTATION

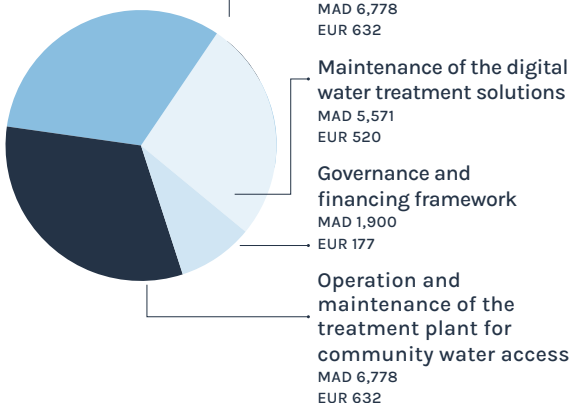
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Mapping and feasibility analysis						
Governance and financing framework						
Pilot wastewater reuse for industrial processes						
Pilot one water-related industrial infrastructure project for community water access						
Monitoring and capacity building						

DETAILS ON IMPLEMENTATION⁵²

CAPEX (MAD/EUR'000)
MAD 1,172,785
EUR 109,362



OPEX (MAD/EUR'000)
MAD 21,027 / year
EUR 1,961 / year



ACTION OWNER

SRM & RGON

DELIVERY PARTNERS

MTEDD

Environmental standards & regulatory framework

CRI

Industrial zone development

Municipalities

Local coordination & urban interface

ABHDON

Water resource & discharge management

Ministry of Interior /

DGCT

Inter-institutional coordination

Private operators

Industrial wastewater treatment

Industrial associations

Sector coordination

Ministry of

Industry & Trade

Industrial policy alignment

Women & youth

Entry-level monitoring roles – per GAP

ACTION DESCRIPTION

OVERVIEW

The region faces chronic water scarcity, and is currently heavily dependent on groundwater, while seawater pollution from food processing wastewater is degrading biodiversity. To address these challenges, it is essential to diversify water sources and reduce pressure on traditional freshwater supplies, particularly from water-intensive industries such as food processing, agriculture and future green hydrogen projects.

This action aims to leverage shared water infrastructure through public-private co-investment. Upstream, it focuses on wastewater treatment plants to enable reuse of treated water for industrial purposes. Downstream, it promotes shared use of industrial water systems, such as desalination facilities and treated effluent reuse. These measures will also help unlock treated effluent for safe agricultural reuse in suitable areas, supporting irrigation modernisation and reducing dependence on diminishing aquifer reserves. Additionally, they will improve water quality,

strengthen water security for underserved communities, safeguard marine ecosystems, and mitigate risks to coastal tourism. This action will also support the new industrial zones currently under finalisation and planned across the region, embedding shared treatment systems and circular water use within new developments to reduce pollution and resource pressure from the outset.

ACTION COMPONENTS

MAPPING AND FEASIBILITY ANALYSIS

Combine mapping of industrial water demand (e.g., solar farms, green hydrogen, food processing) with technical and economic feasibility studies. Assess opportunities to integrate community water needs (drinking water, irrigation) into industrial desalination, reuse systems, and joint effluent treatment plants. The analysis will also consider where treated industrial effluent can safely support agricultural uses, including both edible and non-edible crops

GOVERNANCE AND FINANCING FRAMEWORK

Develop collaborative models for co-investment between private sector actors and the public sector (water agencies such as ONEE-BO, ABHDON or the Region), ensuring alignment with adaptation objectives and resource recovery opportunities. Governance arrangements will clarify water allocation between industrial and agricultural users to maximise shared benefits.

PILOT WASTEWATER REUSE FOR INDUSTRIAL PROCESSES

Develop and pilot one municipal wastewater treatment plant upgrade close to industrial areas of either Tan-Tan, El Ouatia or Sidi Ifni. The action will focus on co-investment to enable reuse of treated effluent in existing agricultural and industrial processes, reducing freshwater demand and supporting circular water use.

PILOT ONE WATER-RELATED INDUSTRIAL INFRASTRUCTURE PROJECT FOR COMMUNITY WATER ACCESS

Identify and pilot in coordination with industry stakeholders one project to enable reuse of treated industrial effluent or

desalinated water for community purposes such as agriculture and domestic supply, improving resilience and water security. This will include the design and construction or upgrade of one joint industrial wastewater treatment plant compliant with law n°12-03, targeted at the food processing industry (e.g. fishing, canning, fishmeal) to reduce water pollution from this activity and further enable water reuse for irrigation or other industrial processes, and support composting/soil amendments through valorisation of organic by-products for agricultural use.

MONITORING AND CAPACITY BUILDING

Implement continuous water quality monitoring for industrial and agricultural areas. Provide training for operators on chemical use, waste management, and system maintenance. Training modules will also cover safe agricultural reuse standards to support farmers in adopting treated effluent within quality guidelines.

GENDER EQUALITY AND HUMAN CAPITAL



Targeted local roles in shared water infrastructure

Include women and youth from nearby communities in entry-level roles linked to industrial-urban water systems (e.g. water-quality sampling, environmental monitoring, basic O&M support for reuse infrastructure, and community liaison roles between industries, utilities and municipalities). Short, modular training sessions will be delivered as part of recruitment process, ensuring opportunities are accessible to underserved populations rather than limited to industrial workforces.



Risk-sensitive location planning

Prioritise site selection that avoids disproportionate impacts on underserved communities (e.g. noise, odour, access restrictions). Involve women and community representatives in early siting discussions to identify sensitivities related to mobility, safety, and access to water, ensuring industrial symbiosis strengthens local resilience. Run site walks with women before shortlisting and open a time-bound grievance channel (e.g. commune office and WhatsApp) before final selection.



Awareness and trust-building on reuse and pollution reduction

Deliver locally tailored awareness activities in surrounding communities through meetings at commune halls/markets and radio, to explain reuse practices, pollution controls and health safeguards, engaging women as key communicators. Set up a hotline for questions and incident reporting.

ECONOMIC DEVELOPMENT

400 FTE jobs

CLIMATE MITIGATION⁵³

14,000 tCO₂/year

IMPACT INDICATORS

Volume of treated wastewater reused for industrial or agricultural purposes (m³/year)

Baseline: ~0 in GON; wastewater reuse identified as source with 10-20 Mm³ potential

Target: Contribute to national 100 Mm³/yr REUT by 2030 (NDC 3.0)

Reduction in freshwater consumption by industries/farms switching to reused wastewater (m³/year)

Baseline: Current industrial/agricultural freshwater abstraction in GON (TBC from SRM data)

Target: 10-15% reduction in abstraction by 2030

(No reference or source)

DIGITAL

N/A

RESILIENCE CO-BENEFITS

Drought, Infrastructure failure/obsolescence

52. Mapping and feasibility analysis – EUR 100,000, based on Arup internal projects; governance and financing framework – benchmarked using an annual lawyer salary in Morocco of MAD 379,907, sourced from ERI Economic Research Institute; pilot wastewater reuse for industrial processes – USD 60 million for a treatment plant (40k m³/day), based on an internal benchmark; O&M for industrial wastewater treatment – USD 0.05/m³, based on a Zero Liquid Discharge case study referenced in 2030 WRG's Water Use in Scarce Environments; pilot water-related industrial infrastructure project for community water access – USD 60 million for a treatment plant (40k m³/day), also based on an internal benchmark; monitoring and capacity building / digital water treatment solutions – USD 1.4 million, based on a composite benchmark and internal estimation drawing on examples of real-time sensors, digital decision-support systems and wastewater monitoring solutions; and maintenance of digital water treatment solutions – USD 600,000, based on the Arup internal projects.

53. It was estimated based on improved wastewater treatment and reuse, using an assumed daily water flow of 40,000 m³/day, equivalent to 29.2 million m³/year for 2 plants, and a treatment emissions factor of 0.708 kgCO₂/m³; this gives baseline treatment-related emissions of 20,673.6 tCO₂/year, of which it assumes 66.7% can be avoided through the proposed intervention

LONG-TERM ACTIONS

W8

Deployment of a network of shaded drinking water fountains

Design and installation of shaded drinking water fountains, supported by an assessment and identification of target areas and main water sources (e.g. aquifers or desalination plants), and stakeholder engagement with residents and site users.

1. Assessment and identification of locations, including target areas, primarily located in major cities. This includes stakeholder engagement to understand user needs, inform site selection, and guide design preferences.
2. Design and installation in priority locations (Guelmim, Tan-Tan, Sidi Ifni, Assa, Zag) and rural centres in the region (Mirleft, Lakhsas, Bouizakarne), as well as near green infrastructure.
3. Monitoring of usage and maintenance needs

W9

Modernisation of irrigation systems and techniques

Implementation of water-efficient irrigation systems on 4,000 to 6,000 hectares of agricultural land throughout the region in order to adapt to worsening drought conditions. By reducing water demand and improving irrigation efficiency, this action helps to maintain crop productivity in a context of changing rainfall patterns. It will be based on a preliminary study and a technical

and financial assessment of modern interventions, and will be supported by continuous sampling and remote sensing monitoring.

1. Preliminary study for a new irrigation system
2. Technical and financial assessment of appropriate modern interventions.
3. Construction of new irrigation systems and implementation of an IoT remote sensing system. This action is based on the 2030 strategy, which aims to equip more than 10,000 hectares of agricultural land with drip irrigation systems by 2030.
4. Sampling and monitoring by remote sensing

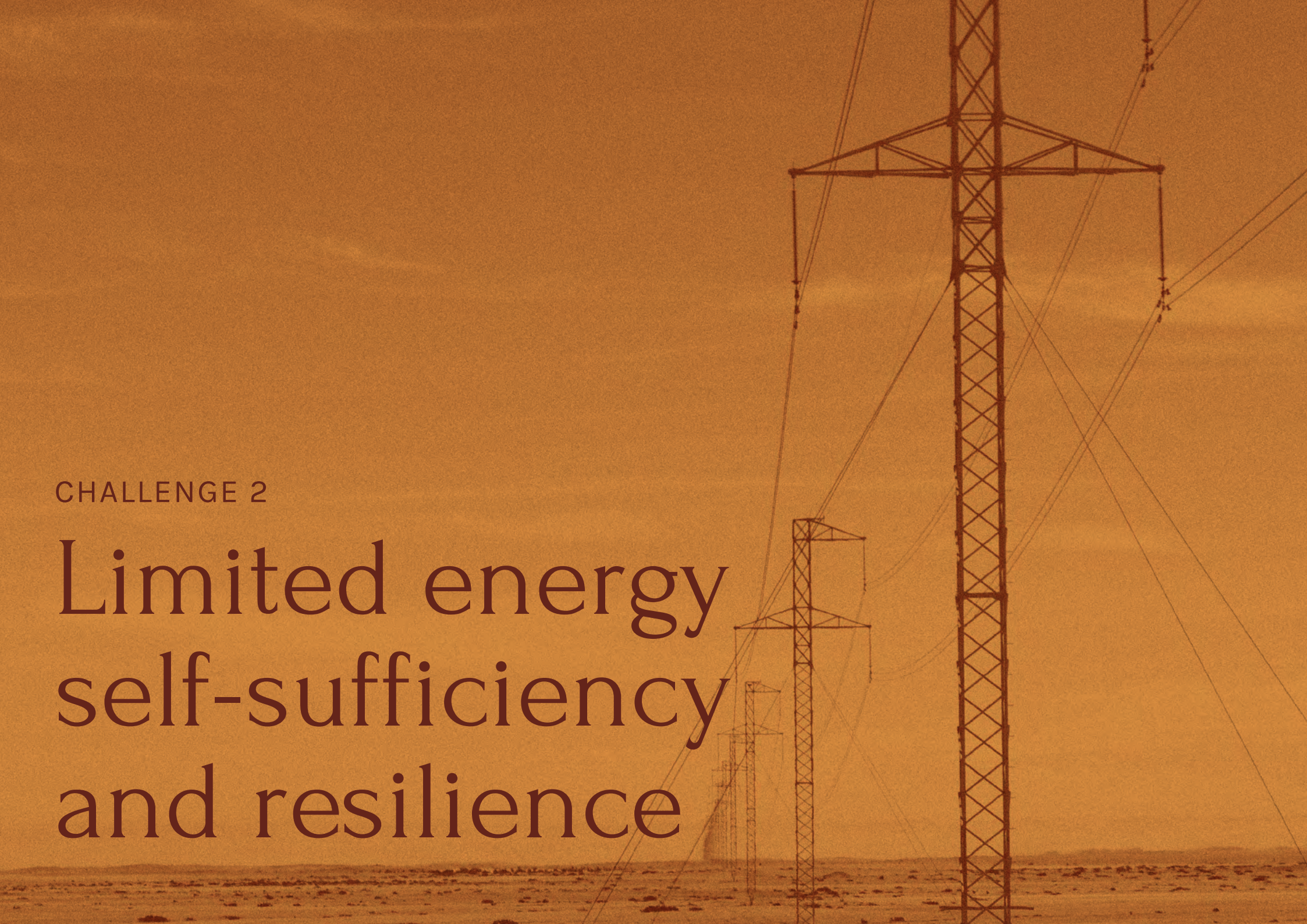
W10

Implementation of water efficiency measures at the property level

Deploy water efficiency measures at the property level as an adaptation strategy in the context of regional water scarcity and to complement the water supply ecosystem through the implementation of pilot greywater reuse and water separation systems in public buildings, with the support of stakeholders and building requirements for water reuse.

1. Test the acceptability of greywater reuse with community stakeholders
2. Implement property-level water optimisation pilot projects in public buildings (e.g., regional offices, schools, hospitals) throughout the asset lifecycle: from the reuse of treated wastewater for construction, through the implementation of water separation systems in building design, to the reuse of greywater for irrigation of green spaces and groundwater recharge.

3. Where appropriate, formulate and implement regional policy and regulatory frameworks to promote water efficiency and greywater reuse in new non-residential building developments.



CHALLENGE 2

Limited energy self-sufficiency and resilience

CHALLENGE 2

Limited energy self-sufficiency and resilience

The Guelmim-Oued Noun region's energy system is heavily reliant on fossil fuels, which account for nearly 69% of total energy consumption. At the national level, primary energy consumption in 2022 was driven largely by petroleum products (58%), followed by coal (32%). The region's energy demand is rising, driven by urbanisation and economic growth, while renewable energy remains underexploited despite high solar and wind potential. Public buildings, hammams, and the food processing industry are major energy consumers, often using inefficient technologies. The grid is ageing and vulnerable to climate risks, and rural areas still face energy access gaps.

The Regional Council, in partnership with ONEE and AMEE, is piloting renewable energy projects and energy efficiency programmes, as outlined in the PDR and the Regional Energy Efficiency and Decarbonation Plan. The region is also at the centre of Morocco's national green hydrogen ambitions. MASEN is leading the Power-to-X (PtX) project in the region (Morocco's first industrial-scale green hydrogen initiative) comprising a 200 MW hybrid solar and wind plant, a 100 MW electrolyser, and a seawater desalination unit in Tan-Tan, co-financed by Germany's KfW (€300 million). In parallel, the Chbika project, launched in October 2024 under joint presidency of King Mohammed VI and French President Emmanuel Macron, will develop 1 GW of renewable capacity to produce 200,000 tonnes of green ammonia per year for the European market (TotalEnergies/EREN, Copenhagen Infrastructure Partners, A.P. Moller Capital). OCP and ENGIE have also signed a preliminary partnership covering desalination, renewables and green

hydrogen in the region. These projects form part of Morocco's Offre Maroc initiative, under which five international consortia were pre-selected in March 2025 across the three southern regions. The GCAP actions under Challenge 5, particularly E1 (grid modernisation), E2 (energy communities) and E3 (agrivoltaics), are designed to complement these large-scale initiatives by addressing local energy access and resilience gaps that national projects alone will not resolve.

The GCAP proposes a comprehensive set of actions:

- An ambitious grid upgrade programme across the region to **modernise and strengthen electricity transmission network** **E1** to support future growth, electrification of demand, renewable integration and improve reliability.
- Energy resilience and community connectivity will also be supported by the **development of energy/self-sufficient communities in rural areas** **E2** which will seek to establish community-owned solar microgrids and storage for off-grid villages.
- To reduce fossil fuel use in agriculture, the programme will deploy **solar-powered agricultural infrastructure and agrivoltaics** **E3**, combining renewable energy generation with crop production to support sustainable farming and improve resilience to climate change.
- Public buildings such as schools, hospitals, and administrative facilities will undergo deep energy renovations through **rooftop solar PV, solar thermal installations, and efficiency upgrades** **E4**, ensuring

improved energy performance and greater reliance on renewable sources.

- Outdated lighting systems will be replaced with LED and solar-powered alternatives as part of the **deployment of energy-efficient, low-carbon public lighting** **E5**, cutting emissions, lowering energy costs, and enhancing the quality of urban lighting contributing to safety and inclusivity.
- Traditional hammams will be retrofitted under the **initiative to improve energy and water efficiency** **E6**, incorporating efficient boilers, water reuse systems, and solar technologies to preserve cultural heritage while reducing resource consumption.
- Finally, the **decarbonisation of the food processing industry** **E7** will focus on electrifying processes, integrating renewable energy, and implementing efficiency measures, in key industrial sectors, particularly across fisheries-related processing, to drive a significant reduction in carbon emissions.

Through investment of MAD 6,060,059,000 (EUR 565,107,000), these actions are estimated to directly support the creation of 1,100 jobs support and to reduce emissions, improve energy security, and position the Region as a leader in Morocco's green energy transition.

In the long term, there is also potential for the Region to explore longer-term actions such as a one-stop shop for home renovation and electrification **E8**.

ACTION FUNCTION	ACTION REF.	ACTION TITLE	PROVINCE	SPATIAL EXTENT			
				URBAN	RURAL	COASTAL	REGIONAL
UPGRADE Actions that modernise the grid	E1	Modernise and strengthen electricity transmission network infrastructure to support the growth of green energy	All provinces				
DISTRIBUTION Actions that expand and decentralise renewable energy	E2	Develop energy communities/ self-sufficient communities in rural areas	All provinces				
	E3	Solar-powered agricultural infrastructure combined with agrivoltaics	All provinces				
	E4	Deploy rooftop solar photovoltaic panels, solar thermal systems and deep renovations for public buildings	All provinces				
DECARBONISATION Actions that cut consumption and emissions	E5	Deployment of energy-efficient, low-carbon and inclusive public lighting	All provinces				
	E6	Improving energy and water efficiency in traditional hammams	All provinces				
	E7	Decarbonisation Tan-Tan, of the food processing industry	Sidi-Ifni				

Table 7. Function and location matrix of Challenge 2 actions

SOCIAL MEDIA CAMPAIGN INSIGHT

#

Residents reported frequent power cuts and ageing electricity networks affecting daily life, and highlighted poorly lit streets and neighbourhoods impacting safety. These concerns reinforce the GCAP's focus on grid modernisation, local energy resilience, and public lighting upgrades.

E1

Modernise and strengthen electricity transmission network infrastructure to support the growth of green energy

AT A GLANCE

Modernisation, expansion and reinforcement of the region's ageing electrical infrastructure to prepare for both the expansion of large-scale production in the region (photovoltaic/wind farms) and the deployment of distributed photovoltaic systems at the domestic level on rooftops throughout the region.

SECTORS
Energy and Buildings, Land Use

SPATIAL EXTENT
Regionally across all provinces

POLICY SYNERGIES

PDR

PDR E.1.1.1 – Structuring the GON Hydrogen Valley around four hubs

PDR B.3.1.2 – Upgrading programme for rural centres (Phase 2)

NDC 3.0

Mitigation NDC 9: Digitalisation of the electricity distribution network

Mitigation NDC 1-7: National renewable energy development (wind/solar)

STRATEGIC GOALS

- SG2**
Ensure universal access to clean and affordable energy and become a national leader in renewable energy and green hydrogen production.
- SG6**
Retrofit and build climate-resilient, energyefficient infrastructure for all.
- SG7**
Build a more gender-inclusive region.

RELATED GCAP ACTIONS

U1

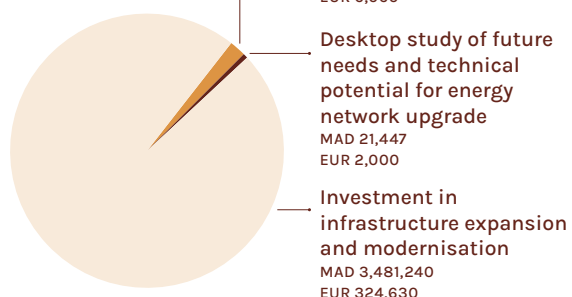
E2

SCHEDULE OF IMPLEMENTATION

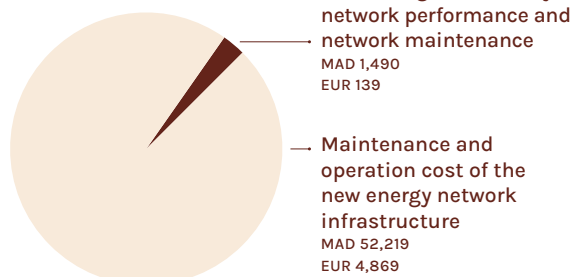
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Desktop study of future needs and technical potential for energy network upgrade						
Investment in infrastructure expansion and modernisation						
Monitoring of electricity network performance and network maintenance						

DETAILS ON IMPLEMENTATION⁵⁴

CAPEX (MAD/EUR'000)
MAD 3,567,677
EUR 17,100



CAPEX (MAD/EUR'000)
MAD 53,709 / year
EUR 5,008 / year



ACTION DESCRIPTION

OVERVIEW

The existing grid is ageing and highly vulnerable to climate-related stress. Areas south of Tan-Tan and northern zones near Sidi Ifni and north

of Guelmim province suffer frequent power outages and a degraded network, particularly following the 2024 floods. Moreover, the current infrastructure cannot meet rising demand driven by demographic growth, economic development, and renewable energy integration.

This action aims to upgrade the grid to enable the integration of renewables, notably domestic systems like rooftop solar, reduce outages, and support sustainable industrial and residential growth. It will be supported by technical studies to identify critical areas of intervention as well as the implementation of performance monitoring systems to optimise network resilience.

The grid upgrade programme will be designed to accommodate the significant increase in renewable generation capacity expected from major incoming projects, including the MASEN Power-to-X plant and the Chbika green hydrogen project, both located in the region. Coordination with MASEN, ONEE and private developers will be integrated into the action's governance to ensure infrastructure investments are sequenced with national project timelines.

ACTION OWNER

ONEE-Electricity Branch

DELIVERY PARTNERS

ANRE Regulation & tariff setting	SRM GON Active electricity distribution operator under Loi 83-21 since Oct 2025
MASEN RE project alignment – Chbika, Power-to-X	Private RE developers / IPPs Delivery and operation
RGON Co-financing & advocacy for regional priorities	OFPPT Skills training for grid technicians
Municipalities Permitting & local coordination	

ACTION COMPONENTS

DESKTOP STUDY OF FUTURE NEEDS AND TECHNICAL POTENTIAL FOR ENERGY NETWORK UPGRADE

The first step involves a comprehensive assessment of future electricity demand and grid resilience. This includes modelling demographic and economic growth scenarios to forecast load requirements and mapping technical potential for renewable energy integration, such as large-scale projects and distributed systems like rooftop solar. The study should also evaluate grid hosting capacity, intermittency challenges, and decentralisation readiness, identifying opportunities for microgrids and distributed energy resources in remote areas. Additionally, a climate resilience audit is essential to pinpoint vulnerabilities in substations and transmission lines exposed to flooding and extreme heat, ensuring that future upgrades address both capacity and environmental risks.

INVESTMENT IN INFRASTRUCTURE EXPANSION AND MODERNISATION

This component focuses on reinforcing the primary network and modernising secondary systems to support a renewable-heavy grid. Upgrades should include high-voltage lines, substations, and smart grid technologies such as advanced metering, automated voltage regulation, and dynamic frequency control. Infrastructure design must incorporate climate-resilient standards, including flood-proofing and heat-resistant materials, to safeguard critical assets. These investments will enable bidirectional energy flows, improve reliability, and create a flexible network capable of integrating decentralised generation and supporting sustainable industrial and residential growth.

MONITORING OF ELECTRICITY NETWORK PERFORMANCE AND NETWORK MAINTENANCE

Continuous monitoring and proactive maintenance are vital for long-term grid stability. Real-time sensors and IoT devices should be deployed to track asset health and predict

failures before they occur. Performance dashboards can provide transparency and support decision-making, while preventive maintenance regimes based on data analytics will reduce downtime and costs compared to fixed schedules. Integrating community feedback and outage reporting systems will enhance responsiveness and allow operators to refine strategies for distributed energy resources.

GENDER EQUALITY AND HUMAN CAPITAL



Inclusive planning for grid routing and maintenance access

Conduct participatory planning with community representatives, women farmers, cooperatives and local authorities, particularly in remote and rural areas, to agree on grid routing, substation locations and long-term maintenance access. Engagement will identify sensitive areas (fields, water points, paths, seasonal grazing routes) and preferred access corridors. This will minimise disruption to livelihoods and mobility, improve maintenance safety, and ensure network upgrades deliver equitable and locally acceptable benefits, especially for communities newly connected to the grid.



Women in Green Energy pipeline

In partnership with regional high schools, OFPPT, local universities and grid/operators, launch a STEM engagement and mentoring programme for girls (school clubs, site visits, role-model talks), followed by scholarships/grants to local universities and paid internships in grid planning, asset monitoring and smart-grid operations, and a structured placement path into entry-level roles (network data assistants, substation tech trainees, field monitoring) with workplace policies in contracts (anti-harassment, gender-appropriate PPE/facilities, safe transport to work).

ECONOMIC DEVELOPMENT | CLIMATE MITIGATION

370 FTE jobs

N/A

DIGITAL

- SCADA enhancements and cybersecurity measures to prevent cascading failures
- Real-time sensors and IoT devices should be deployed to track asset health and predict failure

RESILIENCE CO-BENEFITS

Infrastructure failure/obsolescence

IMPACT INDICATORS

Grid capacity to integrate renewable energy (MW)

Baseline: 97% electrification coverage but frequent cuts in Assa-Zag

Target: Grid modernisation to support national 52% RE target by 2030 (20% solar, 20% wind, 12% hydro) (SNEE 2030 and NDC 3.0)

Technical losses in electricity distribution network (% network line losses)

Baseline: 18% network line losses (2019) – GCAP baseline

Target: ≤10% network losses – (Estimation: NDC 3.0 and EBRD Green City Indicators)

Number of households and communities gaining reliable electricity access (including Assa-Zag, Labouirat, Al Mahbas)

Baseline: 97% regional electrification; Assa-Zag at 95% with frequent cuts

Target: 100% reliable electrification by 2028 (Morocco PERG programme national target)

54. Study of future needs and technical potential for network upgrade – EUR 2 million, based on Arup internal projects; electricity network expansion and modernisation – benchmarked against an infrastructure upgrade of 646 miles of power lines for USD 935 million, which was converted to about MAD 3.5 million/km; annual network O&M (excluding losses) – 1.5% of Capex, based on the Cost and Economic Aspects, Comparing high voltage overhead and underground transmission infrastructure (up to 500 kV); and electricity network monitoring / smart management systems – USD 7,000/km, comprising USD 200/km for IoT sensors, USD 1,500/km for communication infrastructure, USD 3,000/km for SCADA/IoT platform integration, USD 1,500/km for dashboards and analytics, and USD 800/km for AI/ML-based preventive maintenance, with ongoing monitoring costs additionally benchmarked using 10 FTEs at an average Moroccan public-sector salary of USD 1,000/month.

E2

Develop energy communities/ self-sufficient communities in rural areas

AT A GLANCE

Develop access to clean energy in rural areas through solar electrification and a community energy system, supported by governance, legal frameworks, investments, capacity building, and digital monitoring.

SECTORS
Energy and Buildings, Land Use

SPATIAL EXTENT
Rural areas in all provinces

POLICY SYNERGIES

National strategy of energy transition

PDR

PDR B.3.1.2 – Upgrading programme for rural centres

NDC 3.0

Mitigation NDC 37: Deployment of rooftop solar PV by 2035 (self-production)

Mitigation NDC 71 & 76: Solar energy for agriculture & rural systems

Mitigation NDC 14: Renewable energy (rooftop PV) self-consumption in industry (1,500 MW by 2035)

STRATEGIC GOALS

- SG2**
Ensure universal access to clean and affordable energy and become a national leader in renewable energy and green hydrogen production.
- SG6**
Retrofit and build climate-resilient, energyefficient infrastructure for all.
- SG7**
Build a more gender-inclusive region.

RELATED GCAP ACTIONS

U1

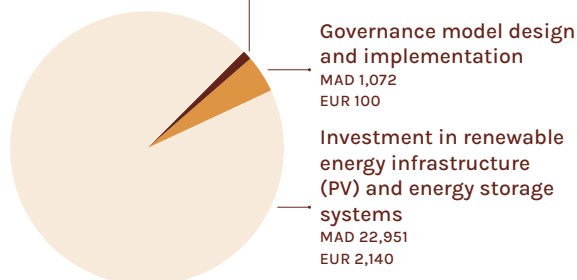
E1

SCHEDULE OF IMPLEMENTATION

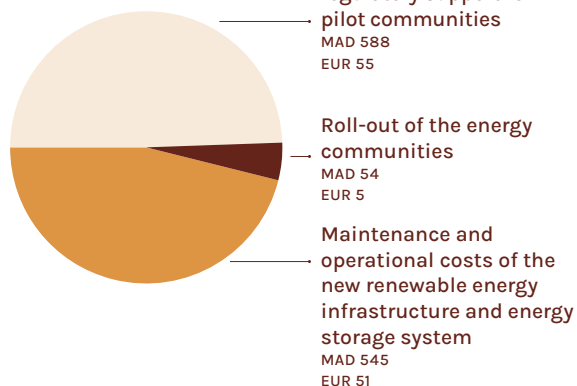
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Feasibility study for establishment of local energy communities						
Governance model design and implementation						
Investment in renewable energy infrastructure (PV) and energy storage systems						
Capacity building and regulatory support for pilot communities						
Roll-out of the energy communities						

DETAILS ON IMPLEMENTATION⁵⁵

CAPEX (MAD/EUR'000)
MAD 24,345
EUR 2,270



CAPEX (MAD/EUR'000)
MAD 1,187 / year
EUR 111 / year



ACTION DESCRIPTION

OVERVIEW

The Guelmim-Oued Noun region presents energy access gaps and vulnerability in rural areas, with electrification levels below 100% and some areas mainly in the north of the region still being disconnected from the grid. Despite high solar potential and mature technologies for local energy generation such as photovoltaic kits, these practices remain anecdotal in rural areas. This leads to energy poverty for rural households, preventing economic inclusion while also increasing reliance on alternative biomass energy sources.

This action looks to build on the high solar potential to empower rural communities with decentralised renewable systems by investing in local, self-sustainable renewable energy infrastructure and energy storage systems. These will enhance resilience, reduce power-related emissions, and support inclusive community development.

ACTION OWNER

ONEE-Electricity Branch

DELIVERY PARTNERS

Municipalities

Local delivery & site identification

AMEE

Energy audits & capacity building

MASEN

Solar PV integration

Local cooperatives – SSE model

Community-owned operations

RGON

Governance model design, co-financing & TA

ANRE / MTEDD

Regulatory pathway for energy communities

SRM GON

Grid interconnection operator since Oct 2025

OFPPT & women's

Cooperatives
Training – per GAP

INDH platforms & youth associations

Outreach – per GAP

National Agency for

Water and Forests
Implementation

ACTION COMPONENTS

FEASIBILITY STUDY FOR ESTABLISHMENT OF LOCAL ENERGY COMMUNITIES

The first phase will look to identify pilot communities for the initiative based on energy poverty levels, geographic isolation, and readiness for decentralised solutions.

This action will analyse technical, economic, and social factors to select the most suitable electrification model through either grid extension or autonomous off-grid systems. It will assess renewable resource availability, infrastructure costs, and community energy needs. The study will also evaluate storage requirements, resilience to climate risks, and scalability, ensuring the chosen solution delivers reliable, affordable, and clean energy.

GOVERNANCE MODEL DESIGN AND IMPLEMENTATION

The next phase will define a governance structure and legal framework to enable community-owned energy systems. It will clarify roles, responsibilities, and decision-making processes, ensuring compliance with national energy regulations. The framework will also include mechanisms for community participation, tariff setting, and dispute resolution, creating a transparent and inclusive foundation for long-term sustainability.

Morocco's regulatory framework provides a partial but incomplete basis for community energy systems. Law 82-21 (2023) enables households, local authorities and cooperatives to self-generate electricity and sell surplus to the grid, while Law 13-09 (as amended by Laws 58-15 and 40-19) allows groups of consumers to collectively purchase renewable energy from independent producers connected to the medium voltage network. However, no specific legal framework currently exists for fully autonomous off-grid community microgrids, the model envisaged for the most remote rural communities in the region. The governance design phase of E2 will therefore need to work within existing self-generation provisions while engaging MTEDD and ANRE to clarify the regulatory pathway for community-

owned off-grid systems, and to explore whether the Organic Law 111-14 on regions provides a basis for the Regional Council to act as co-owner or guarantor of such systems.

INVESTMENT IN RENEWABLE ENERGY INFRASTRUCTURE (PV) AND ENERGY STORAGE SYSTEMS

This stage will deploy solar photovoltaic systems and battery storage in 2 pilot communities to provide stable, decentralised power serving approximately 50 households each. Investments will prioritise modular, scalable technologies suited to rural conditions. Systems will be designed for community ownership and easy maintenance, reducing reliance on external operators. This infrastructure will enable energy independence, support productive uses such as irrigation and refrigeration, and improve quality of life. The action will explore options to finance the upfront cost of infrastructure by the Region or external funders and enable the communities to buy back the systems.

CAPACITY BUILDING AND REGULATORY SUPPORT FOR PILOT COMMUNITIES

This action will deliver training programmes on system operation, maintenance, and governance for local stakeholders. It will also provide regulatory guidance to ensure compliance with energy standards and facilitate access to incentives. Building technical and managerial capacity will empower communities to manage their systems effectively, fostering resilience and long-term sustainability. This will be accompanied by the implementation of digital tools for real-time monitoring of energy generation, storage, and consumption.

ROLL-OUT OF THE ENERGY COMMUNITIES

This action will scale successful models to other rural communities, leveraging lessons learned from pilots. It will include guidelines for replication, financing strategies, and partnerships with local authorities and private investors. Replication will accelerate rural electrification and contribute to regional energy resilience.

GENDER EQUALITY AND HUMAN CAPITAL



Inclusive governance and participatory energy allocation

Establish women- and youth-inclusive governance structures for pilot energy communities (e.g. management, tariff and maintenance committees), supported by targeted outreach through women's cooperatives, INDH platforms and youth associations, with roles formalised in community bylaws. These bodies will lead participatory planning sessions with households (particularly women-headed and low-income households) using meetings, household mapping and visual tools to define energy entitlements, rules for peak-demand management, and priorities for productive uses (e.g. irrigation, refrigeration). This integrated approach ensures transparent, fair and locally accepted energy allocation while embedding women's leadership in everyday energy management.



Phased skills pathway for operation, maintenance and management

Build a female talent pipeline by delivering short, gender-sensitive training programmes for marginalised groups on PV system operation, basic maintenance, battery management, safety and use of digital monitoring tools. Training will be delivered with OFPPT, utilities, local energy agencies and NGOs, and paired with on-the-job mentoring from technicians and cooperative leaders. Graduates can progress into caretaker roles, cooperative technicians, or energy managers within the community.



Safe, inclusive environments and social norms

Governance rules and training will explicitly address safe and inclusive participation, including meeting times accessible to women, codes of conduct, and practical measures such as lighting around energy facilities and safe access to equipment. This helps remove social barriers and supports sustained women's participation in technical and leadership roles.

ECONOMIC DEVELOPMENT | **CLIMATE MITIGATION⁵⁶**
 50 FTE jobs | 530 tCO₂/year

DIGITAL

Implement digital tools for real-time monitoring of energy generation, storage, and consumption optimising benefits to the grid. Dashboards will track performance indicators such as reliability, cost recovery, and user satisfaction. Data-driven insights will support predictive maintenance and inform future improvements, ensuring transparency and accountability.

RESILIENCE CO-BENEFITS

Infrastructure failure/obsolescence

IMPACT INDICATORS

Number of off-grid rural communities electrified through solar microgrids or energy communities

Baseline: 0 energy communities; 452 unserved households in 3 provinces

Target: 2 pilot energy communities (~50 households each) by 2028

Number of households with access to clean, reliable electricity, disaggregated by gender of household head

Baseline: 452 unconnected households; Assa-Zag worst served

Target: 0 unconnected households by 2030 (Morocco PERG programme national target)

55. Feasibility study for establishing local energy communities – EUR 30,000, based on Arup internal projects; governance model design and implementation – EUR 100,000, also based on Arup internal projects; rooftop solar PV – USD 800,000/MWp, derived from a 2.5 MWp rooftop solar project in Casablanca costing USD 2 million; PV O&M – EUR 7,800–14,500/MW/year (average EUR 11,150/MW/year), based on the BloombergNEF; battery energy storage – approximately EUR 1.20–1.79 million/MW, based on a set of large-scale Polish storage project benchmarks, with the pilot cost estimated for a 1.2 MW / 4.8 MWh system; storage O&M – 2.5% of Capex, based on the NREL benchmark; capacity-building support – GBP 3,995 per course, based on The Hague Academy benchmark; and roll-out / communication materials – EUR 5,000, based on Arup internal projects.

56. It was estimated based on the deployment of 0.25 MWp of rooftop solar PV and a 1.2 MW / 4.8 MWh battery storage system, using an average solar yield of 6.3875 kWh/kW/day and a Moroccan grid emission factor of 689 tCO₂/GWh; this gives annual PV generation of 582,859.4 kWh/year (0.5829 GWh/year) and estimated avoided emissions of 401.6 tCO₂/year. It also assumes additional savings from battery storage of 105.7 tCO₂/MW, resulting in 126.9 tCO₂/year for the 1.2 MW system.





E3

Solar-powered agricultural infrastructure combined with agrivoltaics

AT A GLANCE

Establishment of solar infrastructure for agriculture. Agrivoltaics structures will provide shade, helping to reduce heat stress for crops and animals while providing energy for agricultural needs. This includes the installation of 1,000 hectares of agrivoltaic systems, and 165 MWp of photovoltaic for irrigation systems for livestock, supported by feasibility studies and performance monitoring.

 **SECTORS**
Energy and Buildings, Land Use

 **SPATIAL EXTENT**
Rural areas in all provinces

POLICY SYNERGIES

PDR

PDR D.2.2.1 – Support for establishing agricultural value-adding and processing units

PDR D.2.1.1 – Management and commercialisation of the 5,000 ha irrigated perimeter by desalinated water (Chbika)

NDC 3.0

Mitigation NDC 76: Promotion of solar installations for irrigation & livestock

Mitigation NDC 71: Solar PV for argan value chain

Mitigation NDC 72: Conversion to semi-direct and conservation agriculture

Mitigation NDC 1-7: National renewable energy expansion (wind, solar, hybrid)

Adaptation NDC 16-20 (irrigated agriculture & drought resilience)

STRATEGIC GOALS

-  **SG2**
Ensure universal access to clean and affordable energy and become a national leader in renewable energy and green hydrogen production.
-  **SG6**
Retrofit and build climate-resilient, energyefficient infrastructure for all.
-  **SG7**
Build a more gender-inclusive region.

RELATED GCAP ACTIONS

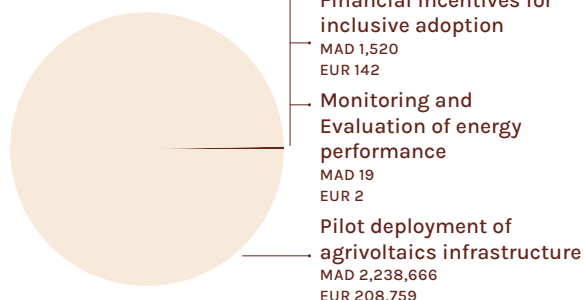
E2

SCHEDULE OF IMPLEMENTATION

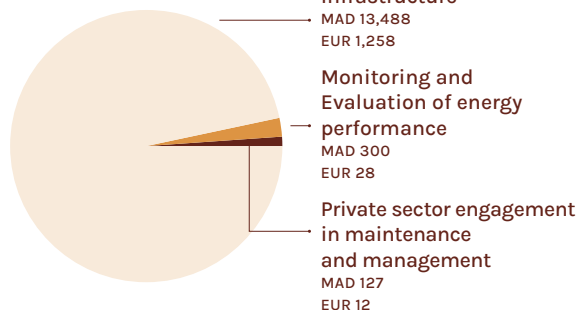
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Agricultural energy audit and agrivoltaics feasibility						
Pilot deployment of agrivoltaics infrastructure						
Financial incentives for inclusive adoption						
Monitoring and Evaluation of energy performance						
Private sector engagement in maintenance and management						

DETAILS ON IMPLEMENTATION⁵⁷

CAPEX (MAD/EUR'000)
MAD 2,243,422
EUR 209,202



CAPEX (MAD/EUR'000)
MAD 13,915 / year
EUR 1,298 / year



ACTION DESCRIPTION

OVERVIEW

Agriculture and fishing accounted for 25.8% of energy consumption across the region and there is a high reliance on fossil fuels for irrigation in the Guelmim-Oued Noun region, particularly the extensive use of butane for water pumping, remains a significant challenge in the agricultural sector. This dependency not only contributes to greenhouse gas emissions, but also results in increased operational costs for farmers and the public sector as a main financial contributor to the sector. Additionally, the region's crops are exposed to intense solar radiation for more than 300 days each year, which leads to considerable evaporation and a subsequent reduction in water efficiency.

This action will pilot the deployment of agrivoltaics infrastructure, supported by energy audits and feasibility studies and enabled by financial incentives. The agrivoltaics development will harness abundant solar energy, helping farmers to substantially decrease their reliance on fossil fuels, thereby lowering energy costs and reducing environmental impact. Agrivoltaics, which involve installing solar panels above crop fields, provide the dual benefit of generating renewable electricity and offering shade to plants and livestock. By adopting these technologies, agriculture in the region can become more resilient to climate change, ensuring sustainable productivity while making full use of its natural solar advantage.

57. Agricultural energy audit and agrivoltaics feasibility – EUR 300,000, based on Arup internal projects; agrivoltaic systems – USD 875,000 per 250 kW system (i.e. USD 3,500/kW), based on the Rutgers / TAPAS Economics of Agrivoltaics benchmark; drip irrigation – USD 5,725/ha as the benchmark initial cost in Morocco, based on the Assessment of Drip Irrigation in Morocco; irrigation maintenance – 10% of Capex, based on the FAO benchmark; operation and maintenance of agrivoltaic systems – USD 20/kW, based on the same Rutgers agrivoltaics benchmark; energy management system – USD 5,000, based on the UNEP Copenhagen Climate Centre benchmark; and private-sector engagement / outreach activities were benchmarked at EUR 9,000 for large events and EUR 7,700 for workshops, based on Arup internal projects.

ACTION OWNER**Ministry of Agriculture (DRA-GON)****DELIVERY PARTNERS**

AMEE Energy audits & feasibility studies	Private agrivoltaics developers Installation & EPC
RGON TA, co-design & targeted farmer support	OFPPT Training for women farmers
Farmers' cooperatives Community-level implementation	Agricultural cooperatives & INDH platforms Women-led farm selection
MASEN Solar integration & technical advisory	Tamwilcom Financing
SDR TPME SME support for agri-solar enterprises	Banks Financing
ABHDON Aquifer & irrigation water efficiency – water nexus	Municipalities Farmer engagement and implementation
	CGEM (Confédération Générale des Entreprises du Maroc) Private sector coordination

ACTION COMPONENTS**AGRICULTURAL ENERGY AUDIT AND AGRIVOLTAICS FEASIBILITY**

A comprehensive audit of current agricultural energy practices will be conducted along an assessment of the technical and economic feasibility of agrivoltaics systems across the region. This study will identify priority zones, crop types, and farm profiles most suitable for intervention.

PILOT DEPLOYMENT OF AGRIVOLTAICS INFRASTRUCTURE

The action will establish 1,000 hectares of agrivoltaic systems at selected pilot sites, combining solar energy generation with crop cultivation to optimise land use and enhance sustainability. These installations will feature solar-powered irrigation systems, demonstrating the synergy between water and energy management while reducing reliance on conventional resources in line with actions W6 and W2. The pilots aim to validate technical performance under local climatic and soil conditions, assess crop productivity, and showcase economic viability.

FINANCIAL INCENTIVES FOR INCLUSIVE ADOPTION

Financial mechanisms such as subsidies, low-interest loans, or tax benefits will be explored to encourage adoption of agrivoltaics systems, ensuring accessibility for smallholder farmers and equitable participation.

MONITORING AND EVALUATION OF ENERGY PERFORMANCE

A monitoring framework will be established to track energy generation, efficiency, and cost savings on large farms (above 20 hectares). The data collected will be used to inform scaling strategies and optimise system design for regional conditions.

PRIVATE SECTOR ENGAGEMENT IN MAINTENANCE AND MANAGEMENT

Partnerships with private actors will be developed for the upkeep and management of agrivoltaics systems. These will include provision of training programmes and performance-based incentives to build local capacity and ensure long-term sustainability.

GENDER EQUALITY AND HUMAN CAPITAL**Phased agrivoltaics adoption and skills support for women farmers**

Prioritise women-owned smallholder farms for agrivoltaics, using participatory farm selection with agricultural cooperatives, INDH platforms and communes to ensure alignment with cropping patterns, irrigation needs and land-tenure realities. This initial uptake will be followed by short, modular and gender-sensitive training delivered with OFPPT, agricultural extension services, local energy agencies and utilities, covering safe operation, basic maintenance and productive use of grid-connected solar (including agrivoltaics), scheduled around agricultural and care calendars and supported by simple, local-language guidance.

**Inclusive finance and technical assistance for uptake**

Combine financial incentives (subsidies, concessional

loans, equipment leasing) with hands-on technical assistance (see above) to reduce upfront barriers for women farmers. Support will include simplified application processes, assistance with vendor selection and after-sales service, and links to group purchasing via cooperatives to lower costs.

**Safe and enabling participation**

Pair women farmers with peer mentors and local technicians during the first seasons of operation to build confidence and reliability. Contractors and service providers will apply safe-workplace practices (appropriate PPE, clear codes of conduct, daylight tasks where feasible) to address social norms that limit women's participation in energy-related activities.

ECONOMIC DEVELOPMENT

400 FTE jobs

CLIMATE MITIGATION⁵⁸264,500 tCO₂/year**DIGITAL**

Sensors for monitoring performance of agrivoltaics and efficiency gains of crops

RESILIENCE CO-BENEFITS

Drought, Extreme temperatures, Infrastructure failure/obsolescence

IMPACT INDICATORS**Agrioltaic surface area installed (ha)**

Baseline: 0 ha agrioltaic in GON; 5,000 ha Chbika irrigated perimeter planned

Target: 1000 ha by 2031+

Clean energy capacity installed for agriculture (MWp)

Baseline: 0 MWp solar irrigation, with high reliance on butane for pumping

Target: 45 MWp by 2031+ (NDC M-76)

58. It was estimated based on agrivoltaic electricity generation and irrigation efficiency improvements, using an installed PV capacity of 164.73 MW, an average solar yield of 6.3875 kWh/kWp/day, and a Moroccan grid emission factor of 688.5 tCO₂/GWh; this gives annual electricity generation of 384,060,209.2 kWh/year (384.06 GWh/year) and estimated avoided emissions of 264,425.5 tCO₂/year. It also includes additional savings from switching irrigation systems, using an emissions difference of 0.077 tCO₂/ha between sprinkler and drip irrigation, resulting in a further 80 tCO₂/year.

E4

Deploy rooftop solar photovoltaic panels, solar thermal systems and deep renovations for public buildings

AT A GLANCE

Deploy photovoltaic solar panels and solar thermosiphons on the roofs of regional and other public buildings to reduce CO2 emissions, with the support of technical studies, a development fund, pilot projects and training opportunities for local communities and SMEs.

SECTORS
Energy and Buildings, Land Use

SPATIAL EXTENT
Urban areas in all provinces

POLICY SYNERGIES

PDR

PDR B.2.1.1 – Upgrading programme for provincial cities (public facilities)

PDR C.1.1.2 – Equipment of healthcare centres

PDR C.2.1.1 – Funding programme for new regional higher-education institutions

NDC 3.0

Mitigation NDC 37: Deployment of rooftop solar PV

Mitigation NDC 36: National Solar Water Heater Programme

Mitigation NDC 34: Energy efficiency for building envelopes (RTCM)



STRATEGIC GOALS



SG2
Ensure universal access to clean and affordable energy and become a national leader in renewable energy and green hydrogen production.



SG6
Retrofit and build climate-resilient, energyefficient infrastructure for all.



SG7
Build a more gender-inclusive region.

RELATED GCAP ACTIONS

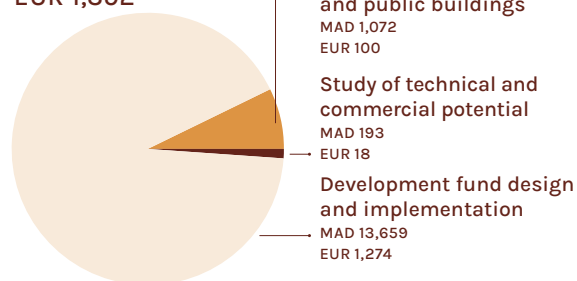
U1

SCHEDULE OF IMPLEMENTATION

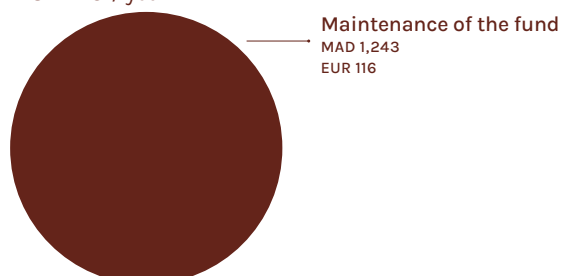
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Study of technical and commercial potential						
Development fund design and implementation						
Procure and deliver the programme of rooftop solar PV across municipal and public buildings						

DETAILS ON IMPLEMENTATION⁵⁹

CAPEX (MAD/EUR'000)
MAD 14,924
EUR 1,392



CAPEX (MAD/EUR'000)
MAD 1,243 / year
EUR 116 / year



ACTION DESCRIPTION

OVERVIEW

Public buildings in the region face high energy consumption and poor energy performance, with public institutions accounting for 60% of overall consumption and 80% of daily consumption. Most of that energy use come from firewood and electricity from non-renewable sources. More generally there is limited understanding of building energy performance within the region with fewer than 25% having energy performance certificates.

This action will deploy rooftop solar PV across municipal and public buildings and include complementary retrofit measures to improve energy performance in public buildings. These components will be supported by studies of technical and commercial potential and the development of a fund to support the programme implementation. This will reduce operational costs for the public sector, strengthen leadership in the energy transition, and create opportunities to enhance the skills of the regional supply chain. These actions will also improve comfort and resilience in public infrastructure, ensuring that public buildings become models of sustainability and efficiency for the wider community.

59. Study of technical and commercial potential – EUR 18,000, based on the Solar Map of Pamplona benchmark; development fund design and implementation – EUR 65,000, based on the similar project “creating a Sustainable Energy Fund in Vilnius” (with ongoing programme support additionally benchmarked using 5 FTEs at an average Moroccan public-sector salary of USD 1,000/month); deep renovation works – EUR 600/m², based on Arup internal projects and applied to the assumed public building area; and rooftop solar PV programme preparation (including site assessments, structural evaluations and integration with existing electrical infrastructure) – EUR 100,000, based on Arup internal projects.

ACTION OWNER	
AREP	RGON
DELIVERY PARTNERS	
AMEE Technical audits & energy performance assessments	MASEN PV integration
Municipalities Building access & local coordination	MTEDD Regulatory oversight & building codes – RTCM
Public institutions – schools, hospitals, admin Beneficiaries	Private operators Installation & EPC
ESCOs Delivery & performance contracts	OFPPT Skills training for PV installation
	Private operators

ACTION COMPONENTS

STUDY OF TECHNICAL AND COMMERCIAL POTENTIAL

This phase will assess roof suitability, solar resource availability, and cost-benefit scenarios for PV and thermosiphon systems, while prioritising basic energy performance improvements to reduce demand before adding renewables. Measures may include enhancing insulation, optimising lighting, and improving HVAC efficiency. The assessment will identify priority buildings such as schools and hospitals, ensuring technical feasibility, financial viability, and a holistic approach to energy efficiency.

DEVELOPMENT FUND DESIGN AND IMPLEMENTATION

This action will establish a dedicated fund to finance installations, leveraging public and private contributions. The regional and public buildings programme will take the form of a development fund which will identify a pipeline of building-level projects and procure packages of solar PV and thermal installations in a manner designed to attract market interest and achieve acceptable payback for the investment, including engagement with International Financial Institutions (IFI) and/or private funds.

The development fund will consider a comprehensive renovation of up to three pilot regional and public buildings. Proposed measures include installing cool, reflective roofs,

adding shading devices, and insulating building envelopes to cut energy use and enhance indoor thermal comfort. By reducing indoor temperatures, these improvements can also boost workplace productivity.

PROCURE AND DELIVER THE PROGRAMME OF ROOFTOP SOLAR PV ACROSS MUNICIPAL AND PUBLIC BUILDINGS

The delivery phase will include site assessments, structural evaluations, and the integration of solar PV systems with existing electrical infrastructure. Some sites may explore the integration of battery energy storage systems alongside these installations. This stage will also ensure compliance with quality standards and integrate energy efficiency measures during renovations.

GENDER EQUALITY AND HUMAN CAPITAL



Equitable public-building prioritisation

Prioritise schools, hospitals, community centres and social facilities that primarily serve women, children, elderly people and vulnerable populations for rooftop solar, solar thermal and deep renovation pilots. This ensures that energy savings, improved thermal comfort and resilience benefits accrue first to users with the highest exposure to heat stress and service access needs.



Inclusive local supply chains and SMEs

Use the programme to stimulate local supply chains, prioritising local SMEs and cooperatives for installation and renovation contracts. SMEs participating in the programme will be required to recruit and train women and youth, helping expand regional capacity in solar PV, solar thermal systems, insulation, shading devices and energy-efficient retrofits. Apply inclusive workplace standards (gender-appropriate PPE, facilities and codes of conduct) in procurement to support women's participation.



Young women in building-energy professions pipeline

Establish a structured pipeline for women and young people into energy-related building professions,

delivered in partnership with AMEE, OFPPT, municipalities, universities and technical schools. This will include targeted outreach to young women at university, AMEE-led training and certification (solar installation, auditing, energy performance), and paid internships or site placements during public-building works, linking education directly to live projects.

ECONOMIC DEVELOPMENT 30 FTE jobs	CLIMATE MITIGATION N/A
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DIGITAL

Implement digital tools for real-time monitoring of energy generation, storage, and consumption including benefits to grids (eg. accommodating more demand at peak times, reducing carbon intensity). Dashboards will track performance indicators such as reliability, cost recovery, and user satisfaction. Data-driven insights will support predictive maintenance and inform future improvements, ensuring transparency and accountability.

RESILIENCE CO-BENEFITS

Extreme temperatures, Infrastructure failure/obsolescence

IMPACT INDICATORS

Number of public buildings retrofitted with solar PV and/or solar thermal systems

Baseline: 0 public buildings retrofitted

Target: 50 public buildings (schools, health centres, municipal buildings) by 2030 (NDC M-37)

Building sector energy consumption reduction (% reduction vs BAU)

Baseline: Public buildings = 60% of regional energy consumption; 80% of daily consumption

Target: -14% building sector energy reduction by 2030 (SNEE 2030)

Total installed rooftop solar capacity on public buildings (kWp)

Baseline: 0 kWp public building solar in GON

Target: 500 kWp by 2030 (NDC M-37)

E5

Deployment of energy-efficient, low-carbon and inclusive public lighting

AT A GLANCE

Upgrade urban lighting systems to high-efficiency, solar-powered and responsive technologies, based on an infrastructure audit and night-time vulnerability assessment, with gradual implementation.

SECTORS
Energy and Buildings, Land Use

SPATIAL EXTENT
Urban areas in all provinces

POLICY SYNERGIES

PDR

PDR B.2.1.1 – Upgrading programme for provincial cities (Phase 2)

PDR B.3.1.2 – Upgrading programme for rural centres

PDR C.4.1.1 – Implementation of the Diversity Programme (Gender & Disability)

NDC 3.0

Mitigation NDC 40: National Public Lighting Energy Efficiency Programme



STRATEGIC GOALS



SG2

Ensure universal access to clean and affordable energy and become a national leader in renewable energy and green hydrogen production.



SG6

Retrofit and build climate-resilient, energyefficient infrastructure for all.



SG7

Build a more gender-inclusive region.

RELATED GCAP ACTIONS

U1

SCHEDULE OF IMPLEMENTATION

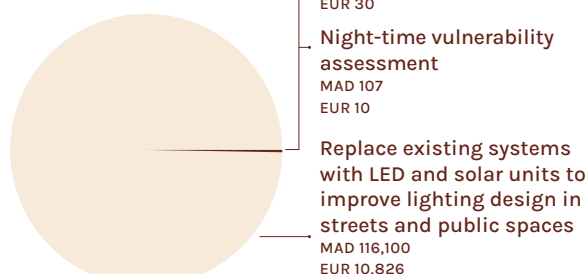
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Initial audit and phased plan						
Night-time vulnerability assessment						
Replace existing systems with LED and solar units to improve lighting design in streets and public spaces						

DETAILS ON IMPLEMENTATION⁶⁰

CAPEX (MAD/EUR'000)

MAD 116,529

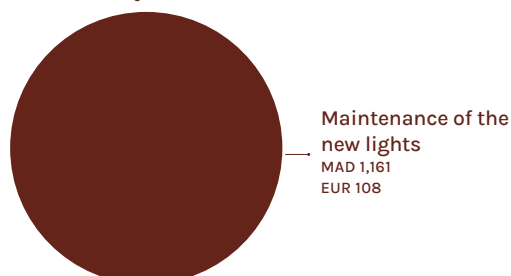
EUR 10,866



CAPEX (MAD/EUR'000)

MAD 1,161 / year

EUR 108 / year



ACTION DESCRIPTION

OVERVIEW

Public lighting, while accounting for only 0.7% of total energy use in the Guelmim-Oued Noun region, relies heavily on outdated systems that waste energy and limit efficiency. Although some initiatives to introduce LED technology exist, progress remains uneven. Moreover, public lighting plays a critical role in safety and social inclusion, particularly for women and vulnerable groups, making its modernisation an urgent priority for both environmental and social reasons. This action builds on the urban rehabilitation programme launched in Guelmim and Bouizakarne, which includes major upgrades to public lighting as part of wider street and avenue redevelopment efforts.

This action will upgrade public lighting to modern, energy-efficient systems will significantly reduce energy consumption, improve safety, and enhance the quality of public spaces. The implementation of the action will be supported by an initial audit of lighting infrastructure as well as night-time vulnerability assessments in target locations to target particularly vulnerable areas. This action supports climate mitigation goals while fostering social inclusion, creating well-lit, secure environments that benefit all community members and demonstrate leadership in sustainable urban development.

60. Initial audit – EUR 30,000, based on Arup internal projects; night-time vulnerability assessment – EUR 10,000, also based on Arup internal projects; public lighting replacement – USD 3,000 per solar light, based on the Streetlights-solar.com benchmarks; and maintenance of the new lighting infrastructure – 1% of Capex, based on Arup internal projects.

ACTION OWNER	
Municipalities	
DELIVERY PARTNERS	
RGON Co-financing & design standards	ESCOs Performance-based contracting
AMEE Training, audits & technical assistance	Private lighting suppliers
ONEE-BE Grid interface for lighting networks	Ministry of Interior / DGCT Oversight
SRM GON Electricity distribution operator since Oct 2025 – éclairage public within SRM scope per Loi 83-21	Civil society & women's groups Gender-informed safety prioritisation

ACTION COMPONENTS

INITIAL AUDIT AND PHASED PLAN

This action will evaluate existing lighting infrastructure across the region, identify high-priority areas, and define a phased upgrade strategy, including coordination with the plans for delivery of U1. It will consider energy consumption, coverage gaps, and maintenance needs.

NIGHT-TIME VULNERABILITY ASSESSMENT

This phase will analyse how lighting affects safety and accessibility, incorporating community feedback through community engagement activities, such as neighbourhood walks, public consultation and workshops. Evidence-based solutions will address vulnerable zones and improve inclusivity.

REPLACE EXISTING SYSTEMS WITH LED AND SOLAR UNITS TO IMPROVE LIGHTING DESIGN IN STREETS AND PUBLIC SPACES

The delivery phase will include site assessments, This action will install 10,000 new solar lights to improve lighting in streets and the public realm. It will be supported by an

initial audit and phased plan, prioritising areas with poor coverage or high energy use. It will reduce emissions and operational costs. This phase will also consider placement and brightness of lights to enhance visibility and aesthetics, creating safer and more welcoming environments.

GENDER EQUALITY AND HUMAN CAPITAL

- **Gender-informed prioritisation**

Conduct targeted surveys and data collection focusing on women, young people, elderly residents and other vulnerable groups to identify locations where poor lighting limits safety, mobility, or access to services. Inputs will be combined with crime data, pedestrian flows and service locations (schools, markets, transport stops) to prioritise upgrades where lighting gaps have the greatest social impact.
- **Participatory night-time safety audits**

Organise night-time safety walks and facilitated assessments with women, elderly residents and youth in selected neighbourhoods. These walk-throughs will identify dark spots, unsafe crossings, poorly lit paths and public spaces, informing decisions on lighting placement, height, brightness and coverage. Findings will be documented and used directly to refine lighting designs before installation.
- **Inclusive design**

Ensure lighting solutions support long-term safety and usability, including appropriate pole heights, avoidance of glare, unobstructed sightlines, integration with shade trees and street furniture. Design choices will balance energy efficiency with social outcomes, improving night-time mobility.

ECONOMIC DEVELOPMENT	DIGITAL
80 FTE jobs	N/A

CLIMATE MITIGATION ⁶¹	RESILIENCE CO-BENEFITS
3,600 tCO ₂ /year	Infrastructure failure/obsolescence

IMPACT INDICATORS

Reduction in energy consumption from public lighting in GON (%)
Baseline: Consumption TBC from SRM/commune energy audit (E5 Year 1 component)
Target: ≥40% reduction in public lighting energy consumption by 2031 (SNEE 2030)

61. It was estimated by scaling a benchmark from ICLEI Case Study, which assumes annual emissions savings of 65,358 tCO₂/year from the replacement of 180,000 lights, equivalent to 0.3631 tCO₂ per light per year; this factor was applied to the assumed deployment of 10,000 new lights in Guelmim.

E6

Improving energy and water efficiency in traditional hammams

AT A GLANCE

Encourage to modernise traditional hammams to cope with increasing drought, through a technical and economic feasibility study, pilot 16 hammams renovations with water reuse systems, followed by monitoring, evaluation and regional-scale expansion.



SECTORS
Energy and Buildings, Water



SPATIAL EXTENT
Urban areas in all provinces

POLICY SYNERGIES

PDR
N/A

NDC 3.0

Mitigation NDC 40: National Public Lighting Energy Efficiency Programme

STRATEGIC GOALS



SG1
Ensure sustainable, equitable, and resilient water management across the region.



SG2
Ensure universal access to clean and affordable energy and become a national leader in renewable energy and green hydrogen production.



SG7
Build a more gender-inclusive region.

RELATED GCAP ACTIONS

W2

W6

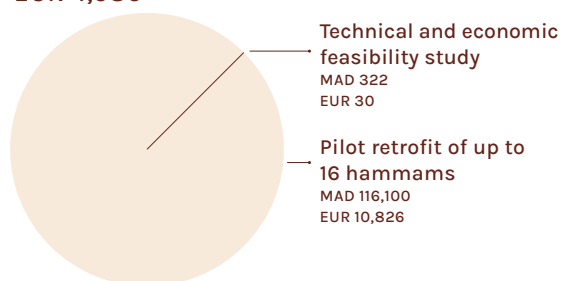
SCHEDULE OF IMPLEMENTATION

ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Technical and economic feasibility study						
Pilot retrofit of up to 16 hammams						
Monitoring and evaluation of pilots						
Regional roll-out						

DETAILS ON IMPLEMENTATION⁶²

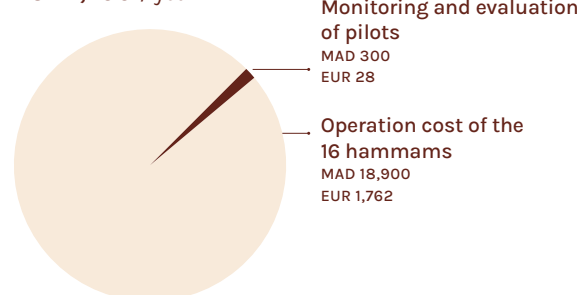
CAPEX (MAD/EUR'000)

MAD 53,408
EUR 4,980



CAPEX (MAD/EUR'000)

MAD 19,200 / year
EUR 1,790 / year



62. Technical and economic feasibility study – EUR 160,000, based on Arup internal projects; pilot retrofit of hammams – benchmarked using the Victoria Baths reference, including cost items such as GBP 60,000 for heating the front of house, GBP 16,360 for re-opening the Turkish baths, GBP 169,080 for bringing pools back into use, and GBP 313,890 for upgrading the energy centre, which together were used to estimate retrofit costs per facility; energy-related operating costs were based on annual consumption benchmarks from the same Victoria Baths source and a natural gas price benchmark for Morocco from GlobalPetrolPrices; and monitoring and evaluation costs were estimated using 2 FTEs at an average Moroccan public-sector salary of USD 1,000/month, sourced from maroc.ma.

ACTION DESCRIPTION

OVERVIEW

Hammams face multiple interconnected challenges, including energy-intensive operations and outdated boiler systems that drive high pollution levels and excessive consumption of wood and water. They account for over 50% of energy use in the region's tertiary sector, relying on inefficient infrastructure that strains resources.

This action will encourage the modernisation of traditional hammams to significantly cut boiler emissions, reduce air pollution from burning biomass, reduce water use and deforestation, and deliver health benefits across the region. Improved fuel efficiency also offers strong financial returns for owners, with investments typically reaching breakeven in around six months.

ACTION OWNER

Communes and municipalities

DELIVERY PARTNERS

AMEE

Technical audits & training on energy efficiency

Hammam owners' associations

Investment & operations

RGON

Co-financing & programme coordination

Ministry of Interior

Authorisations & building permits

ESCOs

Delivery & performance contracts

OFPPT

Skills training for retrofit technicians

Women's cooperatives

User-centred renovation design

ACTION COMPONENTS

TECHNICAL AND ECONOMIC FEASIBILITY STUDY

A technical and economic feasibility study will assess the potential for modernisation of hammams, including implementation of more efficient boilers using alternative organic biomass such as argan or almond shells, olive pits, estimate energy and water savings, explore operating models and return on investment for traditional facilities, and the identification of pilot towns and cities.

PILOT RETROFIT OF UP TO 16 HAMMAMS

The pilot project focuses on the comprehensive retrofit of up to 16 traditional hammams. Each facility will undergo renovation and modernisation to enhance energy and water efficiency, including improved building insulation, installation of high-performance boilers, and advanced water reuse systems such as greywater recycling. To further reduce environmental impact, solar thermal and photovoltaic technologies will be integrated to provide renewable heating and electricity. This initiative aims to create a replicable model for eco-friendly hammams that preserve tradition while meeting contemporary standards of comfort and resource efficiency.

MONITORING AND EVALUATION OF PILOTS

Monitoring and evaluation of the pilot hammams to measure impact and guide future scaling. This component will track energy and water consumption before and after retrofits, assess operating costs, and gather user feedback on comfort and satisfaction. The findings will provide evidence-based insights into performance, efficiency gains, and user experience improvements.

REGIONAL ROLL-OUT

The next phase aims for region-wide deployment, targeting 50% of the 250 existing hammams in the region. This scale-up will build on lessons from the pilot and

introduce robust support mechanisms to ensure adoption and sustainability. These include financial incentives such as subsidies, tailored technical assistance for operators, and the establishment of public-private partnerships to mobilise investment and expertise.

GENDER EQUALITY AND HUMAN CAPITAL



Women-centred renovation design

Engage women as primary users and influencers in pilot hammam renovations through short consultations and walk-throughs with female users, attendants and owners. Input will inform layout, ventilation, thermal comfort, accessibility features (steps, seating, handrails), operating schedules and privacy considerations, ensuring renovations meet women's needs and drive acceptance of upgrades



Training women and youth as boiler promoters and technicians

Support young women and men to become local promoters and technicians for improved, low-emission hammam boilers (including biomass alternatives such as nut shells). This will include hands-on workshops with manufacturers, mentoring by experienced installers, and links to finance so trainees can operate as micro-entrepreneurs or service contractors during the regional roll-out. The same training pathway will include optional/additional modules on solar thermal circuits, heat-exchangers/controls, and basic water-reuse integration, enabling graduates to service schools, clinics, community centres and small hotels/guesthouses as well as hammams, building a transferable, income-generating skillset for the wider retrofit market.



Accessible facilities

Ensure lighting solutions support long-term safety and usability, including appropriate pole heights, avoidance of glare, unobstructed sightlines, integration with shade trees and street furniture. Design choices will balance energy efficiency with social outcomes, improving night-time mobility.

ECONOMIC DEVELOPMENT

100 FTE jobs

DIGITAL

N/A

CLIMATE MITIGATION⁶³

3,600 tCO₂/year

RESILIENCE CO-BENEFITS

Drought, Infrastructure failure/obsolescence

IMPACT INDICATORS

Number of hammams retrofitted with energy-efficient boilers and/or solar thermal systems

Baseline: Number of operating hammams in TBC from commune surveys.

Target: 30 hammams retrofitted by 2030

Energy consumption reduction per hammam (%)

Baseline: Average hammam energy consumption TBC from energy audit.

Target: ≥40% reduction in wood/fuel consumption per hammam by 2030 (AMEE energy efficiency benchmarks)

Water consumption reduction per hammam (m³/year)

Baseline: Average hammam water consumption TBC from water utility data.

Target: ≥30% reduction through solar water pre-heating and recycling by 2030

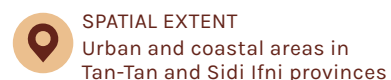
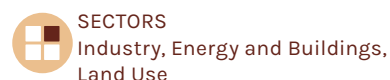
63. It was estimated based on benchmark savings per retrofitted hammam from the Victoria Baths reference, including 28 tCO₂/year from heating the front of house, 42 tCO₂/year from re-opening the Turkish baths, 125 tCO₂/year from bringing pools back into use, and 31 tCO₂/year from upgrading the energy centre; this gives total estimated savings of 226 tCO₂/year per hammam, which was applied to 16 hammams.

E7

Decarbonisation of the food processing industry

AT A GLANCE

Encourage the decarbonisation of the industrial food processing, including fisheries related value chains, by establishing a regional roadmap for industry, promoting improvements in energy efficiency, integration of renewable energy and electrification of processes, supported by access to finance and capacity building.



POLICY SYNERGIES

PDR

PDR D.1.3.1 – Industrial investor support programme for processing activities

PDR D.1.4.2 – Development of support services in ports (ice production, cold logistics, etc.)

PDR D.1.4.1 – Construction & upgrading of sentinel fishing villages

PDR E.3.1.1 – Regional carbon-footprint monitoring programme

PDR D.6.1.1 – Development of the El Ouatia economic zone (Phase 2)

NDC 3.0

Mitigation NDC 10-11: Energy efficiency in industry by 2030

Mitigation NDC 14: Renewable energy (rooftop PV) self-consumption in industry

STRATEGIC GOALS

- SG2**
Ensure universal access to clean and affordable energy and become a national leader in renewable energy and green hydrogen production.
- SG6**
Retrofit and build climate-resilient, energy efficient infrastructure for all.
- SG7**
Build a more gender-inclusive region.

RELATED GCAP ACTIONS

W7

E1

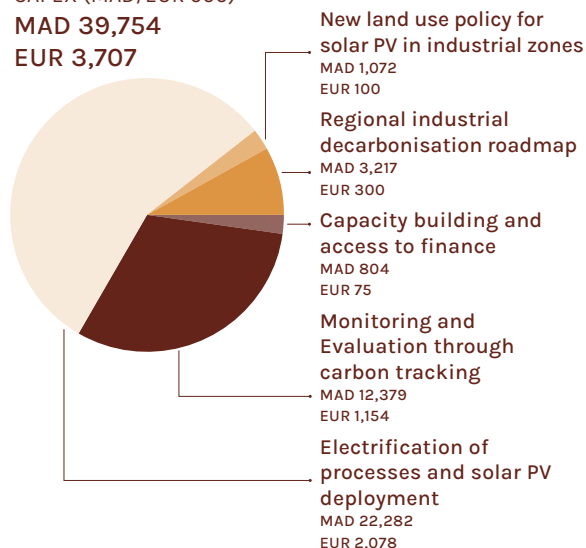
SCHEDULE OF IMPLEMENTATION

ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Regional industrial decarbonisation roadmap						
New land use policy for solar PV in industrial zones						
Electrification of processes and solar PV deployment						
Monitoring and Evaluation through carbon tracking						
Capacity building and access to finance						

DETAILS ON IMPLEMENTATION⁶⁴

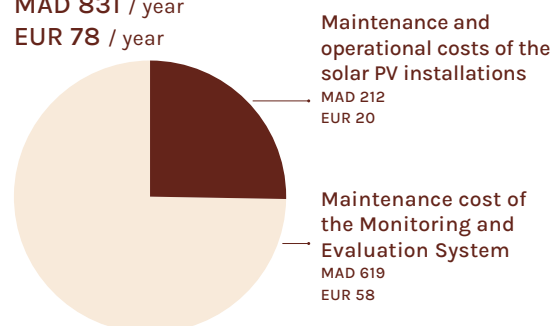
CAPEX (MAD/EUR'000)

MAD 39,754
EUR 3,707



CAPEX (MAD/EUR'000)

MAD 831 / year
EUR 78 / year



ACTION DESCRIPTION

OVERVIEW

The industrial sector, responsible for 5.6% of total energy demand in the Guelmim-Oued Noun region, relies entirely on fossil fuels, with no contribution from renewables. Within this sector, the food processing industry alone accounts for 82.3% of energy consumption, making it a key target sector for the action. In particular, fisheries-related value chains concentrated around Tan-Tan and Sidi Ifni include energy-intensive cold chain and logistics infrastructure, which remains largely fossil-fuel powered and drives both costs and emissions. Despite the region's very high solar potential, this resource remains largely untapped. In parallel, Tan-Tan, identified as the main industrial cluster, is expanding alongside an increasing urban footprint, creating opportunities for shared infrastructure and integrated solutions.

This action will encourage industrial decarbonisation through a regional roadmap aligned with AMEE's national strategy, setting clear targets, compliance requirements, and investment priorities. It includes mandatory solar PV integration in new industrial zones, electrification of processes in pilot facilities, and large-scale renewable deployment. Complementary measures cover carbon tracking, capacity building, and access to green finance, ensuring transparency, technical support, and a predictable framework for industries to transition towards a low-carbon economy. By leveraging solar potential and modernising industrial processes, the initiative will support sustainable growth, strengthen competitiveness, and help position the Region as a leader in low-carbon industrial development.

ACTION OWNER**Ministry of Industry & Trade****DELIVERY PARTNERS**

MASEN RE integration for industrial processes	CRI Investment support & SME facilitation
MTEDD Regulatory oversight & environmental standards	CGEM regional branch Private sector coordination
AMEE Energy efficiency audits & roadmap development	RGON Enabling package coordination & co-financing
IRESEN Innovation & R&D	OFPPT Workforce upskilling & women in green industrial skills

ACTION COMPONENTS**REGIONAL INDUSTRIAL DECARBONISATION ROADMAP**

This component will establish a comprehensive roadmap that sets sector-specific targets and timelines for reducing emissions, fully aligned with AMEE's national strategy. It will outline clear compliance requirements and investment priorities for industries, with particular attention to agri-food and fisheries processing value chains, helping stakeholders plan long-term transitions. The roadmap will also identify key milestones, monitoring indicators, and mechanisms for accountability, ensuring that the Region moves towards a low-carbon economy in a structured and transparent manner.

NEW LAND USE POLICY FOR SOLAR PV IN INDUSTRIAL ZONES

This phase will introduce regulatory measures mandating the integration of solar photovoltaic (PV) systems in all new industrial developments, including the five new industrial zones currently under finalisation and planned across the region. By embedding renewable energy requirements into land-use planning, the policy will ensure that new food-processing and fisheries-related facilities are designed with clean energy integration from the outset. It will also provide guidelines for optimal site selection, grid connectivity, and

technical standards, creating a predictable framework for developers and investors.

ELECTRIFICATION OF PROCESSES AND SOLAR PV DEPLOYMENT

This action will focus on replacing fossil fuel-based processes with electric alternatives in energy-intensive sectors such as fisheries (e.g. cold stores, ice plants and processing units) and food processing by selecting 3 pilot facilities with estimated energy needs of 3 MWp. It will be complemented by large-scale deployment of solar PV systems to supply clean electricity, reducing dependence on imported fuels and cutting operational costs. Technical assistance will be provided to industries to identify suitable electrification technologies and integrate renewable generation effectively.

MONITORING AND EVALUATION THROUGH CARBON TRACKING

To ensure transparency and continuous improvement, this phase will implement advanced energy management systems and carbon footprint tracking tools across the pilot industrial facilities. These systems will enable real-time monitoring of energy consumption and emissions, providing actionable insights to optimise performance. Regular reporting will help measure progress against the roadmap targets and inform policy adjustments where needed.

CAPACITY BUILDING AND ACCESS TO FINANCE

This component will deliver targeted training programmes on climate-smart practices, renewable integration, and energy efficiency for industry professionals and local suppliers, including fisheries cooperatives and operators of cold storage and processing facilities. In parallel, it will facilitate access to financing through partnerships with banks and development agencies, offering tailored instruments such as green loans and guarantees. By combining knowledge and financial support, this action will empower businesses to invest confidently in sustainable technologies.

GENDER EQUALITY AND HUMAN CAPITAL**Women in green industrial skills**

Establish a targeted skills-to-jobs pathway for women and youth in the food-processing sector by delivering modular, gender-sensitive training on energy efficiency, renewable integration and process electrification. Training will be delivered in partnership with AMEE, OFPPT, industry associations and pilot facilities, and will focus on practical roles such as energy auditors, process-efficiency technicians, solar O&M assistants and carbon-data officers. Targeted outreach will focus on existing female employees looking to advance their careers, as well as through women's cooperatives, technical schools and local employment platforms will ensure women are actively recruited, with paid internships, site-based learning linking training directly to real industrial applications and longer-term employment opportunities.

**Inclusive access to decarbonisation finance**

Enable women-owned and SMEs in food processing to participate in industrial decarbonisation by designing tailored green-finance windows (e.g. concessional loans, technical-assistance-linked grants). Support will include simplified application procedures, business and investment coaching, and hands-on assistance to meet technical, compliance and reporting requirements under the regional decarbonisation roadmap, allowing smaller firms to invest confidently in energy-efficient equipment, electrification and on-site renewables. All coaches and advisors engaged through the programme will receive practical training on gender-responsive enterprise support (e.g., addressing time/care constraints in scheduling, using inclusive communication, and establishing clear, safe feedback channels) so that guidance is accessible, relevant and effective for women-led businesses.

ECONOMIC DEVELOPMENT 70 FTE jobs	DIGITAL N/A
CLIMATE MITIGATION ⁶⁵ 4,800 tCO ₂ /year	RESILIENCE CO-BENEFITS Infrastructure failure/ obsolescence

IMPACT INDICATORS

Renewable energy share in energy mix of targeted food processing facilities (%)

Baseline: ~0% RE in food processing energy mix

Target: ≥30% RE share in retrofitted enterprises by 2030 (NDC M.14)

Energy intensity reduction per participating enterprise (% reduction)

Baseline: TBC – no energy audit data for industries

Target: -22% at national industry sector level by 2030 (SNEE 2030)

64. Regional industrial decarbonisation roadmap – EUR 300,000, based on Arup internal projects; new land use policy for solar PV in industrial zones – EUR 100,000, also based on Arup internal projects; rooftop solar PV deployment – USD 800,000/MWp, derived from a 2.5 MWp rooftop solar project in Casablanca costing USD 2 million; PV O&M – EUR 7,800–14,500/MW/year (average EUR 11,150/MW/year), based on the BloombergNEF benchmark; energy management systems – USD 8 million for 18 facilities (USD 444,444 per facility), based on the benchmark of industrial EMS deployment; maintenance and operational costs of the EMS – 5% of Capex, based on Arup internal projects; and capacity-building / access to finance support – EUR 75,000, also based on Arup internal projects.

65. It was estimated based on the deployment of 3 MWp of rooftop solar PV, using an average solar yield of 6.3875 kWh/kW/day and a Moroccan grid emission factor of 689 tCO₂/GWh; this gives annual electricity generation of 6,994,312.5 kWh/year (6.9943 GWh/year).



LONG-TERM ACTION

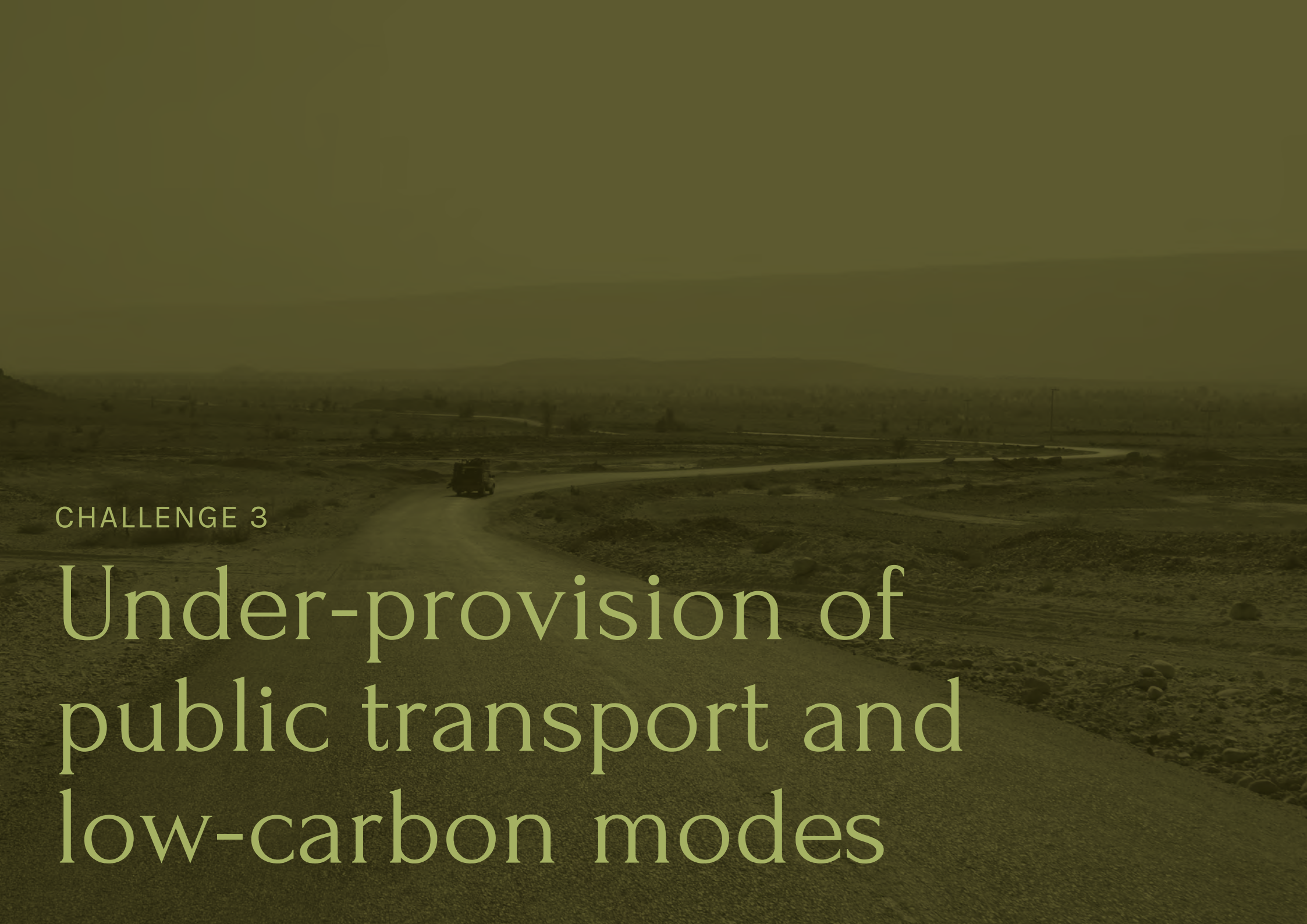
E8

One-stop shop for home renovation and electrification

Establish an advisory and financial assistance service to help households cope with rising average and extreme temperatures, through local advice points, a catalogue of trusted suppliers, financial incentives for rooftop photovoltaic installations and efficient appliances, and the deployment of smart metering systems.

1. Creation of an energy and renovation advice point in public buildings in major urban and rural areas to provide advice on solutions to reduce energy consumption and passive cooling, such as cool roofs and low-thermal-transmission windows. In this context, create a catalogue of trusted suppliers, giving priority to local suppliers.
2. Creation of a financial incentive programme (grants or 0% loans) for energy efficiency measures: photovoltaic panels on roofs, installation of solar systems, more efficient stoves in rural areas.
3. Deploy a smart energy consumption metering system.



A sepia-toned photograph of a desert landscape. A winding road leads from the foreground into the distance, where a small vehicle is visible. The terrain is arid with sparse vegetation and distant hills under a hazy sky.

CHALLENGE 3

Under-provision of public transport and low-carbon modes

CHALLENGE 3

Under-provision of public transport and low-carbon modes

The region's transport network has improved in recent years, particularly with the opening of a new highway connecting Guelmim to Agadir. However, there remains a stark divide between urban and rural areas: secondary road networks are of lower quality, and public transport is largely absent. Over 90% of commuting trips are made by private vehicles, while walking and cycling are common in urban centres but lack safe, dedicated infrastructure. This situation limits access to jobs, education, and services, especially for women, youth, and rural residents, and contributes to rising emissions and congestion.

Regional authorities, supported by the PDR and national strategies, are responsible for planning and coordinating transport infrastructure. Recent efforts include the purchase of buses for Guelmim and the development of an urban mobility plan, but coverage and integration remain limited.

The GCAP introduces a suite of actions to promote inclusive, low-carbon mobility which will consist of:

- **The improvement of transport infrastructure in rural areas** **T1** including by upgrading and constructing climate-resilient rural roads to connect isolated communities.
- In urban centres and tourist areas, **the development of infrastructure for active travel** **T2**, consisting of building new footpaths and cycle lanes in urban centres and tourist areas.
- The launch of a pilot programme for shared bicycles, e-bikes, and scooters in Guelmim City **to develop a shared micro-mobility system** **T3**.
- The introduction of a **new and expanded fleet of buses as a public transport option** **T4** to improve accessibility and reduce reliance on informal taxis. The action will look to procure 45 buses for urban and rural routes.
- **The development of intermodal transport hubs** **T5** to create hubs in main cities to integrate public transport, micro-mobility, and park-and-ride options.
- The transition to lower carbon modes will be supported by the **planning and pilot implementation of electric charging infrastructure** **T6** to establish a pilot network of EV charging stations in major cities and along key corridors.

With a total of MAD 2,433,488,000 (EUR 226,928,000), these actions are estimated to directly support the creation of more than 900 jobs and will enhance connectivity, reduce emissions, and ensure equitable access to mobility for all residents in the Guelmim-Oued Noun region.

The impact of these actions could be further amplified through the development of a Sustainable Urban Mobility Plan (SUMP), which would provide an integrated framework for sequencing investments, coordinating modes and operators, and aligning infrastructure with land-use and service access priorities. While the development of a SUMP sits outside the remit of the GCAP, the actions described here are in line with the objectives of a Sustainable Urban Mobility Plan.

In addition to these actions, the Region will be exploring longer-term actions such as the extension of public transport lines operated by private operators, micro-distribution centres and cargo bikes and the introduction of intelligent transport systems.

ACTION FUNCTION	ACTION REF.	ACTION TITLE	PROVINCE	SPATIAL EXTENT			
				URBAN	RURAL	COASTAL	REGIONAL
ACCESS Actions that support access to the transport network	T1	Improvement of transport infrastructure in rural areas	All provinces				
	T2	Development of infrastructure for active travel	All provinces				
SERVICE Actions that improve and expand transport services	T3	Development of a shared micro-mobility system	Guelmim				
	T4	Provision of buses as a public transport option in urban areas and subsequent extension to rural areas	All provinces				
INTERGRATION Actions that integrate public transport services and low-emission travel	T5	Development of intermodal transport hubs	All provinces				
	T6	Planning and pilot implementation of electric charging infrastructure in strategic locations	All provinces				

Table 8. Function and location matrix of Challenge 3 actions



T1

Improvement of transport infrastructure in rural areas

AT A GLANCE

Develop rural road infrastructure to reduce vulnerability to flooding and landslides, through a survey of the existing road network, reconstruction of primary roads using permeable materials and integration of SuDS systems, and construction of new roads connecting rural douars to main roads.



SECTORS
Transport



SPATIAL EXTENT
Rural areas in all provinces

POLICY SYNERGIES

PDR

PDR B.1.2.1 – Programme for construction and modernisation of non-classified roads

PDR B.1.1.1 – Programme for construction and modernisation of classified interregional & intraregional roads

PDR B.1.3.1 – Road maintenance programme

NDC 3.0

Adaptation NDC 12: Prevention and management of floods, droughts and extreme climate events.

Adaptation NDC 44: Generalisation of territorial project design in vulnerable zones

STRATEGIC GOALS



SG4

Build an inclusive, low-carbon, and accessible transport system connecting all communities.



SG6

Retrofit and build climate-resilient, energy-efficient infrastructure for all.



SG7

Build a more gender-inclusive region.

RELATED GCAP ACTIONS

U1

U2

SCHEDULE OF IMPLEMENTATION

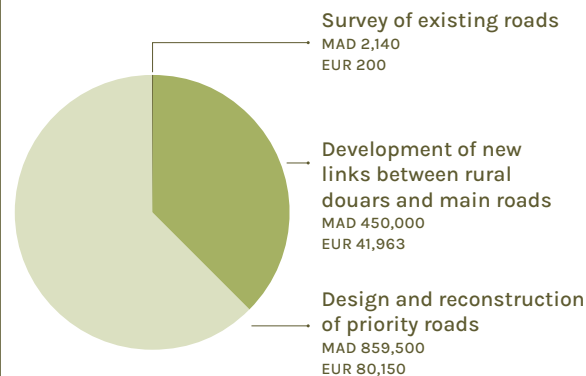
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Survey of existing roads						
Design and reconstruction of priority roads						
Development of new links between rural douars and main roads						

DETAILS ON IMPLEMENTATION⁶⁶

CAPEX (MAD/EUR'000)

MAD 1,311,640

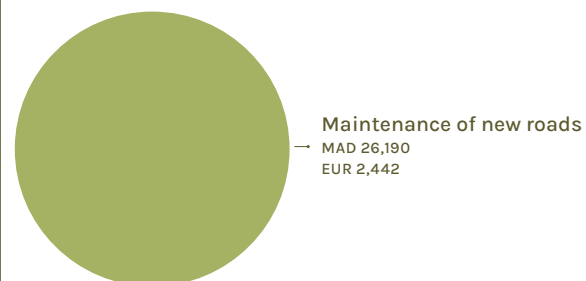
EUR 122,313



OPEX (MAD/EUR'000)

MAD 26,190 / year

EUR 2,442 / year



ACTION DESCRIPTION

OVERVIEW

Rural areas in the Guelmim-Oued Noun region face persistent challenges in connectivity and resilience due to inadequate road infrastructure. For some localities, the only access to the urban core, is via a path built into the bed of a wadi, making these routes highly vulnerable to flooding. The destructive 2014 floods, which caused an estimated MAD 6 billion in damages, demonstrated the vulnerability of road infrastructure in the region. This limits access to essential services, disproportionately affecting women, young people, and vulnerable groups. With the intensification of flooding due to climate change, there is a risk that such events will recur, causing material damage, and broader impacts on the regional economy.

This action will deliver a targeted programme of rural road upgrades and new links, prioritising climate-resilient design and community needs. By integrating permeable materials (such as porous asphalt paving) and a targeted use of Sustainable Drainage Systems (SuDS), the programme will reduce runoff, manage stormwater, and extend the lifespan of rural roads, ensuring year-round access for remote communities.

With extreme weather events becoming more frequent and severe, upgrading rural transport infrastructure is critical to reducing vulnerability, supporting social inclusion, and enabling sustainable economic development. The action aligns with the Regional Development Plan's ambition to improve rural accessibility and climate resilience.

ACTION OWNER

**Ministry of
Equipment & Water**

RGON

DELIVERY PARTNERS

Municipalities

Local road maintenance & planning

ABHDON

Hydrological design & flood risk assessment

Provincial Councils

Co-financing & territorial coordination

Civil Protection

Emergency preparedness

AREP

Road surveys & climate vulnerability assessments

Women's cooperatives & community groups

Equitable route prioritisation

ACTION COMPONENTS

SURVEY OF EXISTING ROADS

A comprehensive survey will be conducted to map the current rural road network, identifying sections most at risk from flooding, landslides, and erosion. The assessment will use climate risk data and local knowledge to prioritise roads serving the most isolated or underserved communities. Community engagement, especially with women and families, will ensure that the assessment reflects real mobility needs and social priorities.

DESIGN AND RECONSTRUCTION OF PRIMARY ROADS

Primary roads will be reconstructed or upgraded using permeable pavements and climate-resilient engineering solutions. Where appropriate, Sustainable Drainage Systems (SuDS), such as swales, infiltration trenches, and vegetated buffers will be integrated to manage stormwater. Designs will also consider safe pedestrian access and crossings, supporting inclusive mobility for all users.

DESIGN AND RECONSTRUCTION OF PRIMARY ROADS

Primary roads will be reconstructed or upgraded using permeable pavements and climate-resilient engineering solutions. Where appropriate, Sustainable Drainage Systems (SuDS), such as swales, infiltration trenches, and vegetated buffers will be integrated to manage stormwater. Designs will also consider safe pedestrian access and crossings, supporting inclusive mobility for all users.

GENDER EQUALITY AND HUMAN CAPITAL

**Equitable prioritisation of rural road upgrades**

Use the road survey and climate-risk assessment to prioritise routes serving villages with higher proportions of women, elderly residents, youth, and people with limited mobility, particularly where access to schools, health centres, markets, and water points is currently unreliable. Validate prioritisation with municipalities and social services to ensure investments address social isolation and service gaps and promote access to economic opportunities for all, not only traffic volumes.

**Inclusive and culturally sensitive community consultation**

Conduct community consultations during road planning that actively include women, nomadic groups, and marginalised households, using local languages and holding meetings at times and locations accessible to those with care responsibilities. Consultation will combine on-site safety walk-throughs, small local meetings (schools, markets, health centres), and participatory mapping, with mobile outreach for nomadic groups, and a simple feedback loop to validate crossings, lighting, and traffic-calming locations.

**Safety-oriented road design**

Integrate pedestrian safety measures (such as safe crossings, traffic calming and appropriate lighting) into rural road upgrades to protect vulnerable users and improve both actual and perceived safety, based on community consultation.

**Women's access to jobs in construction and transport**

Work with contractors, vocational training providers (e.g. OFPPT), and municipal employment services to create entry-level training and employment opportunities for women within road construction and maintenance activities. This may include short, on-site training modules linked to construction phases (e.g. materials handling, quality checks, road safety, basic surveying, administrative and logistics roles), flexible work

arrangements where feasible, and targeted outreach to women from nearby rural communes. Contractors will be encouraged to identify suitable roles beyond traditional construction tasks, including site administration, safety monitoring, and community engagement.

**Inclusive procurement**

Integrate inclusive procurement provisions into works contracts, encouraging contractors to offer on-site training, apprenticeships, or paid work placements for unemployed youth and local residents, including women. Provisions may include incentives for local recruitment, basic skills development (e.g. health and safety, traffic management), and mentoring to support progression into longer-term employment in the construction or transport sector.

ECONOMIC DEVELOPMENT	DIGITAL
500 FTE jobs	N/A

CLIMATE MITIGATION	RESILIENCE CO-BENEFITS
N/A	Flood, Infrastructure failure/obsolescence

IMPACT INDICATORS

Average distance from rural households to nearest paved road (km)

Baseline: 2.72 km regional average; Tan-Tan rural = 11.2 km, Assa-Zag rural = 16.9 km.

Target: Reduce to <5 km for Tan-Tan and Assa-Zag by 2030 (PDR) + Reduce average distance to nearest paved road to ≤2.0 km by 2031 (aligning with the SDG 9.1.1 threshold)

Share of rural roads in good or acceptable condition (%) (condition A+B)

Baseline: 82.4% condition A+B nationally; road paving rate 74% regional average, Assa-Zag 49% (2019)

Target: Maintain ≥85% and improve paving rate to ≥75% by 2030

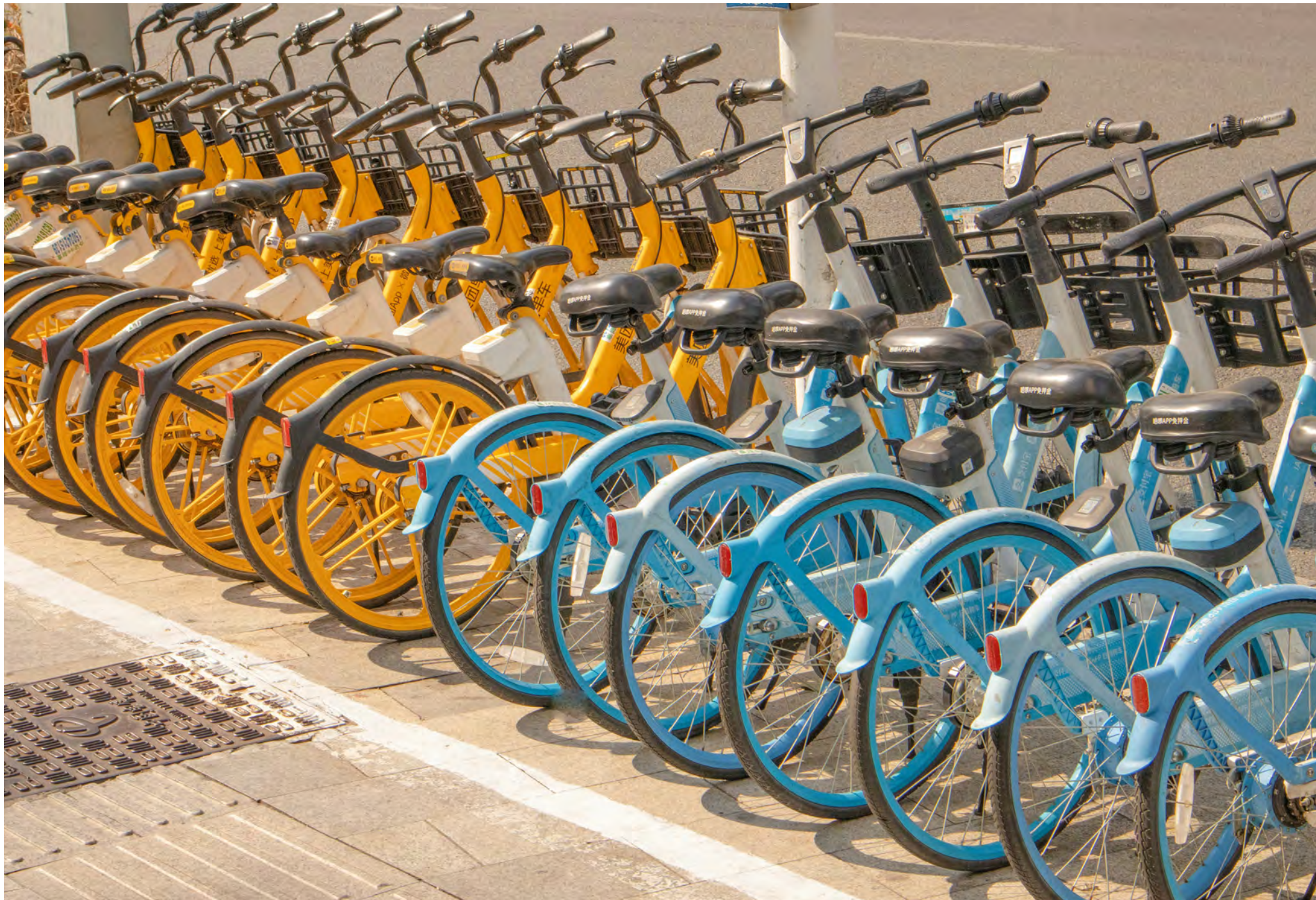
T1 LONG-TERM ACTION

Introduction of intelligent transport systems

Introduction of intelligent transport systems (ITS) in Guelmim through a feasibility study, adaptive traffic lights and real-time monitoring technologies for congestion and incident management. A regional mobility app will be developed to provide users with live public transport information.

1. Feasibility study
2. Implementation of adaptive traffic light systems to give priority to pedestrians/cyclists
3. Deployment of traffic monitoring/control technologies (e.g. sensors, CCTV, data analysis to manage congestion/incidents)
4. Development and launch of a regional mobility mobile app offering real-time public transport information and route planning to facilitate multimodal travel

66. Survey of existing roads – EUR 200,000, based on Arup internal projects benchmark; design and reconstruction of priority roads / new road engineering structures – MAD 859.5 million, based on the PDR 2022–2027 programme benchmark, with 50% of the investment assumed to be covered under the GCAP; development of new links between rural douars and main roads – MAD 450 million, also based on the PDR 2022–2027 benchmark, again with 50% GCAP coverage assumed; and annual maintenance of both categories of new roads was estimated at 2% of Capex, based on Arup internal projects.
All cost benchmarks were adjusted for inflation, PPP indexation, or location-specific cost escalation factors.



T2

Development of infrastructure for active travel

AT A GLANCE

Development of new safe active travel infrastructure, through the creation of 100 km of footpaths and 100 km of dedicated cycle paths.



SECTORS
Transport



SPATIAL EXTENT
Urban areas in all provinces



POLICY SYNERGIES

PDR

PDR B.2.1.1 – Upgrading programme for provincial cities (Phase 2)

PDR B.3.1.2 – Upgrading programme for rural centres

NDC 3.0

Mitigation NDC 51: Promotion of electric mobility for two and three-wheeled vehicles

Mitigation NDC 47: Creation of Regional Express Rail service (RER)

Mitigation NDC 43: Vehicle emission standards improvement

STRATEGIC GOALS



SG4

Build an inclusive, low-carbon, and accessible transport system connecting all communities.



SG7

Build a more gender-inclusive region.

RELATED GCAP ACTIONS

T3	T4	T5
U2	U3	U5

SCHEDULE OF IMPLEMENTATION

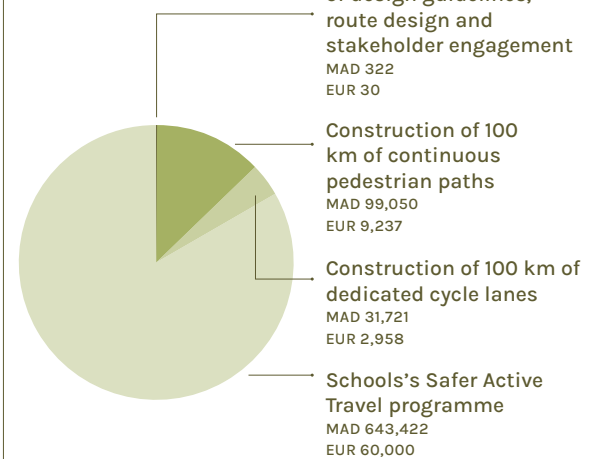
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Planning and preparation of design guidelines, route design and stakeholder engagement						
Construction of 100 km of continuous pedestrian paths						
Construction of 100 km of dedicated cycle lanes						
Schools's Safer Active Travel programme						

DETAILS ON IMPLEMENTATION⁶⁷

CAPEX (MAD/EUR'000)

MAD 774,515

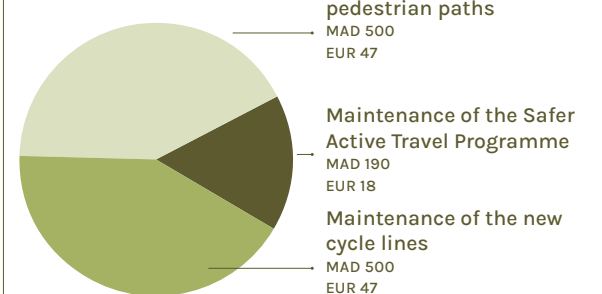
EUR 72,225



OPEX (MAD/EUR'000)

MAD 1,190 / year

EUR 112 / year



ACTION OWNER

RGON

Municipalities

DELIVERY PARTNERS

Ministry of Education & Sports
School-zone redesign

NARSA
Road safety standards

Civil society
Community engagement & co-design

Ministry of Interior / DGCT
Urban design approvals

Women's groups & youth associations
Co-designed routes

Local schools
Participatory mapping

ACTION DESCRIPTION

OVERVIEW

Active travel in the Guelmim-Oued Noun region is significantly constrained by the lack of safe, continuous infrastructure for walking and cycling. While urban centres already see considerable walking and cycling activity, existing infrastructure is fragmented and often unsafe, especially along major roads. This gap discourages both residents and tourists from choosing active travel and is particularly acute in rapidly growing towns. With rising urbanisation and a growing interest in sustainable mobility, there is an urgent need to provide high-quality infrastructure that supports walking and cycling. Improved active travel networks will not only reduce reliance on private vehicles and lower emissions, but also enhance public health, social inclusion, and the region's attractiveness for tourism.

To address these constraints, the programme proposes the delivery of approximately 100 km of continuous footpaths and 100 km of dedicated cycle lanes across the region, designed to international standards and integrated with popular tourist sites. Multilingual signage and inclusive design will ensure that the infrastructure is accessible to all users, including women, children, people with disabilities, and visitors. This action will also focus on redesigning streets around 50 schools throughout the region to create safer and healthier environments for children.

Active travel investments will play a key role in the wider mobility system. This action will support first- and last-mile access to the proposed public transport services (T4) and multimodal mobility hubs (T5), ensuring seamless connectivity for short trips and improving access to strategic corridors. It will also be complementary to the micro-mobility sharing system proposed under T3, facilitating safe use of bicycles, e-bikes, and e-scooters and strengthening the region's sustainable mobility offering.

ACTION COMPONENTS

PLANNING AND PREPARATION OF DESIGN GUIDELINES, ROUTE DESIGN AND STAKEHOLDER ENGAGEMENT

Given the region's dispersed settlement pattern and the emerging demand for sustainable mobility, further detailed planning and feasibility assessments will be required to determine the precise locations, design standards, and phasing of implementation. These studies should consider:

- primary urban corridors in Guelmim, Sidi Ifni, Tan-Tan, and Assa;
- accessibility needs around key educational facilities;
- benchmarking against similar low-density regions;
- a phased roll-out approach aligned with financial resources and local capacity.

The 100 km of continuous pedestrian paths and dedicated cycle lanes and 50 school locations presented in this action are indicative, providing an initial understanding of potential coverage and cost implications. They are intended to guide investment planning and enable a scalable approach that can be expanded as feasibility studies progress.

Furthermore, a set of regionally tailored design guidelines will be developed, specifying standards for footpath and cycle lane width, surface materials, safety features, and accessibility. The guidelines will include requirements for clear, multilingual signage and wayfinding, and ensure that routes connect residential areas with schools, town centres, and major tourist attractions. Stakeholder engagement will ensure the needs of local communities and visitors are reflected in the final designs.

CONSTRUCTION OF 100 KM OF CONTINUOUS PEDESTRIAN PATHS

New footpaths will be constructed along key corridors in Guelmim, Sidi Ifni, Tan-Tan, and Assa, prioritising areas with high pedestrian demand and accident risk. Paths will

be designed for universal accessibility, with features such as tactile paving, ramps, and safe crossings.

CONSTRUCTION OF 100 KM OF DEDICATED CYCLE LANES

Dedicated cycle lanes will be built to provide safe, direct routes for cyclists, separated from motor vehicle traffic wherever feasible. Cycle parking, lighting, and rest areas will be included to support uptake and ensure safety, especially for women and young people.

SCHOOLS'S SAFER ACTIVE TRAVEL PROGRAMME

A targeted programme will redesign streets around 50 schools, introducing traffic calming measures such as raised crossings, reduced speed limits, and protected footpaths and cycle paths. The "Healthy Streets" approach will be rolled out to create safer, more attractive environments for children and families. Capacity building will include training traffic officers and delivering road safety programmes for school staff and municipal teams, fostering a culture of safe, active travel from an early age.

GENDER EQUALITY AND HUMAN CAPITAL



Co-designed active travel routes

Co-design pedestrian and cycling infrastructure with women and youth through on-site walk-throughs, combined with short workshops and participatory mapping exercises at schools, markets, cooperative and community centres. These engagements will identify preferred routes, unsafe crossings, lighting needs, and barriers to use, ensuring infrastructure reflects daily mobility patterns rather than purely traffic engineering priorities.



Women's access to skills and jobs in active travel delivery and operations

Work with contractors, OFPPT and municipal teams, to create entry-level roles for women

across: planning (street audits, lighting/walkability checks near schools/markets), implementation and operations (wayfinding upkeep, vegetation care, school route marshals). Outreach will prioritise women along priority corridors and align shifts with school hours/care responsibilities where feasible.



Inclusive procurement tied to work packages

Embed clauses in design, works, and Schools' Safer Active Travel contracts requiring on-site training and paid placements for women and unemployed youth (e.g., surfacing basics, traffic management at worksites, HSE, temporary accessibility routing). Include local recruitment/mentoring targets, gender-disaggregated reporting, and use micro-contracts (wayfinding, small-scale landscaping, cycle-parking) to enable participation by women-led cooperatives/SMEs.



Safe and universally accessible design

Deliver step-free, well-maintained footpaths and protected cycle lanes with safe crossings, resting points and tactile features to ensure accessibility for children, elderly people, people with disabilities and with reduced mobility.



Inclusive signage and wayfinding

Install multilingual and accessible signage (Arabic, local languages and symbols) to support children, tourists and migrant communities. Signage will prioritise legibility, visibility at night, and intuitive wayfinding to schools, town centres, transport hubs and tourist sites, strengthening confidence among first-time and vulnerable users.



Lighting and visibility for women's safety

Integrate continuous street lighting, illuminated crossings and reflective signage along active travel routes (especially near schools, bus stops, markets and park edges) to improve both actual and perceived safety. Lighting design will balance energy efficiency

with visibility and sightlines, supporting women's mobility during early morning and evening hours.

ECONOMIC DEVELOPMENT

40 FTE jobs

DIGITAL

• N/A

CLIMATE MITIGATION⁶⁸

• 50,400 tCO₂/year

RESILIENCE CO-BENEFITS

Infrastructure failure/obsolescence

IMPACT INDICATORS

Length of dedicated cycling lanes and pedestrian paths constructed (km)

Baseline: 0km dedicated cycling infrastructure in Guelmim-Oued Noun region

Target: 100 km of dedicated cycle paths by 2031

Share of urban trips made by active modes in target cities (%)

Baseline: TBC from mobility survey in Guelmim and Tan-Tan.

Target: 10% active mode share by 2030 (consistent with national urban mobility ambition)

67. Planning, design guidelines, route design and stakeholder engagement – EUR 30,000, based on Arup internal projects; pedestrian paths – MAD 990/m² for pavement construction/renovation, based on the City of Warsaw cost schedule; cycle lanes – EUR 50,000/km for a simple cycle track in easy terrain, based on the European Cyclists' Federation factsheet; maintenance of cycling lanes – USD 13/m, based on the Active Living Research benchmark; safer active travel interventions around schools – EUR 240,000/km, based on Arup internal projects benchmark; and traffic lights at pedestrian crossings – MAD 3,800 per unit, based on the Czestochowa municipal cost schedule.

68. It was estimated by scaling a benchmark from the City of Zagreb Sustainable Energy and Climate Action Plan, which assumes annual emissions savings of 62,998.6 tCO₂/year for 250 km of utilised cycling and pedestrian infrastructure; this benchmark was applied to the assumed 200 km of active travel infrastructure in Guelmim (100 km of pedestrian paths and 100 km of cycle lanes).



T3

Development of a shared micro-mobility system

AT A GLANCE

Introduction of a micro-mobility sharing pilot programme in Guelmim City, including 100 bicycles, 100 electric bicycles, and 100 electric scooters, supported by docking stations or free-floating zones for parking throughout the city.



SECTORS
Transport



SPATIAL EXTENT
Urban areas in Guelmim province

POLICY SYNERGIES

PDR

n/a

NDC 3.0

Mitigation NDC 51: Promotion of electric mobility for two and three-wheeled vehicles

Mitigation NDC 49: Bonus-Malus system for new vehicle purchases

Mitigation NDC 43: Vehicle emission standards improvement

STRATEGIC GOALS



SG4

Build an inclusive, low-carbon, and accessible transport system connecting all communities.



SG7

Build a more gender-inclusive region.

RELATED GCAP ACTIONS

T2

T5

SCHEDULE OF IMPLEMENTATION

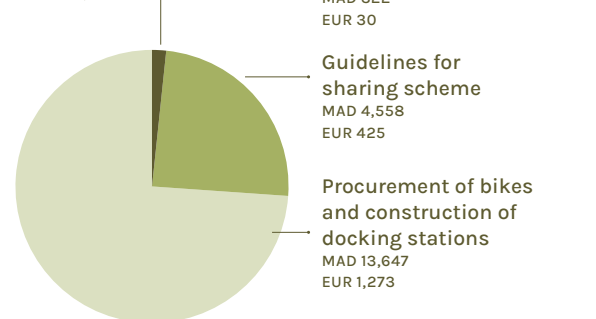
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Planning and determining the service coverage area						
Guidelines for sharing scheme						
Procurement of bikes and construction of docking stations						

DETAILS ON IMPLEMENTATION⁶⁹

CAPEX (MAD/EUR'000)

MAD 18,527

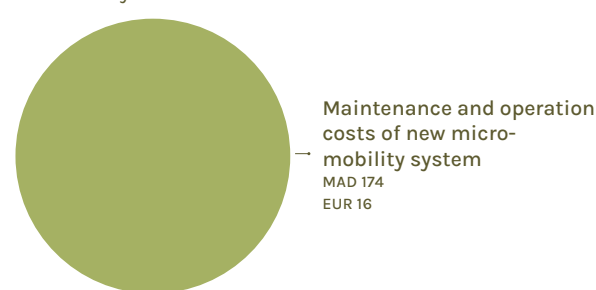
EUR 1,728



OPEX (MAD/EUR'000)

MAD 174 / year

EUR 16 / year



ACTION DESCRIPTION

OVERVIEW

The Guelmim-Oued Noun region's urban centres already see significant cycling activity, but the lack of safe, dedicated infrastructure for cycling

and the absence of demand-responsive intra-municipal transport options limit the potential for sustainable mobility. Most residents and visitors must rely on private vehicles or informal taxis for short trips, increasing congestion and safety risks for cyclists and pedestrians.

This action will introduce a shared micro-mobility programme, offering bicycles, electric bicycles, and electric scooters for both residents and tourists. The programme will be piloted in Guelmim City, with a view to future expansion, and will include clear guidelines, multilingual signage, and a pricing system that encourages regular use. Parking options (docking stations or free-floating) will be studied during the planning stage and will be strategically located to maximise convenience and uptake.

Introducing the programme will provide affordable, low-carbon alternatives for short trips, support active lifestyles, and enhance the region's appeal as a tourist destination. By integrating micro-mobility with public transport hubs (T5) and tourist sites, the action will improve urban mobility, reduce car dependency and emissions, and promote inclusive access for all users.

ACTION OWNER

Municipalities

City of Guelmim

DELIVERY PARTNERS

Private mobility

operators

fleet supply & operations via PPP

RGON

Feasibility studies, standards & co-funding

NARSA

Road safety rules & vehicle standards

Police/municipal

authorities

Traffic management

Civil society & women's

groups

Equitable station siting

ACTION COMPONENTS

PLANNING AND DETERMINING THE SERVICE COVERAGE AREA

A detailed analysis will identify priority zones for micro-mobility deployment, focusing on areas with high demand, connectivity gaps, and proximity to transport hubs, tourist attractions, and high-density neighbourhoods. The service area will be mapped to ensure equitable access and integration with existing and planned mobility infrastructure.

GUIDELINES FOR SHARING SCHEME

Comprehensive operational guidelines will be developed, covering vehicle standards, safety requirements, docking station design, user experience, and a flexible pricing structure. The guidelines will specify multilingual signage and wayfinding for accessibility, routes connecting major destinations, and a pricing system that includes pay-as-you-go and subscription options. Preferential rates for students, low-income users, and tourists will be considered, with payment and access enabled through digital platforms and physical kiosks.

PROCUREMENT OF BIKES AND CONSTRUCTION OF DOCKING STATIONS

The pilot phase will deploy a fleet of 100 shared bicycles, 100 e-bikes, and 100 e-scooters, with corresponding docking stations or free-floating zones for parking strategically placed for maximum convenience and visibility. The launch will be supported by a public awareness campaign and ongoing monitoring to assess usage patterns, user satisfaction, and opportunities for future expansion to other cities in the region.

The operation and charging of the e-bikes and e-scooters will be the full responsibility of the operator. These processes can be managed through a dedicated depot system where spare batteries are stored and replaced throughout the day to ensure continuous availability.

GENDER EQUALITY AND HUMAN CAPITAL



Equitable station locations

Prioritise docking stations and parking zones near schools, markets, health centres, residential areas and transport hubs commonly used by women, children and youth, informed by local mobility mapping and on-site walk-throughs.



Accessible vehicles and universal design

Include a range of accessible micro-mobility options, such as low-step bicycles, e-bikes with adjustable frames and tricycles, to enable use by people with disabilities, older users, and caregivers travelling with children. Docking stations and kiosks will be designed for step-free access and intuitive use.



Training and local jobs in micro-mobility operations

Provide practical training for women and young people to support day-to-day operation of the shared micro-mobility system, including mobile repair and maintenance teams, battery charging and redistribution, and staffing of physical kiosks and user support points, creating accessible local employment linked to the new service.



Affordable and inclusive access

Apply tiered pricing or subsidies for low-income users and students and enable access through both digital platforms and physical kiosks/cards, supported by multilingual and symbolic guidance.



Safety, confidence and awareness for first-time users

Pair the scheme launch with women-focused orientation sessions, school demonstrations, and short safety campaigns explaining how to use bikes, e-bikes and scooters safely, where to ride, and how the scheme is monitored.

ECONOMIC DEVELOPMENT

20 FTE jobs

CLIMATE MITIGATION⁷⁰

160 tCO₂/year

DIGITAL

Development of an e-mobility app for bike booking

RESILIENCE CO-BENEFITS

Infrastructure failure/obsolescence

IMPACT INDICATORS

Number of micro-mobility vehicles (bicycles, e-bikes, e-scooters) deployed and in active use

Baseline: 0 shared micro-mobility systems

Target: Pilot fleet of 50–100 vehicles in Guelmim by 2028 (PDR)

Share of women users of the micro-mobility system (%)

Baseline: 0

Target: ≥40% women users by 2030 (NDC A-84)

69. Planning and service coverage analysis – EUR 30,000, based on Arup internal projects; guidelines for the sharing scheme – EUR 300,000, based on Arup internal projects; bicycle sharing points / docking stations – benchmarked from Agadir project at c. EUR 14,155 per station; bicycle racks – benchmarked from Agadir project at c. EUR 142 per rack point; e-bike charging stands – MAD 10,400 per unit, based on a commercial supplier benchmark; electric scooter charging stands – MAD 5k per unit, based on a commercial supplier benchmark; scooters – USD 700–800 per unit, based on the Joyride benchmark; scooter maintenance – USD 125 per scooter, based on the MiniEVs benchmark; charging station O&M – 5% of Capex, based on the NREL; and dock operating costs – USD 90–120 per dock per month, based on the ITDP Bike-share Planning Guide.

70. It was estimated using benchmark emissions savings from shared micro-mobility systems in Melbourne (42.4 gCO₂/km), Seattle (37.7 gCO₂/km), Düsseldorf (22.1 gCO₂/km), Paris (20.7 gCO₂/km), Stockholm (20.7 gCO₂/km) and Berlin (14.8 gCO₂/km), resulting in an average saving factor of 26.4 gCO₂/km; this was combined with an assumed average daily use of 56.97 km/day per scooter/bike.

T4

Provision of buses as a public transport option in urban areas and subsequent extension to rural areas

AT A GLANCE

Procurement of 45 buses to provide public transport in urban areas and medium- to long-term expansion to rural areas and tourist centres.



SECTORS
Transport



SPATIAL EXTENT
Regionally across all provinces

POLICY SYNERGIES

PDR

PDR B.1.4.1 – Programme for construction of bus stations

NDC 3.0

Mitigation NDC 52: Low-emission vehicle renewal programme (electric, hybrid or alternative fuels)

STRATEGIC GOALS



SG4
Build an inclusive, low-carbon, and accessible transport system connecting all communities.



SG7
Build a more gender-inclusive region.

RELATED GCAP ACTIONS

T1	T2	T3	T5
U1	U2		

SCHEDULE OF IMPLEMENTATION

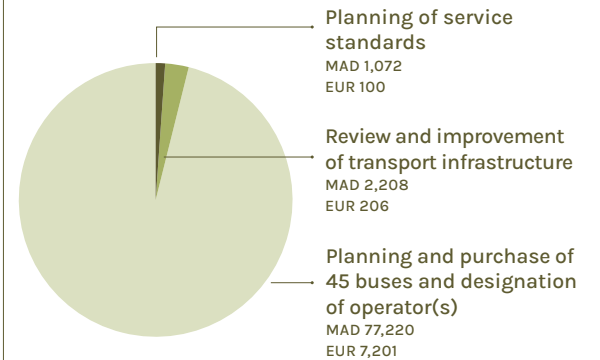
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Planning of service standards						
Review and improvement of transport infrastructure						
Procurement of bikes and construction of docking stations						
Expansion of the service coverage area and fleet in the medium and long term.						

DETAILS ON IMPLEMENTATION⁷¹

CAPEX (MAD/EUR'000)

MAD 80,500

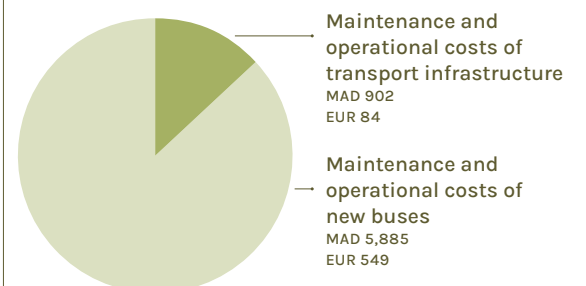
EUR 7,507



OPEX (MAD/EUR'000)

MAD 6,787 / year

EUR 633 / year



71. Planning of service standards – EUR 100,000, based on Arup internal projects; GPS tracking / supporting transport infrastructure equipment – MAD 740 per unit, based on a Teltonika GPS tracker benchmark from the Moroccan market; real-time passenger information displays – USD 5,000 per unit, based on the King County benchmark; maintenance of passenger information displays – MAD 9k per display, based on the Częstochowa municipal cost schedule; minibuses – EUR 160,000 per vehicle, based on Arup internal projects benchmark / bus price reference; and vehicle operating costs were estimated using assumptions on fuel consumption of 0.13 l/km, annual mileage of 73,000 km per vehicle, and a Morocco gasoline price benchmark of MAD 13.78/litre from GlobalPetrolPrices.



ACTION DESCRIPTION

OVERVIEW

Public transport in the Guelmim-Oued Noun region is currently limited, with most urban and rural residents relying on private vehicles or informal taxis. This lack of reliable, affordable, and inclusive public transport restricts access to jobs, education, and essential services, especially for women, young people, and those in remote areas. The region's tourism potential further highlights the need for modern, sustainable mobility solutions. Given the regional context of low but concentrated demand and sparsely located households, improvements must follow a regulated, phased and incremental approach that strengthens connectivity for both urban areas and rural communities.

This action will introduce additional regulated bus services (including smaller bus vehicles where appropriate – often referred to as “minibuses” in terms of size only) to provide a clean, efficient public transport option across the region. The programme will be implemented in phases, starting with planning and pilot deployment in major cities, followed by gradual extension to rural areas and key tourist sites. Service standards, infrastructure upgrades, and integration with other mobility initiatives (T5, T3) will ensure a high-quality, user-friendly system.

To reflect a nuanced and incremental approach to clean mobility while ensuring ambition from the outset, the action will define a pathway to introduce cleaner vehicles from day one, by specifying low-emission requirements for all new vehicles and incorporating electric buses into procurement and operations where feasible from the start. The transition to electric buses will then be scaled progressively in line with T6, ensuring that fleet electrification is coordinated with grid capacity and charging availability, including phasing that can begin with charging at priority nodes such as mobility hubs and/or operator depots as infrastructure becomes available.

On the longer term, the action will support a gradual transition to cleaner fleets, recommending that the final phase of the planned vehicle rollout consider the procurement of electric buses and minibuses in line with T6, grid capacity, and charging infrastructure availability. In that way, the region can leverage its renewable energy potential, reduce emissions and congestion while improving accessibility, affordability and reliability. Expanding the service to rural areas and tourist destinations will further promote regional integration and drive economic development.

ACTION OWNER

Municipalities	RGON
Transport Authority	

DELIVERY PARTNERS

Private operators PPP for fleet operations & maintenance	Ministry of Interior / DGCT Regulatory oversight
--	--

MASEN RE-powered bus depots	Women's groups & rural communities Equitable route planning
---------------------------------------	---

SRM GON Electricity supply for charging infrastructure, coordinated with T6

ACTION COMPONENTS

PLANNING OF SERVICE STANDARDS

The service standards will define routes that connect town centres, shopping areas, education centres, and major tourist attractions, with clear timetables and set fares.

In service design, the action might also allow for a combination of fixed routes and demand-responsive transport (DRT) – where fixed routes can serve denser urban corridors and hub-points, while DRT can improve coverage and accessibility for more dispersed settlements and rural communities where conventional fixed routes may not be efficient.

Stakeholder engagement will ensure the system addresses the needs of all user groups.

REVIEW AND IMPROVEMENT OF TRANSPORT INFRASTRUCTURE

Existing infrastructure will be assessed and upgraded as needed, including the installation of bus stops, clear signage, and real-time information systems supported by GPS trackers and displays at bus stops. Improvements will include integration with new active travel and micro-mobility networks, and mobility hubs (T2, T3 and T5) to support convenient transfers and strengthen first/last-mile access.

PLANNING AND PURCHASE OF 45 BUSES AND DESIGNATION OF OPERATOR(S)

A detailed operational plan will be developed, including the procurement of a fleet of 45 buses and minibuses, consistent with official regional plans, 15 of which have already been procured, and the selection or appointment of qualified operators. The plan will consider vehicle specifications, operational needs, and maintenance requirements

Vehicle specifications will prioritise cleaner vehicles from the outset and define a phased pathway for electrification, with electric buses introduced where feasible from early stages and expanded over time in coordination with T6 charging rollout and overall grid capacity.

EXPANSION OF THE SERVICE COVERAGE AREA AND FLEET IN THE MEDIUM AND LONG TERM

Based on performance and demand, the service will be progressively expanded to additional urban and rural areas, as well as tourist centres with the opportunity to explore transitioning to electric buses in the longer term. Over the medium to long term, procurement and operational planning will support an increasing share of electric buses as charging infrastructure delivered under T6 becomes available (including at or near key interchange locations such as T5 mobility hubs, where appropriate).

GENDER EQUALITY AND HUMAN CAPITAL

- 
Equitable route planning and service phasing
- Prioritise routes that serve women, students, elderly populations, and rural communities by mapping daily trip patterns to schools, health centres, markets, and employment areas. Early pilot routes will be validated through short consultations with women, youth, and caregivers to ensure services address real mobility needs.
- 
Accessible vehicles and stops for all users
- Ensure buses and stops are designed for universal accessibility, including low-floor vehicles, handrails, priority seating, audible/visual stop announcements, step-free access where feasible, and clear signage. Stop locations will be selected to minimise walking distances and exposure to unsafe crossings, especially for children and older users, with suitable coverage and lighting options.
- 
Training and local jobs in operations and maintenance
- Recruit women and youth through commune job centres, INDH platforms, and women's cooperatives, then deliver short vocational modules with OFPPT and the selected operator, including content on customer service, road safety, ticketing/GPS, basic vehicle checks. Graduates move into paid on-the-job placements, as drivers (where feasible), dispatch/user-support staff, depot attendants, or basic maintenance assistants, with formal contracts issued by operators and oversight from the municipality/Region to ensure safe, inclusive working conditions.
- 
Safety and dignity for women and vulnerable passengers
- Introduce measures to improve safety and comfort for women, including clearly marked priority seating for women (notably pregnant women and elderly women), visible driver codes of conduct, and well-lit stops. These measures will help reduce harassment
- risks and increase confidence in using public transport, particularly during early morning and evening hours.
- 
Training for vehicle operators
- Introduce regular trainings for vehicle operators on safety risks for vulnerable groups – how to recognise them, proper mitigation and reporting procedures. Update training programs with real life case studies.

ECONOMIC DEVELOPMENT

100 FTE jobs

DIGITAL

- Equipping buses with real-time information systems supported by GPS trackers

CLIMATE MITIGATION⁷²

- 2,950 tCO₂/year

RESILIENCE CO-BENEFITS

Infrastructure failure/obsolescence

IMPACT INDICATORS

Number of inter-communal bus routes operational

Baseline: 0 formal bus routes serving rural communes
Target: 1 route per province connecting rural communes by 2028

Share of low-emission or electric vehicles in bus fleet (%)

Baseline: 0% electric in current fleet
Target: 20% low-emission by 2030, 100% by 2035 (NDC M-52)

T4 LONG-TERM ACTION

Extension of public transport lines operated by private operators

Encourage to expand service coverage through partnerships with the private sector, leasing and operating public transport lines to improve regional mobility.

1. Develop a regulatory framework to ensure the quality and affordability of services
2. Develop a lease agreement for vehicles and operations.
3. Assess and prioritise underserved routes/high-demand locations (e.g. routes between Sidi Ifni and Guelmim and between Guelmim and Tan-Tan, rural areas or between Guelmim and the future university hub).
4. Modernise infrastructure, including installing bus stops and shelters, signage and lighting in priority areas, to complement ongoing modernisation and construction work in major cities.

72. It was estimated based on the replacement of conventional buses with 45 minibuses, assuming 250 km/day per vehicle and total annual mileage of 4,106,250 km/year; the model applies a conventional fuel consumption of 0.38 l/km, a diesel emission factor of 2.6988 kgCO₂/litre, electricity consumption of 1.45 kWh/km, and an electricity emission factor of 0.21107 kgCO₂/kWh, resulting in baseline diesel use of 1,560,375 litres/year and electricity demand of 5,954,062.5 kWh/year; this gives emissions of 4,211.1 tCO₂/year for conventional vehicles and 1,256.7 tCO₂/year for electric buses.



T5

Development of intermodal transport hubs

AT A GLANCE

Development of intermodal transport hubs in Guelmim, Sidi Ifni, Tan-Tan and Assa, integrating digital systems, and planned construction of the Sidi Ifni bus station.



SECTORS
Transport



SPATIAL EXTENT
Urban areas in all provinces

POLICY SYNERGIES

PDR

PDR B.1.4.1 – Programme for construction of bus stations

NDC 3.0

Mitigation NDC 47: Creation of Regional Express Rail service (RER)

Mitigation NDC 43: Vehicle emission standards improvement

Mitigation NDC 52: Low-emission vehicle renewal programme

STRATEGIC GOALS



SG4

Build an inclusive, low-carbon, and accessible transport system connecting all communities.



SG7

Build a more gender-inclusive region.

RELATED GCAP ACTIONS

T3

T4

SCHEDULE OF IMPLEMENTATION

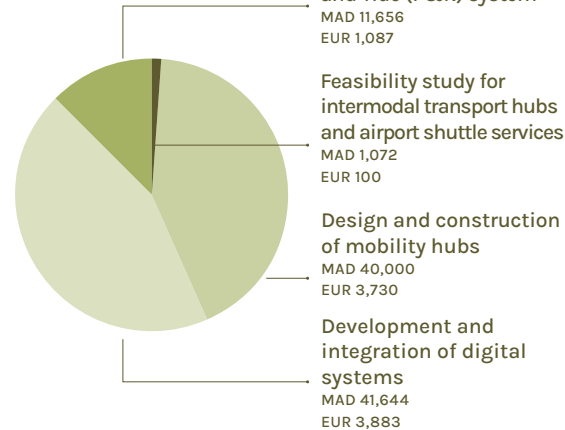
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Feasibility study for intermodal transport hubs and airport shuttle services						
Design and construction of mobility hubs						
Development and integration of digital systems						
Construction of a park-and-ride (P&R) system						

DETAILS ON IMPLEMENTATION⁷³

CAPEX (MAD/EUR'000)

MAD 94,372

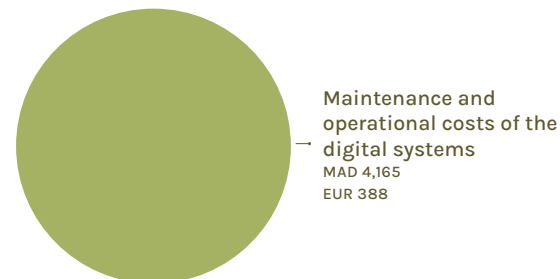
EUR 7,507



OPEX (MAD/EUR'000)

MAD 4,165 / year

EUR 388 / year



ACTION OWNER

RGON

AREP

DELIVERY PARTNERS

Ministry of Equipment & Water
Infrastructure standards

Police/traffic authorities
Access management

ONCF
Bus and rail connectivity

Civil society – women, elderly, disabled users
Community input

Bus operators
Inter-urban & rural services

Private developers
Commercial & digital systems

ACTION DESCRIPTION

OVERVIEW

The absence of a formal public transport system in the Guelmim-Oued Noun region, combined with limited service coverage, is a major barrier to sustainable mobility and equitable access. Inter-communal travel currently relies on unregulated small taxis, resulting in unreliable, and often costly journeys, especially for those without private vehicles. As a result, over 90% of commuting trips are made by private transport (Indicator 11), highlighting the urgent need for integrated, accessible alternatives.

This action will establish intermodal transport hubs in Guelmim, Sidi Ifni, Tan-Tan, and Assa, providing seamless connections between regional coaches, airport shuttles, local buses, and micro-mobility options. The design of hubs will also consider integration with flexible or demand-responsive transport options to provide a better service for rural hinterlands as well. The hubs will be designed to support digital integration and encourage a shift away from private car use. The planned construction of the Sidi Ifni bus station will serve as a model for future facilities, demonstrating an integrated approach to hub design, operations, and user experience that can be replicated across the region.

By integrating real-time digital systems, shared mobility services, and park-and-ride options, these hubs will enhance accessibility, reduce congestion, and support the region's transition to a low-carbon, contributing to more sustainable urban environments for both residents and visitors across the region.

ACTION COMPONENTS

FEASIBILITY STUDY FOR INTERMODAL TRANSPORT HUBS AND AIRPORT SHUTTLE SERVICES

A comprehensive feasibility study will identify optimal locations and operational models for intermodal hubs in Guelmim, Sidi Ifni, Tan-Tan, and Assa, as well as assess the potential for airport shuttle integration. The study will analyse demand, connectivity gaps, and technical requirements, ensuring that hubs are accessible and well-connected to key destinations.

The selection of hub locations should consider the current conditions of existing private operators; these may be used as a criterion for site selection, or alternatively, existing operating arrangements may be adjusted in line with the locations chosen for the hubs. The study should also assess integration with T4, ensuring that bus services are planned to feed into and benefit from the proposed mobility hubs.

DESIGN AND CONSTRUCTION OF MOBILITY HUBS

The design and construction phase will incorporate findings from the feasibility study and ensure alignment with micro-mobility initiatives (T3). The hubs will feature waiting areas, ticketing, real-time information displays, secure parking for personal and rental bikes and scooters, and clear wayfinding, with a focus on safety, and accessibility.

DEVELOPMENT AND INTEGRATION OF DIGITAL SYSTEMS

Digital systems will be developed and integrated to provide real-time information on schedules, connections, and availability of shared mobility services via an app. These systems will support journey planning, ticketing, and user feedback, enhancing the overall travel experience for residents and visitors.

CONSTRUCTION OF A PARK-AND-RIDE (P&R) SYSTEM

A park-and-ride system will be introduced, with car parks located near intermodal hubs to encourage private

vehicle users to switch to public or shared transport. The P&R system will be promoted through incentives and clear signage, supporting modal shift and reducing congestion in city centres.

GENDER EQUALITY AND HUMAN CAPITAL



Community input and user-led service design

Establish clear community input channels for hub design and operation, including workshops and feedback sessions with women, students, elderly users, and people with disabilities. Input will inform waiting area design, stop locations, information systems, opening hours, and amenities (e.g. seating, toilets, kiosks), ensuring hubs respond to everyday needs rather than purely technical considerations. Draft designs and service features will then be shared for validation through simple displays and digital channels, with a clear mechanism to incorporate feedback before finalisation.



Accessible, safe and inclusive hub design

Ensure intermodal hubs are universally accessible for women, elderly users and people with disabilities, with step-free access, seating, toilets, clear sightlines, and well-lit waiting areas to improve comfort and perceived safety.



Safe pedestrian access and integration with micro-mobility

Ensure hubs are seamlessly connected to safe pedestrian routes and shared micro-mobility services (T3) through direct, well-lit walkways, protected crossings, and clearly marked pick-up/drop-off areas. Design will minimise walking distances and avoid unsafe crossings, particularly for caregivers travelling with children, elderly users, and people with reduced mobility.

ECONOMIC DEVELOPMENT	CLIMATE MITIGATION ⁷⁴
100 FTE jobs	N/A

DIGITAL

Deployment of real-time monitoring and information systems at bus stops/hubs

RESILIENCE CO-BENEFITS

Infrastructure failure/obsolescence

IMPACT INDICATORS

Number of intermodal transport hubs constructed and operational (by province)

Baseline: 2 partially equipped intercity bus stations; no formal intermodal hubs.

Target: 1 per province (4 hubs) by 2030 (PDR)

Number of transport modes accessible from each hub (connectivity score)

Baseline: TBC from transport mapping.

Target: ≥3 modes per hub (bus, taxi, micro-mobility, freight) by 2030

Number of daily passengers using intermodal hubs (including tourists)

Baseline: TBC from existing intercity bus stations usage data

Target: 10% increase in interregional passenger connectivity by 2030

73. Feasibility study for intermodal transport hubs and airport shuttle services – EUR 100,000, based on Arup internal projects; bus stations / mobility hub infrastructure – MAD 40 million, based on the PDR 2022–2027 programme benchmark, with 50% of the investment assumed to be covered under the GCAP; transport app / digital system development – benchmarked at GBP 20,000–55,000 (average GBP 37,500) and cross-checked against an internal estimate of EUR 20,000–35,000 (average EUR 27,500); operating and maintenance costs for digital systems – 10% of Capex, based on Arup internal projects benchmark; unified open e-ticketing system – EUR 4 million, based on Agadir project; and park-and-ride facilities – EUR 384,000 per facility, also based on Agadir project benchmark.

74. It was estimated based on the replacement of conventional buses with 45 minibuses, assuming 250 km/day per vehicle and total annual mileage of 4,106,250 km/year; the model applies a conventional fuel consumption of 0.38 l/km, a diesel emission factor of 2.6988 kgCO₂/litre, electricity consumption of 1.45 kWh/km, and an electricity emission factor of 0.2107 kgCO₂/kWh, resulting in baseline diesel use of 1,560,375 litres/year and electricity demand of 5,954,062.5 kWh/year; this gives emissions of 4,211.1 tCO₂/year for conventional vehicles and 1,256.7 tCO₂/year for electric buses.

T5 LONG-TERM ACTION**Micro-distribution centres and cargo bikes**

Create a series of micro-distribution centres and deploy cargo bikes in Guelmim, based on a feasibility study, with support for the design and construction of small urban depots, partnerships with local businesses and the development of favourable policies and infrastructure.

1. Feasibility study
2. Design and construction of small urban depots in identified commercial and residential areas
3. Deployment of cargo bikes
4. Partnerships with local businesses and logistics providers to support existing supply chains
5. Planning and development of supporting policies and infrastructure (e.g., loading zones and discounts for cargo bike use)



T6

Planning and pilot implementation of electric charging infrastructure in strategic locations

AT A GLANCE

Planning of electric vehicle charging infrastructure in major urban centres and along national roads, based on a feasibility and network capacity study, with implementation of a pilot phase of public charging points in strategic locations, compact stations for electric vehicles and an incentive programme.

 SECTORS Transport	 SPATIAL EXTENT Urban areas in all provinces
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POLICY SYNERGIES

PDR

N/A

NDC 3.0

Mitigation NDC 51: Promotion of electric mobility for two and three-wheeled vehicles

Mitigation NDC 52: Low-emission vehicle renewal programme (electric, hybrid or alternative fuels)

Mitigation NDC 50: CO2 emission performance standards for new vehicles

STRATEGIC GOALS

 SG4	Build an inclusive, low-carbon, and accessible transport system connecting all communities.
 SG6	Retrofit and build climate-resilient, energy-efficient infrastructure for all.
 SG7	Build a more gender-inclusive region.

RELATED GCAP ACTIONS

T4

U5

SCHEDULE OF IMPLEMENTATION

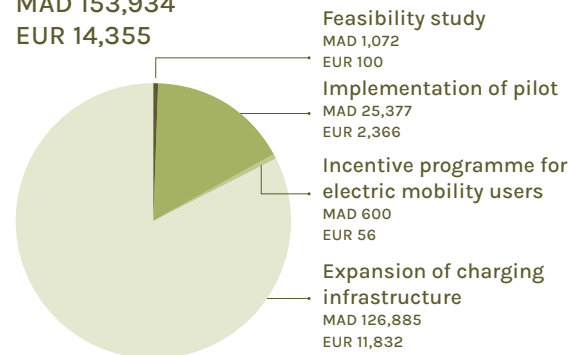
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Feasibility study						
Implementation of pilot						
Incentive programme for electric mobility users						
Expansion of charging infrastructure						

DETAILS ON IMPLEMENTATION⁷⁵

CAPEX (MAD/EUR'000)

MAD 153,934

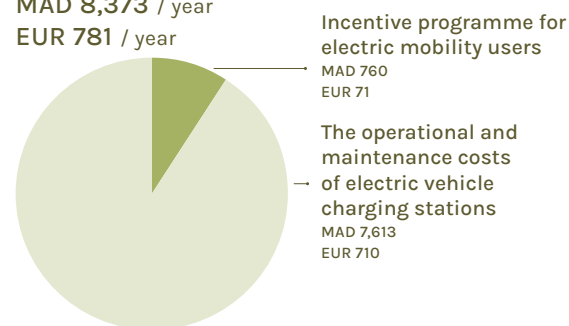
EUR 14,355



OPEX (MAD/EUR'000)

MAD 8,373 / year

EUR 781 / year



ACTION OWNER

RGON

AREP

DELIVERY PARTNERS

Municipalities

Local site approvals & urban integration

MASEN

Solar-powered charging stations

Private charging operators

Installation & operations via PPP

SRM GON

Electricity distribution operator - grid interface since Oct 2025

ONEE-BE

Grid connection & capacity assessments

Women's cooperatives

Equitable siting

ANRE

Regulation & tariff frameworks

ACTION DESCRIPTION

OVERVIEW

The transition to electric mobility in the Guelmim-Oued Noun region is currently limited by low maturity of e-vehicles market in the region and Morocco in general, the high capital costs for electric vehicles and the absence of public charging infrastructure, both in major cities and along key regional corridors. The continued reliance on diesel and petrol-fuelled vehicles in the region is a major contributor to air pollution (32 kTCO₂ eq in 2022 to 42.3 kTCO₂ eq by 2030) and limits progress toward sustainable mobility. As vehicle ownership rises (average annual growth rate of 16%) and the Region seeks to leverage its renewable energy potential, establishing a robust charging network is essential to encourage the uptake of electric vehicles (EVs) and support sustainable transport.

This action aims to lay the groundwork for electric mobility by planning, piloting, and gradually expanding a network of public charging stations. The approach will be informed by a detailed feasibility study, ensuring that infrastructure is optimally located, technically viable, and aligned with projected demand. The action will also introduce incentive programmes to stimulate early adoption and build public confidence in EV technology.

By prioritising major urban centres, tourist locations and national roads for the pilot phase, the Region will demonstrate the viability of electric mobility, reduce range anxiety, and set the stage for broader expansion. This will help position the Region as a leader in clean transport, supporting climate goals and economic development.

ACTION COMPONENTS

FEASIBILITY STUDY

A comprehensive study will assess the technical, economic, and spatial feasibility of EV charging infrastructure across the region. This will include analysis of grid capacity, optimal locations in cities, tourism spots and along national roads, identification of user-types (e.g. tourists) and integration with renewable energy sources. The feasibility study should give particular attention to the Agadir-Guelmim national highway corridor (N1), which serves as the primary route for tourists driving south through Morocco towards the Atlantic Sahara. Charging stations along this corridor would serve both transit tourists and intercity commuters, and would complement the national network currently being developed along the Atlantic axis. Within the region, priority urban locations should include Guelmim city centre and the existing transport hub, Tan-Tan port area, Sidi Ifni seafront (high tourist footfall), and the Assa administrative centre. Integration with planned solar installations (actions E3 and E4) should be assessed to enable solar-powered charging. Stakeholder engagement will ensure that the study reflects user needs, market maturity and supports equitable access.

IMPLEMENTATION OF PILOT

Based on the feasibility study, a pilot network of public charging stations and compact charging hubs will be installed in Guelmim, Sidi Ifni, Tan-Tan, and Assa. The pilot will prioritise high-visibility, high-demand locations such as city centres, transport hubs (especially the ones that would be planned and implemented in the scope of Action T5 – ensuring that these hubs would serve electric vehicles as well), and tourist sites, and will be monitored for usage, reliability, and user satisfaction.

INCENTIVE PROGRAMME FOR ELECTRIC MOBILITY USERS

To encourage early adoption, the Region will introduce targeted incentives such as reduced parking fees, preferential access to charging, or financial support for EV

purchases. Public awareness campaigns and partnerships with local businesses will further promote the benefits of electric mobility and support behaviour change.

EXPANSION OF CHARGING INFRASTRUCTURE

Building on from the pilot, the charging network will be progressively expanded to cover additional urban areas, regional corridors, and key destinations. The expansion will be scaled and guided by ongoing monitoring of demand, technological developments, and integration with national and regional mobility strategies. In the case of limited uptake during the first phase of the programme, the expansion might be temporarily suspended or delayed to longer term.

GENDER EQUALITY AND HUMAN CAPITAL



Safe and equitable siting of charging stations

Locate charging points in visible, well-lit areas with safe pedestrian access near destinations commonly used by women, youth and marginalised groups (markets, transport hubs, health facilities).



Support for community-owned EV solutions

Channel incentives and planning support to women's cooperatives, disability organisations, and local community groups to operate shared EV assets (e.g., community car-share, cargo e-bikes for cooperatives). Provide small grants or concessional leases for vehicles, priority access to charging windows, and simplified contracts for community-run services (e.g. school runs, health-centre trips, last-mile deliveries), ensuring the EV transition generates direct mobility benefits for these groups.



Training and local roles in charging-station operations

Provide short, practical training for women and youth to support EV charging operations, including basic station maintenance, user assistance, payment/kiosk

support, and simple fault reporting. Recruitment will be coordinated through commune job centres, INDH platforms and vocational partners, creating accessible local jobs linked to the emerging EV ecosystem.

ECONOMIC DEVELOPMENT

160 FTE jobs

CLIMATE MITIGATION⁷⁶

300 tCO₂/year

DIGITAL

Development of a charging app or web map, supporting users in locating charging stations and availability

RESILIENCE CO-BENEFITS

Infrastructure failure/obsolescence

IMPACT INDICATORS

Number of public EV charging stations installed and operational (by location type: urban/highway/tourist)

Baseline: ~0 public chargers

Target: 10 public chargers by 2028 (pilot phase). Morocco national target: 2,500 public chargers by 2026, 25,800 by 2035 (APIME).

Total charging capacity installed (kW) on Agadir-Guelmim N1 corridor

Baseline: 0 kW

Target: minimum 2 fast-charge stations (≥50 kW each) on N1 corridor by 2028

Average utilisation rate of installed charging stations (sessions/day)

Baseline: N/A (no stations).

Target: 3 sessions/day per station by 2030 (pilot phase), building toward ≥5 sessions/day by 2031 to demonstrate commercial viability for private operator takeover (McKinsey 2023)



Example of EV charging station

75. Feasibility study - EUR 100,000, based on Arup internal projects; pilot electric charging stations - EUR 40,000 per 50-100 kW charger, based on Arup internal projects; O&M of charging stations - 5% of Capex, based on the NREL; awareness and incentive activities - MAD 100,000 for a building-user awareness project and MAD 500,000 for a school awareness programme, based on Arup internal projects; legal and regulatory support - benchmarked using an annual lawyer salary in Morocco of MAD 379,907, applied to 2 lawyers; and additional roll-out of charging infrastructure was costed using the same per-station benchmark and O&M assumption for a larger network expansion.
76. It was estimated by scaling a benchmark from the Building Electric Vehicle Charging Network - Kootenays, BC case study, which assumes that 43 charging stations support 87,000 km of EV travel and generate annual emissions savings of 21 tCO₂; this was converted to 2,023.26 km and 0.488 tCO₂/year per charging station, and then applied to the assumed network of 600 charging stations, resulting in supported EV travel of 1,213,953.5 km/year.



CHALLENGE 4

Accelerated urbanisation

CHALLENGE 4

Accelerated urbanisation

Urban growth in the Guelmim-Oued Noun region is rapid and uneven, with core cities like Guelmim, Sidi Ifni, and Tan-Tan expanding of respectively 172%, 27% and 73% since 1990. This growth has outpaced infrastructure provision, leading to gaps in roads, drainage, and public amenities. Green space provision is insufficient (less than 10 m² per capita in urban areas), and rural centres face chronic underinvestment. The result is increased pressure on natural resources, declining quality of life, heightened vulnerability to climate risks and reduced capacity to benefit from nature based solutions that address both cooling and flood management.

The Region, through the PDR and in partnership with national ministries, is investing in urban and rural centres modernisation and upgrades, old medina and market upgrades, green space creation, and oasis preservation as key nature based strategies that support both adaptation and biodiversity. However, further action is needed to ensure sustainable, inclusive urban development.

The GCAP addresses these challenges and complements existing initiatives through:

- **The expansion of the urban and rural centre modernisation programme** **U1** looking to upgrade infrastructure, public spaces, and heritage sites in cities and rural centres.
- The implementation of large-scale tree planting, green corridors, and parks to reduce heat, improve resilience through nature-based cooling, permeability, and

ecological improvement will support the **integrated urban realm and green infrastructure programme**

U2.

- The passive cooling efforts will be supported by **shading infrastructure in public spaces** **U3** consisting of installation of modular shade structures and passive cooling solutions in markets and high-traffic areas, complementing vegetated cooling measures where space is constrained.
- The restoration of fragile oasis ecosystems to reduce fire risk, and support community engagement, while strengthening natural buffers against climate impacts, will be strengthened by the **oasis preservation, restoration, and fire resilience programme** **U4**.
- The development of **infrastructure and support services for SMEs for regional ecotourism** **U5** will support sustainable tourism, local businesses, and create active mobility routes.

Together, these actions represent MAD 1,028,642,000 (EUR 95,924,000) of investment and are estimated to support the creation of almost 700 jobs. These interventions will foster vibrant, climate-resilient communities, enhance quality of life, and support sustainable economic growth across the region.

SOCIAL MEDIA CAMPAIGN INSIGHT



Residents highlighted the need for urgent neighbourhood upgrades, including street paving and drainage improvements to reduce flooding and sewage back-ups, which informed the GCAP's focus on targeted urban rehabilitation and resilience measures.

ACTION FUNCTION	ACTION REF.	ACTION TITLE	PROVINCE	SPATIAL EXTENT			
				URBAN	RURAL	COASTAL	REGIONAL
PUBLIC- REALM RENEWAL Actions that modernise urban and rural centres	U1	Expansion of the urban and rural centre modernisation programme	All provinces				
CLIMATE- ADAPTATION Actions that reduce impacts of climate change	U2	Integrated urban All realm and green infrastructure programme	provinces				
	U3	Shading infrastructure in public spaces	All provinces				
	U4	Oasis preservation, restoration and fire resilience programme	Guelmim, Assa-Zag, and Tan-Tan				
GREEN TOURISM Actions that enable the growing sector	U5	Infrastructure and support services for SMEs for regional ecotourism	Sidi Ifni and Tan-Tan				



Table 9. Function and location matrix of Challenge 4 actions

U1

Expansion of the urban and rural centre modernisation programme

AT A GLANCE

Delivery of improvements in infrastructure, public spaces, and heritage conservation through funding and implementation support to expand the provincial city modernisation plan, including the rehabilitation of Guelmim’s old medina and further prioritisation and modernisation of selected rural centres.

SECTORS
Land Use, Energy and Buildings

SPATIAL EXTENT
Urban and rural areas in all provinces

POLICY SYNERGIES

PDR

- PDR B.2.1.1 – Upgrading programme for provincial cities (Phase 2)
- PDR B.3.1.2 – Upgrading programme for rural centres (Phase 2)
- PDR B.2.1.2 – Rehabilitation of the old Medina of Guelmim (Phase 2)

NDC 3.0

Homologation of national norms on sustainable cities and climate adaptation
Adaptation NDC 12: Prevention and management of floods and extreme events.
Mitigation NDC 40: National energy efficiency programme in public lighting

STRATEGIC GOALS

-
- SG5
Promote green, and climate-adaptive urban development while protecting ecosystems.
-
- SG6
Retrofit and build climate-resilient, energyefficient infrastructure for all.
-
- SG7
Build a more gender-inclusive region.

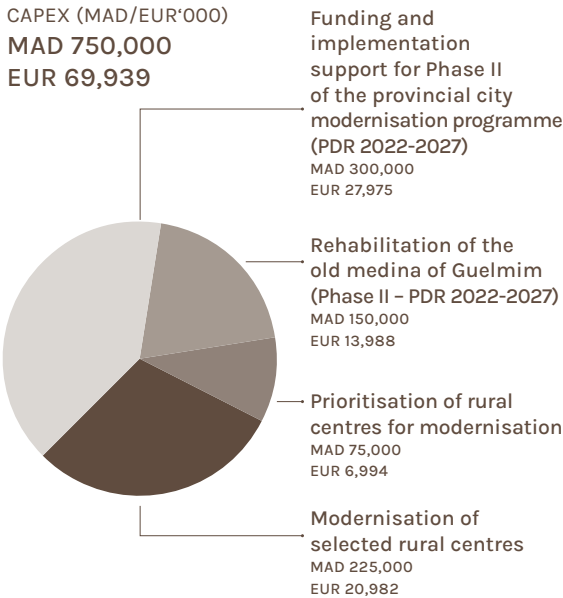
RELATED GCAP ACTIONS

- T2
- U2
- U3
- E5

SCHEDULE OF IMPLEMENTATION

ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Funding and implementation support for Phase II of the provincial city modernisation programme (PDR 2022-2027)						
Rehabilitation of the old medina of Guelmim (Phase II – PDR 2022-2027)						
Prioritisation of rural centres for modernisation						
Modernisation of selected rural centres						

DETAILS ON IMPLEMENTATION⁷⁷



ACTION DESCRIPTION

OVERVIEW

Rapid and uneven urban growth in the Guelmim-Oued Noun region has led to infrastructure gaps and declining quality of public spaces. Cities such as Guelmim and Tan-Tan have expanded faster than infrastructure provision,

creating pressure on roads, drainage, and public amenities. At the same time, rural centres face chronic underinvestment and limited access to well-designed public spaces, which restricts social and economic opportunities.

The expected outcomes include improved urban resilience, enhanced quality of life, and strengthened cultural identity. By engaging local SMEs in implementation, the programme will also create jobs, build skills, and foster community participation, supporting sustainable development across the region.

ACTION OWNER

Ministry of Interior **RGON**
DGCT

DELIVERY PARTNERS

Municipalities

Project delivery & local coordination

AREP

Project execution arm for RGON

Ministry of Housing & Urban Planning

Urban design standards

Provincial Councils

Co-financing & provincial coordination

Local associations

Community engagement & heritage

Ministry of Culture

Medina rehabilitation –Guelmim old medina

Women, youth & elderly residents

Community-led design

77. Funding and implementation support for Phase II of the provincial city modernisation programme – MAD 300 million, based on the PDR 2022-2027 programme, with 50% of the investment assumed to be covered under the GCAP; rehabilitation of the old medina of Guelmim (Phase II) – MAD 150 million, also based on PDR 2022-2027, with 50% GCAP coverage assumed; prioritisation of rural centres for modernisation – MAD 75 million, based on PDR 2022-2027; and modernisation of selected rural centres – MAD 225 million, likewise based on PDR 2022-2027, with 50% of investment assumed under the GCAP.

ACTION COMPONENTS

PRIORITISATION OF URBAN AND RURAL CENTRES FOR MODERNISATION

A structured assessment will identify which urban and rural centres should be prioritised for investment based on criteria such as population size, infrastructure gaps, vulnerability to climate risks, and socio-economic needs and coverage by existing PDR actions. This will ensure resources are allocated effectively and improvements deliver the greatest impact.

FUNDING AND IMPLEMENTATION SUPPORT FOR PHASE II OF THE PROVINCIAL CITY MODERNISATION PROGRAMME (PDR 2022-2027)

This component will identify financial shortfalls and mobilise resources to accelerate the second phase of the provincial city modernisation programme from PDR. Interventions will focus on helping deliver the modernisation programme over and above what was initially planned in the PDR by upgrading infrastructure, improving mobility, and enhancing public spaces, linking all efforts to urban resilience objectives and best practices for climate adaptation and sustainability.

REHABILITATION OF THE OLD MEDINA OF GUELMIM (PHASE II – PDR 2022-2027)

The historic medina will undergo rehabilitation to preserve its cultural heritage while improving accessibility and resilience as part of the PDR. This component will focus on expanding the scope of the current PDR action to include climate adaptation features such as shaded areas and cooling pavements, as well as integration with surrounding urban development to create a cohesive, vibrant public realm.

MODERNISATION OF SELECTED RURAL CENTRES

The selected rural centres will be revitalised through the rehabilitation of local infrastructure, including roads, drainage, and lighting. Public spaces such as village

squares and markets will be improved to create safe, attractive, and functional community gathering places that support social interaction and local commerce. Local SMEs will be engaged in the delivery of these projects to promote job creation, skills development, and community participation, strengthening the local economy and fostering ownership of improvements.

GENDER EQUALITY AND HUMAN CAPITAL



Community-led design of public spaces

Engage women, youth, elderly residents and marginalised groups in the planning and design of upgraded public spaces through co-design workshops, held in medinas, rural centres, markets and community spaces. Engagement will be scheduled at accessible times and locations and conducted in local languages, ensuring that layout, seating, shading, routes, and amenities reflect everyday use patterns, safety concerns, and cultural practices, particularly for women, children and older residents.



Accessible and safe public environments:

Ensure universal accessibility in public-space upgrades, including step-free access, seating, shading, lighting and clear sightlines, improving mobility and perceived safety for elderly people, persons with disabilities and women.



Wayfinding, accessibility and smart-city signage

Integrate clear, accessible signage and wayfinding (including accessibility, mobility and cultural information) as part of the modernisation programme. Signage will use symbols and local languages and be developed with user input from the co-design workshops, to support navigation by women, elderly people, visitors and people with disabilities, strengthening usability and inclusion of upgraded centres.



Inclusive local employment and skills pathways through SMEs

Prioritise local SMEs, cooperatives and micro-enterprises for construction, rehabilitation, landscaping, and public-space maintenance contracts, with incentives for those that employ and upskill women and youth. In partnership with OFPPT, municipalities, and local women's cooperatives, provide short, gender-sensitive training modules (e.g. stonework, green-space maintenance, basic site supervision), complemented by on-the-job mentoring with experienced artisans or contractors. Contracting requirements will promote safe worksites, appropriate PPE and respectful working environments to support women's participation in traditionally male-dominated activities.

ECONOMIC DEVELOPMENT

300 FTE jobs

DIGITAL
N/A

CLIMATE MITIGATION
N/A

RESILIENCE CO-BENEFITS

Infrastructure failure/obsolescence

IMPACT INDICATORS

Rate of coverage by basic urban services in upgraded cities and rural centres (%)

Baseline: Service coverage varies by province; Sidi Ifni water at 52%, Assa-Zag electrification at 95%

Target: 90% basic service coverage in all upgraded centres by 2030 (NDC 3.0)

Number of urban and rural centres with completed climate-resilient upgrading programme (out of provincial target)

Baseline: Phase 1 partially completed; Phase 2 targets all 4 provincial capitals and emerging rural centres.

Target: 4 provincial cities and 5 emerging centres by 2030 (NDC)

Integrated urban realm and green infrastructure programme

AT A GLANCE

Design and implement a green infrastructure programme by combining large-scale tree planting, green corridors, and parks, with planting targeted in areas with the greatest heat-exposure and shading needs. The action includes a site identification study, planting supply strategy with the creation of a regional nursery, the design and delivery of green corridors and parks, community engagement, and monitoring of environmental and social benefits.

SECTORS
Land Use

SPATIAL EXTENT
Urban and rural areas in all provinces



POLICY SYNERGIES

PDR

PDR C.3.5.1: Development of a green belt in Assa-Zag
PDR C.3.5.3: Argan tree plantation and arboriculture maintenance in Guelmim & Sidi Ifni

NDC 3.0

Mitigation NDC 77: Reforestation of forest ecosystems (planting, assisted regeneration, silvopastoral)
Adaptation NDC 74: Development and sustainable management of urban and peri-urban green and blue spaces
Adaptation NDC 60: Green belt development in Assa-Zag (100,000 trees)

STRATEGIC GOALS

-
- SG1
Ensure sustainable, equitable, and resilient water management across the region.
-
- SG5
Promote green, and climate-adaptive urban development while protecting ecosystems.
-
- SG7
Build a more gender-inclusive region.

RELATED GCAP ACTIONS

T2

U1

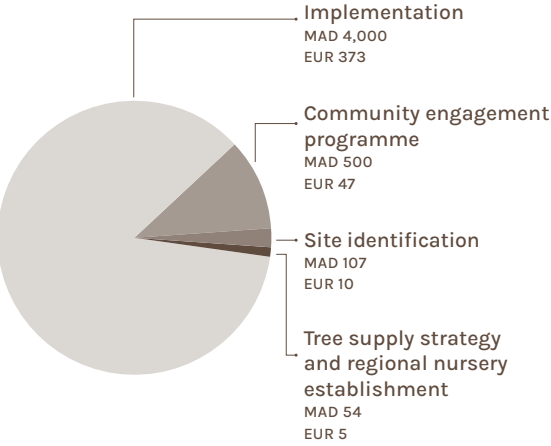
U3

SCHEDULE OF IMPLEMENTATION

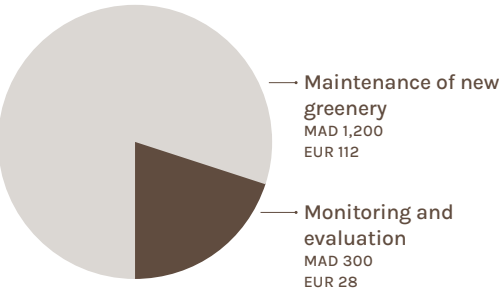
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Site identification						
Planting supply strategy and regional nursery establishment						
Tree planting and green corridor design and delivery						
Neighbourhood parks and school pocket-parks design and deliver						
Community engagement programme						
Monitoring and evaluation						

DETAILS ON IMPLEMENTATION⁷⁸

CAPEX (MAD/EUR'000)
MAD 4,661
EUR 435



OPEX (MAD/EUR'000)
MAD 1,500 / year
EUR 140 / year



78. Site identification / assessment – EUR 10,000, based on Arup internal projects; tree supply strategy and regional nursery establishment – EUR 5,000, based on Arup internal projects; planting programme – MAD 4 million for planting 100,000 trees, based on the PDR 2022–2027, with 50% of the investment assumed to be covered under the GCAP; tree maintenance – 30% of Capex, based on the Deltares benchmark cited in the workbook; community engagement – MAD 500,000, based on Agadir project; and monitoring and evaluation – based on 2 FTEs using an average Moroccan public-sector salary benchmark of USD 1,000/month, sourced from maroc.ma. All cost benchmarks were adjusted for inflation, PPP indexation, or location-specific cost escalation factors.

ACTION DESCRIPTION

OVERVIEW

The Guelmim-Oued Noun region faces significant challenges related to heat stress, limited green space, and soil degradation, which reduce urban resilience, quality of life and biodiversity. Insufficient green spaces in urban centres leave pedestrian areas, public squares, and transport stops exposed to extreme temperatures, particularly affecting vulnerable groups such as the elderly and children. Climate projections for southern Morocco indicate rising temperatures and reduced rainfall, which will likely intensify these conditions. Current stormwater management infrastructure is minimal, and given the region's arid climate, emphasis must shift towards rainwater harvesting and infiltration rather than conventional drainage systems. As the risk of heat stress increases, expanding green infrastructure becomes a critical adaptation strategy, helping to cool urban microclimates, reduce exposure during hotter periods and mitigate localised urban heat island effects.

This integrated programme will focus on increasing urban tree cover in areas with the highest demand for shading and heat-risk reduction, prioritising medinas, dense urban streets and other locations where exposure to extreme temperatures is most acute. A realistic target will be set subject to feasibility assessments, baseline data and proven irrigation sources. The programme combines tree planting, green corridors, and parks designed to form a connected green infrastructure network across key urban areas. Interventions will prioritise drought-tolerant native species and embed nature-based solutions for stormwater management, alongside sustainable irrigation using treated sewage effluent (TSE) where infrastructure allows. Success will depend on local wastewater capacity, funding, and institutional support.

The expected outcomes include reduced urban heat, improved thermal comfort, enhanced biodiversity, and greater climate resilience. Community engagement will be central to the programme, fostering stewardship and awareness while creating opportunities for education and participation. Together with U3, these actions will provide a complementary cooling strategy that reduces heat risks over time while strengthening the long-term adaptation capacity across the region's urban centres.

ACTION OWNER	
ANDZOA National Agency for Oasis & Argan Biosphere	
DELIVERY PARTNERS	
RGON Strategic targeting & co-financing	Local cooperatives Community-led planting & maintenance
Municipalities Local site coordination & land access	ABHDON Water management nexus
Haut-Commissariat aux Eaux et Forêts – HCEFLCD Planting & biodiversity	Schools & civil society Environmental education
	Youth groups Green skills pathways

ACTION COMPONENTS

SITE IDENTIFICATION

Priority planting areas will be identified using tree cover studies, urban heat and flood risk assessments, and demographic data. Participatory mapping will incorporate local knowledge to ensure interventions reflect community needs and maximise impact. While the programme will prioritise public land such as boulevards, existing open/play spaces, collaboration with private landowners may be required in locations where priority planting sites span both public and private land. Each site will include a water budget, a confirmed irrigation source (e.g., Treated Sewage Effluent) and an Operation and Maintenance cost plan before planting proceeds.

PLANTING SUPPLY STRATEGY AND REGIONAL NURSERY ESTABLISHMENT

A phased supply plan will be developed, aligned with planting seasons. This will include establishing a regional nursery and securing long-term contracts with suppliers. Drought-resistant native species will be prioritised to ensure resilience and ecological benefits. A maintenance plan will ensure tree health and long-term success.

TREE PLANTING AND GREEN CORRIDOR DESIGN AND DELIVERY

Develop landscape designs for urban boulevards, neighbourhood green links, and ecological corridors. Prioritise drought-resistant native species (e.g Acacia nilotica, Tamarix aphylla, and Parkinsonia aculeata) and integrate sustainable irrigation systems using TSE. Corridors will encourage active travel by incorporating walking and cycling paths (T2). Where irrigation feasibility is low, substitute planting with permeable surfaces, and shading elements (U3) to achieve cooling without adding water demand. Designs will also incorporate shaded public drinking water fountains at rest points to reinforce heat adaptation and user comfort.

NEIGHBOURHOOD PARKS AND SCHOOL POCKET-PARKS DESIGN AND DELIVERY

Design and deliver new neighbourhood parks and revitalise existing ones in underserved areas to ensure inclusivity and recreational opportunities for all age groups. Incorporate pocket-parks near schools to encourage learning and play, and promote urban food growing through community gardens within selected neighbourhood parks. Park delivery will be phased and contingent on confirmed water sources or NBS suitability to avoid the risks inherent in long-term drought conditions on establishing vegetation.

COMMUNITY ENGAGEMENT PROGRAMME

A Tree Steward programme will be launched with schools and residents to support watering and maintenance. QR codes will provide information about tree species and ecological

benefits. Planting events and recognition initiatives will encourage participation and build local ownership.

MONITORING AND EVALUATION

Satellite and drone imagery will track canopy growth, while monitoring will assess benefits such as temperature reduction, air quality, biodiversity improvements and community engagement outcomes. Annual progress reports will be published to ensure transparency and inform future planning.

GENDER EQUALITY AND HUMAN CAPITAL



Equitable and participatory site selection

Prioritise green infrastructure in heat-exposed and underserved areas and use participatory mapping with women, schools and marginalised communities to identify suitable planting sites that reflect daily mobility and care patterns.



Green skills, youth pathways and internships

Link tree planting and park delivery to local job and skills pathways for youth (and young women in particular) through short, gender-sensitive training modules delivered with municipal services, OFPPT, nurseries and local SMEs. Training will focus on nursery work, planting techniques, irrigation management using TSE, green-space maintenance, and basic monitoring, complemented by paid internships or seasonal contracts and on-the-job mentoring by experienced landscapers.



Women- and community-led stewardship

Involve women, schools and community groups directly in tree planting and ongoing care through a structured Tree Steward programme. Women's cooperatives, parent associations and neighbourhood groups will be supported to take on stipended stewardship roles (watering oversight, basic pruning, reporting losses), recognising unpaid

care work and improving tree survival rates while building local ownership.



Safe, accessible parks and public green spaces

Ensure new parks and green corridors are designed for universal accessibility and safety, including step-free access, shaded seating, clear sightlines and lighting along paths. This supports use by women, elderly people and caregivers and encourages regular, independent use of green spaces.

ECONOMIC DEVELOPMENT	DIGITAL
30 FTE jobs	N/A
CLIMATE MITIGATION ⁷⁹	RESILIENCE CO-BENEFITS
2,200 tCO ₂ /year	Flood/landslide, Extreme temperatures

IMPACT INDICATORS

Number of trees planted in urban and peri-urban areas (cumulative)

Baseline: 250 ha argan regeneration completed (PDR)
Target: 100,000 trees by 2030 (NDC A-60)

79. It was estimated based on tree planting, using an annual sequestration factor of 22 kgCO₂/tree/year and an assumed planting programme of 100,000 trees.



U3

Shading infrastructure in public spaces

AT A GLANCE

Design and install modular shade structures and passive cooling solutions in public spaces with high footfall such as markets, to reduce heat exposure and improve thermal comfort. This will include site identification, co-design activities with local stakeholders, a phased deployment and impact monitoring.

 **SECTORS**
Land Use, Energy and Buildings

 **SPATIAL EXTENT**
Urban areas in all provinces

POLICY SYNERGIES

PDR

PDR B.2.1.1 – Upgrading programme for provincial cities (Phase 2)

PDR B.3.1.2 – Upgrading programme for rural centres

NDC 3.0

Adaptation NDC 93: Homologation of national norms on sustainable cities and climate adaptation

Adaptation NDC 12: Extreme heat & climate event resilience.

Adaptation NDC 74: Development and sustainable management of urban and peri-urban green and blue spaces

Mitigation NDC 77: Reforestation of forest ecosystems

STRATEGIC GOALS

 **SG6**
Retrofit and build climate-resilient, energyefficient infrastructure for all.

 **SG7**
Build a more gender-inclusive region.

RELATED GCAP ACTIONS

U1

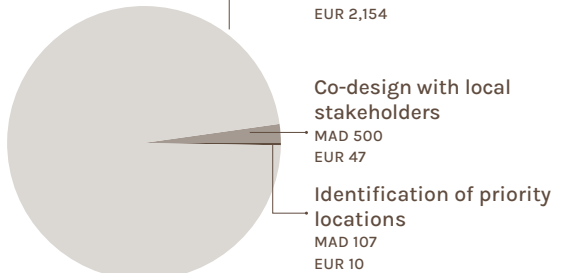
U2

SCHEDULE OF IMPLEMENTATION

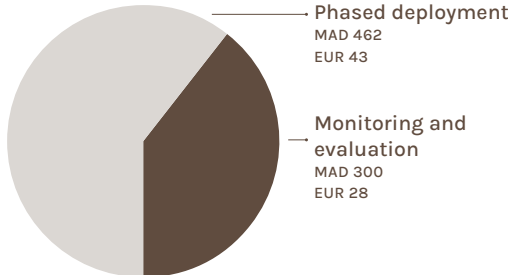
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Identification of priority locations						
Design and development of shade structures and passive cooling solutions						
Co-design with local stakeholders and deployment of infrastructure						
Monitoring and evaluation						

DETAILS ON IMPLEMENTATION⁸⁰

CAPEX (MAD/EUR*000)
MAD 23,707
EUR 2,211



CAPEX (MAD/EUR*000)
MAD 762 / year
EUR 71 / year



ACTION DESCRIPTION
OVERVIEW

Public spaces in the Guelmim-Oued Noun region, including open-air markets and high-traffic pedestrian areas, are highly exposed to extreme heat, creating discomfort and health risks for residents and visitors. Connected, natural shade is

limited in many locations, and tree planting is not always feasible due to space constraints or soil conditions. These challenges disproportionately affect vulnerable groups such as the elderly, children, and outdoor workers. As temperatures continue to rise and heatwaves intensify, these spaces are expected to become increasingly uncomfortable, reinforcing the need for shading and cooling measures that can mitigate local heat island effects and reduce direct heat exposure.

This action will design and install modular shade structures in priority public spaces to reduce heat exposure and improve thermal comfort, complemented by passive cooling solutions such as cool pavements in areas where heat island effects are most pronounced. Structures will use locally sourced, climate-appropriate materials that are durable and easy to maintain. Co-design with local stakeholders will ensure solutions meet community needs and support local employment.

Expected outcomes include improved comfort and safety in public spaces, reduced heat stress, and enhanced resilience to climate change. By complementing the tree planting programme (U2), these shading interventions will form a practical first line of defence against increasing heat risks, providing immediate cooling benefits.

ACTION OWNER

Municipalities

DELIVERY PARTNERS

RGON

Co-funding & design guidance through AREP

Ministry of Interior / DGCT

Urban design approvals

Local associations

Community needs identification

Architecture & engineering firms

Design & delivery

Women vendors & market associations

Co-design of shade solutions

Local artisans

Modular shade structure fabrication

ACTION COMPONENTS

IDENTIFICATION OF PRIORITY LOCATIONS

Use heat maps, footfall data, and community input to identify areas with high exposure during peak hours and limited natural shade. Mapping will also identify street markets, key social infrastructure, and micro-mobility corridors.

DESIGN AND DEVELOPMENT OF SHADE STRUCTURES AND PASSIVE COOLING SOLUTIONS

Develop permanent or modular shade structures using locally available, heat-reflective, and durable materials. Integrate passive cooling measures such as cool pavements in high-risk areas to further reduce surface temperatures. Designs will prioritise accessibility for pedestrians and visibility for vendors and customers. Where appropriate, designs may also include shaded public drinking water fountains at rest points to enhance heat-stress protection and user comfort.

CO-DESIGN WITH LOCAL STAKEHOLDERS AND DEPLOYMENT OF INFRASTRUCTURE

Engage market associations, vendors, and local artisans in the design process to ensure cultural relevance and community ownership. This approach will also create opportunities for local employment in the design and delivery of the structures. Installations will then be deployed in phases and supported by a maintenance plan covering cleaning, repairs, seasonal adjustments, and dismantling of temporary structures.

MONITORING AND EVALUATION

Monitor surface temperature reductions, heat island mitigation, and user/vendor satisfaction to assess effectiveness. Feedback will inform future improvements and scaling.

GENDER EQUALITY AND HUMAN CAPITAL



Co-design with stakeholders

Co-design modular shade solutions with market associations, women vendors, and local artisans through short workshops and on-site mock-ups at markets and high-footfall streets. Sessions will define preferred heights, light/airflow, stall visibility, drainage and seasonal assembly, ensuring designs protect health without disrupting sales or sightlines. Selection of materials and modules will favour locally workable techniques (textiles, metal/wood frames) to enable local production.



Heat-risk targeting

Prioritise installation in high-traffic areas used by women, elderly people, children and outdoor workers (including open-air markets, school approaches, mosques and transport stops) using heat maps, footfall data and community input to time deployment during peak risk periods.



Accessible and safe public-space design

Ensure shade structures and cool pavements provide step-free pedestrian clearance, adequate widths, non-slip surfaces, clear sightlines, and lighting integration where evening activity continues. Designs will be checked on site with older users and people with disabilities to confirm accessibility.



Local jobs, skills and safe worksites

Create short, paid training for women and youth, delivered with municipalities, OFPPT, and artisans' groups. Training will cover fabrication/assembly, installation, inspection and routine maintenance of shade modules. Procurement will favour SMEs/cooperatives that commit to targeted outreach, on-the-job mentoring, PPE sized for women, and basic site safety measures, enabling a practical pathway into green public-realm work.

ECONOMIC DEVELOPMENT 5 FTE jobs	DIGITAL N/A
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CLIMATE MITIGATION N/A	RESILIENCE CO-BENEFITS Extreme temperatures
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IMPACT INDICATORS

Area of public space covered by permanent shading infrastructure (m²)

Baseline: 0 formal shading infrastructure in provincial cities
Target: 4,200 m² shaded public space per provincial capital by 2030

Reduction in ambient temperature in shaded areas compared to unshaded reference points (°C)

Baseline: TBC from urban heat island assessment
Target: ≥3°C reduction in shaded vs. unshaded areas in pilot sites (C40, UN-Habitat)

80. Identification of priority locations – EUR 10,000, based on Arup internal projects; shade structures on 0.42 ha of land – USD 590 per m², based on the VistaHardScape benchmark for shade solutions; community co-design / stakeholder engagement – MAD 500,000, based on Arup internal projects benchmark; maintenance of shading infrastructure – 2% of Capex, based on Arup internal projects; and monitoring and evaluation – based on 2 FTEs using an average Moroccan public-sector salary benchmark of USD 1,000/month, sourced from maroc.ma.

Oasis preservation, restoration and fire resilience programme

AT A GLANCE

Design and install modular shade structures and passive cooling solutions in public spaces with high footfall such as markets, to reduce heat exposure and improve thermal comfort. This will include site identification, co-design activities with local stakeholders, a phased deployment and impact monitoring.

SECTORS

Land Use

SPATIAL EXTENT

Regionally in Guelmim, Assa-Zag and Tan-Tan provinces

POLICY SYNERGIES

PDR

- PDR B.3.2.1 – Oasis rehabilitation programme
- PDR C.3.5.3 – Argan tree plantation & arboriculture
- PDR C.3.7.1 – Flood protection programme
- PDR C.3.6.1 – Conservation & valorisation of the Oued Drâa estuary (SIBE)

NDC 3.0

- Adaptation NDC 56: Strengthening resilience of oasis ecosystems,
- Adaptation NDC 12: Prevention and management of floods, droughts and extreme climate events.
- Adaptation NDC 54: Fight against sand encroachment in oasis zones
- Mitigation NDC 77: Reforestation of forest ecosystems

STRATEGIC GOALS

- SG1
Ensure sustainable, equitable, and resilient water management across the region.
- SG6
Retrofit and build climate-resilient, energyefficient infrastructure for all.
- SG7
Build a more gender-inclusive region.

RELATED GCAP ACTIONS

- W2
- W6
- U5

SCHEDULE OF IMPLEMENTATION

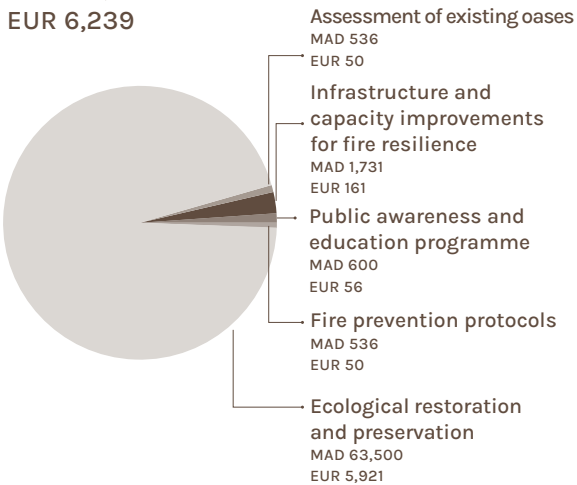
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Assessment of existing oases						
Ecological restoration and preservation						
Fire prevention protocols						
Infrastructure and capacity improvements for fire resilience						
Public awareness and education programme						
Monitoring and evaluation						

DETAILS ON IMPLEMENTATION⁸¹

CAPEX (MAD/EUR'000)

MAD 66,903

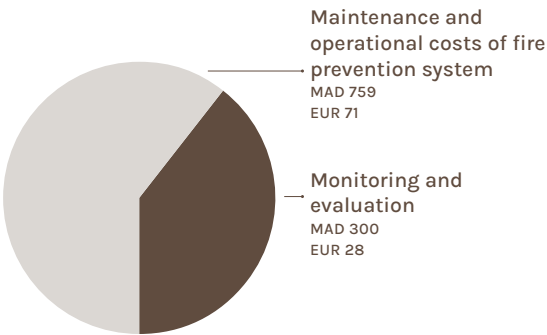
EUR 6,239



CAPEX (MAD/EUR'000)

MAD 1,059 / year

EUR 99 / year



ACTION DESCRIPTION

OVERVIEW

Oasis ecosystems in the Guelmim-Oued Noun region are increasingly degraded and vulnerable due to climate change, overexploitation, and rising fire risk. These fragile landscapes face multiple pressures, including prolonged drought, silting, seasonal locust infestations, groundwater depletion, and loss of biodiversity. Land conversion and overgrazing further erode their ecological and social value, particularly for women who depend on oasis resources for income and household needs.

This action aims to protect and restore oasis systems in the provinces of Guelmim, Assa-Zag, and Tan-Tan through ecological restoration, fire risk reduction, and community engagement. Restoration measures will integrate traditional nature-based solutions alongside modern techniques to enhance resilience and sustainability. Fire prevention protocols and infrastructure improvements will reduce vulnerability to disasters and safeguard livelihoods while strengthening the natural functions that help mitigate the impacts of heat, drought, and wind. Fire resilience and oasis preservation are closely interlinked, as restored vegetation, improved soil structure, and traditional nature-based barriers help reduce fuel loads, slow fire spread, and stabilise microclimates. Integrating fire-resilience infrastructure within the wider restoration effort ensures that both ecological health and emergency response capacity reinforce each other.

The expected outcomes include improved ecological health, reduced fire risk, and strengthened community capacity for disaster preparedness. By involving local women-led cooperatives and youth groups, the programme will also create opportunities for employment and education.

ACTION OWNER**ANDZOA**

National Agency for Oasis & Argan Biosphere

DELIVERY PARTNERS**Regional Council / RGON**

co-financing & community engagement

Municipalities

Local oasis governance

Haut Commissariat aux Eaux & Forêts – HCEFLCD

Forest management & fire prevention

Local oasis communities & cooperatives

Restoration & traditional knowledge

ABHDON

Aquifer monitoring & groundwater recharge

Civil Protection

Fire resilience response capacity

Women-led cooperatives & youth groups

Restoration workforce

Urban Agency

Implementation

Ministry of Spatial Planning

Implementation

ACTION COMPONENTS**ASSESSMENT OF EXISTING OASES**

Conduct a comprehensive assessment of oasis ecosystems, including their ecological status, land use pressures, vulnerability to climate hazards and fire risk. This will provide a baseline for prioritising interventions and monitoring progress. While the PDR defines an initial scope of intervention, the prioritisation process will apply objective selection criteria to refine and confirm priority sites for implementation.

ECOLOGICAL RESTORATION AND PRESERVATION

Restore and preserve selected oasis systems through reforestation with native species, soil rehabilitation, and improved water management in synergy with actions W6 and W2 on water reuse for irrigation and integrated water resource management. Traditional nature-based solutions such as reed and tree fencing to minimise sand encroachment and natural gabions to slow floodwaters

will be integrated to protect fragile vegetation while enhancing natural cooling, moisture retention, and groundwater recharge functions.

FIRE PREVENTION PROTOCOLS

Develop and implement fire prevention measures, including detailed risk mapping (using vegetation density, historical fire occurrences, and proximity to settlements), early warning systems, and coordination mechanisms between local authorities, emergency services, and community fire brigades. Community-based fire management systems will include training for local cooperatives in fire-spotting, safe evacuation procedures, controlled fuel-load reduction, and first-response actions.

INFRASTRUCTURE AND CAPACITY IMPROVEMENTS FOR FIRE RESILIENCE

Upgrade infrastructure in high-risk oasis areas by creating firebreaks, improving access routes for emergency vehicles, and installing water storage facilities for firefighting. Firebreaks and access routes will be designed to protect key restored zones, while water storage points will be strategically located near high-risk vegetation clusters identified through the risk mapping.

These measures will enhance response capacity and reduce damage during fire events. Where feasible, deploy community-owned solar systems (micro-grids or stand-alone PVs) to power pumps for restoration and firefighting storage, and to support early-warning communications and low-energy monitoring. Governance and operations will be anchored in local cooperatives (energy communities) to strengthen autonomy, reduce operating costs, and build long-term resilience, linking, where possible, to water reuse sources (W6).

PUBLIC AWARENESS AND EDUCATION PROGRAMME

Launch a public awareness programme to inform communities about fire risks and strengthen disaster

preparedness. Support women-led cooperatives and youth engagement in oasis restoration and monitoring to promote inclusive participation and local ownership, while encouraging community-driven stewardship of the ecosystems that provide both climate protection and livelihoods.

MONITORING AND EVALUATION

Establish indicators to track ecological health, fire risk reduction, and community engagement outcomes. Use satellite and drone imagery to monitor restoration progress and publish annual reports to ensure transparency and inform future planning, including how restored oasis ecosystems contribute to both adaptation outcomes and biodiversity gains.

GENDER EQUALITY AND HUMAN CAPITAL**Women-led restoration, skills development and resilience pathways**

Engage women-led cooperatives and youth groups as core partners in oasis restoration, covering nursery work, replanting native species, maintenance of water channels and vegetation management along firebreak. This participation will be supported through targeted outreach, stipended roles and on-site training, which then feeds into short, modular and gender-sensitive skills programmes delivered with municipal services, OFPPT, agriculture/forestry departments and local NGOs. Training will focus on deepening knowledge of ecological restoration techniques, fire-risk identification, use of basic monitoring tools (GPS/mobile phones), and safe operation of water and solar-powered equipment, complemented by on-the-job mentoring and safe worksite practices, creating a practical pathway from community stewardship to recognised eco-restoration and resilience roles.



Integration of traditional and nomadic knowledge systems

Participatory workshops with local women and nomadic populations and seasonal mapping exercises will capture insights on grazing patterns, water flows, wind exposure, plant species, and historical fire behaviour, ensuring interventions reflect long-term land stewardship practices rather than purely technical models.

ECONOMIC DEVELOPMENT	DIGITAL
50 FTE jobs	N/A
CLIMATE MITIGATION	RESILIENCE CO-BENEFITS
N/A	Flood/landslide, Drought

IMPACT INDICATORS

Volume of water saved through improved oasis irrigation efficiency (m³/year)

Baseline: Water deficit 41 Mm³/year; oasis agriculture irrigated from Guelmim aquifer (2,000+ ha)
Target: 20% reduction in water use per ha through drip irrigation by 2030 (NDC 3.0)

81. Assessment of existing oases – EUR 50,000, based on Arup internal projects; ecological restoration and preservation – MAD 63.5 million, based on the PDR 2022–2027 for rehabilitation of oases in the region, with 50% of the investment assumed to be covered under the GCAP; fire prevention protocols – EUR 50,000, based on Arup internal projects; fire resilience infrastructure – including USD 1,500 per gateway, USD 300 per forest sensor and USD 3,000 per drone, based on Arup internal projects, as well as EUR 4,200 per 15,000-litre firefighting water storage tank, based on the commercial supplier; operation of the fire monitoring system – based on an annual operational fee of USD 1,000 and staffing assumptions using Moroccan public-sector salary benchmarks; public awareness activities – MAD 100,000 for a building-user awareness project and MAD 500,000 for a school awareness programme, based on Arup internal projects; and monitoring and evaluation – based on 2 FTEs using an average Moroccan public-sector salary benchmark of USD 1,000/month, sourced from maroc.ma.





Infrastructure and support services for SMEs for regional ecotourism

AT A GLANCE

Development of sustainable tourism infrastructure and support services. This includes identifying priority areas for infrastructure delivery, strengthening the support for tourism SMEs, and creating a regional network of ecolodges, campsites, and routes for active mobility such as cycling.

SECTORS

Land Use, Energy and Buildings, Transport

SPATIAL EXTENT

Coastal areas in Sidi Ifni and Tan-Tan provinces

POLICY SYNERGIES

PDR

- PDR D.4.2.2 – Support for establishing eco-lodges and bivouacs
- PDR D.4.3.1 – Support for project holders to develop tourism products (circuits, surf clubs, etc.)
- PDR D.3.1.1 – SSE competitiveness cluster

NDC 3.0

- Adaptation NDC 59: Conservation and promotion of natural ecosystems and protected areas
- Adaptation NDC 57: Argan tree planting in Guelmim and Sidi Ifni provinces
- Adaptation NDC 74: Development and sustainable management of urban and peri-urban green and blue spaces

STRATEGIC GOALS

- SG1**
Ensure sustainable, equitable, and resilient water management across the region.
- SG3**
Transition to a circular economy with zero uncontrolled dumping and high resource recovery.
- SG5**
Promote green, and climate-adaptive urban development while protecting ecosystems.
- SG7**
Build a more gender-inclusive region.

RELATED GCAP ACTIONS

T2

U4

SCHEDULE OF IMPLEMENTATION

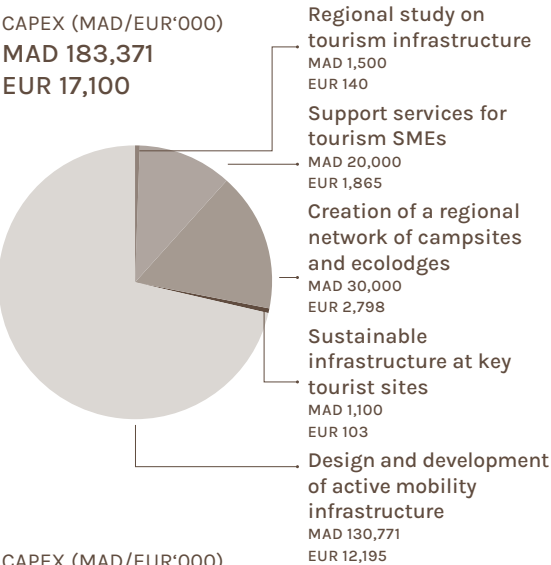
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Regional study on tourism infrastructure						
Support services for tourism SMEs						
Creation of a regional network of campsites and ecolodges						
Sustainable infrastructure at key tourist sites						
Design and development of active mobility infrastructure						

DETAILS ON IMPLEMENTATION⁸²

CAPEX (MAD/EUR'000)

MAD 183,371

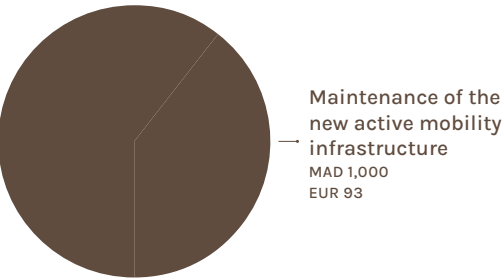
EUR 17,100



CAPEX (MAD/EUR'000)

MAD 1,000 / year

EUR 93 / year



ACTION DESCRIPTION

OVERVIEW

The Guelmim-Oued Noun region has strong potential for ecotourism thanks to its coastal landscapes, oasis ecosystems, and cultural heritage sites. Its rich landscapes remain underutilised for sustainable tourism due to infrastructure gaps, limited services, and insufficient support for local SMEs. These challenges hinder the development of a responsible tourism sector that could generate economic opportunities while preserving the region's ecological integrity and strengthening natural systems that buffer climate impacts.

This action will develop sustainable tourism infrastructure and strengthen support services for SMEs to promote low-impact travel and inclusive economic growth. It will identify priority sites for ecotourism development, create a regional network of ecolodges and campsites, and establish essential services at key tourist destinations. The programme will also provide technical assistance and financing options for SMEs, ensuring local businesses can thrive in the growing ecotourism sector, while promoting practices that protect and enhance natural ecosystems.

Expected outcomes include improved visitor comfort, enhanced resilience of tourism infrastructure, and increased employment opportunities for local communities. By integrating active mobility routes and climate-resilient, energy-efficient infrastructure, the action will position the region as a leading destination for responsible tourism.

ACTION OWNER**SDR TPME**
CRI**RGON**

Regional delegation of tourism

DELIVERY PARTNERS**Ministry of Tourism**National tourism strategy
alignment**CRI**

Investment facilitation

Local cooperatives – SSE

Community-based ecotourism

ANDZOA

Oasis ecotourism development

Private SMEs -

Ecolodge & campsite operators

MTEDD

Environmental compliance

AREPProject execution &
infrastructure delivery**SMIT**

tourism infrastructure design

Women-led cooperatives

Community-led planning

ACTION COMPONENTS**REGIONAL STUDY ON TOURISM INFRASTRUCTURE**

Conduct a comprehensive study to identify priority sites for ecotourism development, focusing on coastal areas, oasis towns, and cultural heritage sites. The study will align interventions with existing and planned cycling and hiking routes to promote active mobility.

SUPPORT SERVICES FOR TOURISM SMES

Develop and launch a dedicated support service for tourism SMEs, offering technical advice, access to finance, and capacity-building programmes. This will strengthen local businesses and encourage sustainable, resource-efficient practices that help maintain the ecological value of tourism areas.

CREATION OF A REGIONAL NETWORK OF CAMPSITES AND ECOLOGES

Establish a network of ecolodges and community-managed campsites to promote low-impact travel. Facilities will include traditional buildings such as kasbahs

and ksour, as well as campsites near oases and cultural sites, emphasising designs and operations that work with natural cooling, shading, and water-saving principles.

SUSTAINABLE INFRASTRUCTURE AT KEY TOURIST SITES

Provide essential services at high-pressure tourist destinations, including water supply and storage, sustainable waste management, secure parking for bicycles and vehicles, and micro-desalination units for accommodation. Priority sites include Plage Blanche, Sidi Ifni, and Tan-Tan. These improvements will help protect sensitive natural environments while ensuring that visitor facilities are resilient to climate stressors such as heat and water scarcity.

DESIGN AND DEVELOPMENT OF ACTIVE MOBILITY INFRASTRUCTURE

Develop 100km of cycle paths and 100km of hiking trails to connect areas of ecological and cultural importance. This will enhance accessibility and promote environmentally friendly travel.

GENDER EQUALITY AND HUMAN CAPITAL**Community-led planning and low-impact infrastructure**

Engage local communities (particularly women) in planning ecotourism infrastructure to ensure cultural fit, environmental protection, and shared benefits. Infrastructure design will support accessibility, family-friendly use, and low-impact standards (water efficiency, waste management, shading), benefiting residents as well as visitors.

**Skills training, mentoring and pathways to market**

Build a female talent pipeline in ecotourism through short, gender-sensitive training modules

delivered with OFPPT, CRT/SMIT tourism bodies, municipalities and experienced operators, covering hospitality standards, eco-site management, safety and safeguarding, digital marketing, pricing and booking platforms. Training will be paired with mentorship (peer and operator-led), exchange visits within Morocco, and on-the-job learning at demonstration sites (ecolodges/camps).

**Targeted support and finance for women- and youth-led ecotourism SMEs**

Prioritise women- and youth-led SMEs and cooperatives (e.g. homestays, campsites, guiding services, bike/hike rentals, craft and food activities) for integrated technical assistance and financing. Targeted outreach will be delivered through INDH platforms, women's cooperatives, commune business desks and tourism associations to identify candidates in oasis towns, coastal villages and rural centres. Support will combine tailored finance pathways (micro-grants, concessional loans, equipment leasing) with simplified application and licensing processes, and direct links to marketing channels (regional booking portals, tourism routes and events), enabling women and young entrepreneurs to start, formalise and scale viable ecotourism micro-projects.

**Exchange and peer-learning networks**

Facilitate regional and international exchange (twinning) between women-led ecotourism initiatives to share good practice on governance, safety, quality standards and marketing, strengthening resilience and visibility of local enterprises.

ECONOMIC DEVELOPMENT
300 FTE jobs**CLIMATE MITIGATION⁸³**
50,400 tCO₂/year

DIGITAL
Territorial marketing and
digital campaigns to
promote the region online

RESILIENCE CO-BENEFITS
Infrastructure failure/
obsolescence

IMPACT INDICATORS

Volume of water saved through improved oasis irrigation efficiency (m³/year)

Baseline: Water deficit 41 Mm³/year; oasis agriculture irrigated from Guelmim aquifer (2,000+ ha)

Target: 20% reduction in water use per ha through drip irrigation by 2030 (NDC 3.0)

82. Regional tourism study / strategic positioning study – MAD 1.5 million, based on the PDR 2022–2027, with 50% of the investment assumed to be covered under the GCAP; support fund for tourism project leaders – MAD 20 million, based on PDR 2022–2027; creation of a regional network of campsites and ecolodges – MAD 30 million, based on PDR 2022–2027; sustainable infrastructure at key tourist sites – MAD 1.1 million, also based on PDR 2022–2027; pedestrian infrastructure – MAD 990/m² for pavement construction/renovation, based on the City of Warsaw cost schedule; cycle lanes – EUR 50,000/km, based on the European Cyclists’ Federation benchmark; and maintenance of active mobility infrastructure – including MAD 5/m for pavement maintenance and USD 13/m for cycle lane maintenance, based respectively on Arup internal projects and the Active Living Research benchmark.
83. It was estimated by scaling a benchmark from the City of Zagreb Sustainable Energy and Climate Action Plan, which assumes annual emissions savings of 62,998.6 tCO₂/year for 250 km of cycling and pedestrian infrastructure; this benchmark was applied to the assumed 200 km of active mobility infrastructure in Guelmim.



A photograph showing a large, disorganized pile of solid waste, including numerous bags and debris, inside a structure with corrugated metal walls. The scene is dimly lit, with a warm, brownish tint. The waste is piled high, reaching towards the top of the frame. The corrugated metal walls are visible in the background, and the overall impression is one of a cluttered and unmanaged waste collection point.

CHALLENGE 5

Fragmented solid waste collection and disposal practices

CHALLENGE 5

Fragmented solid waste collection and disposal practices

The Guelmim-Oued Noun region faces significant challenges in solid waste management, with per capita waste generation rising to 210 kg/year in 2024. Waste collection and disposal are fragmented, especially in rural areas, and recycling rates remain extremely low (3% in urban areas, 0% in rural). The Region relies on a single controlled landfill in Guelmim, while numerous uncontrolled dump sites persist, leading to soil, groundwater, and surface water contamination. The stakeholder engagement undertaken throughout the development of the plan also underlined the need of increased public awareness of the issue, and the challenges presented by creating a coordinated waste management system across different municipalities. These issues present risks to public health and the environment, and are compounded by rapid urbanisation and limited infrastructure.

At the regional level, municipalities are responsible for waste collection, while regional bodies and Groupements de Collectivités Territoriales (GCTs) coordinate landfill management and treatment. The PDR 2022–2027 and provincial waste master plans prioritise the closure of illegal dump sites, construction of new EU-compliant sanitary landfills, and the development of waste recycling centres including organic waste treatment. Private operators like Ozone have improved urban collection, but rural coverage and recycling infrastructure remain inadequate.

The GCAP builds on these efforts with a comprehensive set of actions aiming at:

- **The development of regional waste management infrastructure and EU-compliant sanitary landfills** **WS1** to establish new engineered landfills, close and remediate illegal dump sites and implement long-term leachate and landfill gas treatment and monitoring.
- This will be complemented by **the expansion and upgrade of waste collection and transfer infrastructure** **WS2** consisting of modernising collection systems, deploying new waste bins and collection vehicles, and building transfer stations to improve waste management service coverage.
- The introduction of composting and anaerobic digestion facilities as part of the **development of organic waste treatment infrastructure** **WS3** and promotion of source-separated biowaste collection. This will be supported by education and awareness campaigns to promote source separation of waste and secure public participation to develop a recycling culture.
- The expansion of **waste sorting and recycling capacity** **WS4**, including the creation of sorting centres, recycling hubs, and upcycling initiatives to

increase resource recovery and support the transition to a circular economy.

These actions aim to reduce environmental and health risks, increase recycling rates, and create green jobs, supporting the region's transition to a sustainable, circular waste management system.

Together with a total investment of MAD 2,809,761,000 (EUR 262,015,000), these actions are estimated to directly support the creation of more than 1,100 jobs.

SOCIAL MEDIA CAMPAIGN INSIGHT



Residents raised concerns about illegal waste dumping, affecting health and public spaces, reinforcing the GCAP's actions on improved waste management, collection and processing.

ACTION FUNCTION	ACTION REF.	ACTION TITLE	PROVINCE	SPATIAL EXTENT			
				URBAN	RURAL	COASTAL	REGIONAL
MANAGEMENT Actions that dictate how all waste is managed	WS1	Development of regional waste management infrastructure and EU-compliant sanitary landfills	All provinces				
COLLECTION Actions that ensure waste is collected effectively	WS2	Expansion and upgrade of waste collection and waste transfer infrastructure	All provinces				
PROCESSING Actions that improve processing and recycling of waste supported by education and awareness campaigns	WS3	Development of organic waste treatment infrastructure, including composting, anaerobic digestion facilities and black soldier fly farming	All provinces				
	WS4	Expansion of waste sorting and recycling capacity	All provinces				



Table 10. Function and location matrix of Challenge 2 actions

WS1

Development of regional waste management infrastructure and EU-compliant sanitary landfills

AT A GLANCE

Development of regional waste management infrastructure, new and upgraded EU-compliant sanitary landfills that are engineered and equipped with impermeable base lining systems, landfill gas collection and flaring and/or utilisation systems depending on gas generation potential, leachate collection and treatment systems, upgradient groundwater monitoring wells, and supporting infrastructure such as access roads, fencing, weighbridge, wheel washing units and workforce training programmes.



SECTORS
Land Use



SPATIAL EXTENT
Regionally across all provinces

POLICY SYNERGIES

PDR

PDR C.3.4.1 – Construction of two sanitary landfills (CEV) for municipal waste in Tan-Tan and Sidi Ifni

NDC 3.0

Mitigation NDC 56: Mechanical-biological treatment (MBT) & co-incineration of municipal solid waste

Mitigation NDC 57: Integrated methane capture and utilisation for energy recovery in large landfills

STRATEGIC GOALS



SG3
Transition to a circular economy with zero uncontrolled dumping and high resource recovery.



SG5
Promote green, and climate-adaptive urban development while protecting ecosystems



SG7
Build a more gender-inclusive region

RELATED GCAP ACTIONS

WS2 WS3

SCHEDULE OF IMPLEMENTATION

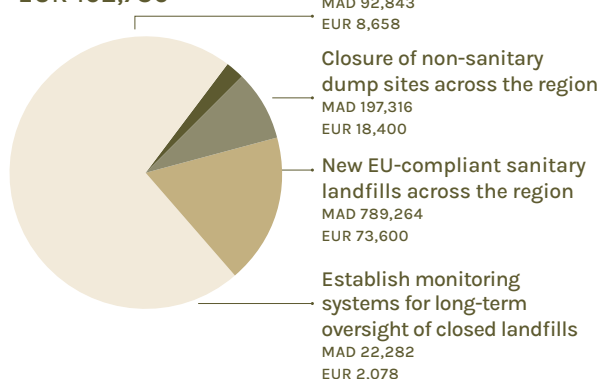
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Integrated waste management strategy and needs assessment study						
Close and remediate non-sanitary dump sites and existing landfills across the region						
Establish environmental and stability monitoring systems for long-term oversight of closed landfills						

DETAILS ON IMPLEMENTATION⁸⁴

CAPEX (MAD/EUR'000)

MAD 1,101,705

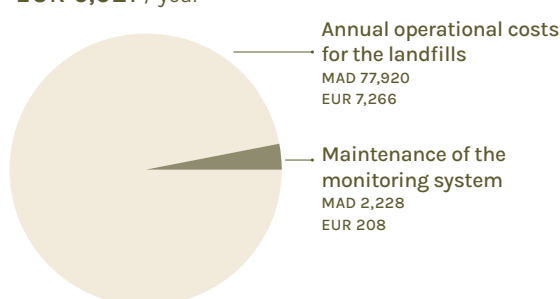
EUR 102,736



OPEX (MAD/EUR'000)

MAD 64,564 / year

EUR 6,021 / year



ACTION OWNER

Ministry of the Interior (DGCT / GCT) **RGON**

DELIVERY PARTNERS

AREP

Project execution & investment packaging

Municipalities / Intercommunal Groupings – GCT

Local delivery

MTEDD

Environmental regulation, EIA & monitoring

Provincial Councils

Co-financing & territorial coordination

Private landfill operators

Construction & operations via PPP

Local associations

Awareness, community monitoring & safeguarding

Women, youth

& nomadic representatives

Risk-sensitive siting – per GAP

ACTION DESCRIPTION

OVERVIEW

The region is currently facing significant environmental issues due to uncontrolled waste disposal and insufficient sanitary landfill infrastructure. With only a single regulated landfill operating in Guelmim and the remainder unmonitored, the situation has led to the proliferation of illegal dump sites. There is an urgent need to address these challenges to mitigate environmental and public health risks.

This action will identify key dump sites for closure and remediation alongside new locations for establishing new EU-compliant sanitary landfills and upgrade regional waste management infrastructure. This will lay the groundwork for future initiatives aimed at recovering value from waste including sorting of recyclables (glass, metals, paper/cardboard, plastics etc) and producing compost for use in agriculture.

ACTION COMPONENTS

INTEGRATED WASTE MANAGEMENT STRATEGY AND NEEDS ASSESSMENT STUDY

Non-sanitary dump sites will be identified and prioritised for closure or remediation, guided by comprehensive environmental and health risk assessments as well as insights from provincial waste plans. Concurrently, the evaluation of potential sites for regional waste centres and sanitary landfills will be conducted using both cost-benefit analysis and environmental criteria to ensure optimal site selection. In addition, the process will involve defining the institutional roles and exploring various governance models, including the potential for private sector participation, to determine the most effective framework for regional utility operation.

CLOSE AND REMEDIATE FOUR NON-SANITARY DUMP SITES AND EXISTING LANDFILLS ACROSS THE REGION

Closure and remediation works will be carried out at four non-sanitary dump sites, involving site containment, regrading, and revegetation where appropriate. Simultaneously, existing landfills will be modernised to meet sanitary standards or, where necessary, closed and replaced with new EU-compliant sanitary landfills. These new landfills will include landfill gas collection systems, with flaring as a minimum requirement and, where gas generation levels allow, the potential for utilisation in gas engines to generate electricity. Additionally, to those, solar panels could be installed on closed landfill cells to generate additional energy. The energy generated from these can then be used to power collection vehicles or for other onsite uses. This will align with the waste treatment strategies tailored for each province.

ESTABLISH MONITORING SYSTEMS FOR LONG-TERM OVERSIGHT OF CLOSED LANDFILLS

Establishment of monitoring protocols for closed landfills, including groundwater monitoring and reporting, landfill

gas emissions monitoring and reporting, and structural stability checks.

GENDER EQUALITY AND HUMAN CAPITAL



Risk-sensitive landfill siting and remediation

Involve women, youth, nomadic representatives and nearby communities in early planning and site walk-throughs, alongside municipalities and regional authorities. Engagement will focus on identifying sensitivities related to daily mobility routes, safety, odour, noise, access to grazing or water points, and seasonal settlement patterns, ensuring landfill locations and remediation works do not disproportionately impact marginalised groups.



Formalisation of informal workers and cooperatives

Engage existing informal waste pickers and cooperatives early in planning to map current livelihoods and integrate them into the formal system. This includes formal contracts, access to PPE, stable income arrangements, and clear roles in collection, sorting, or site management, reducing health risks while preserving livelihoods. Adjust the integration systems to the existing economic and cultural norms of the waste pickers (flexible contracts and working hours compatible with care responsibilities).



Skills and local jobs in landfill operations

Provide targeted training and paid roles for women and local youth in landfill operations such as site maintenance, environmental monitoring and record-keeping. Training will be delivered with operators and vocational partners (e.g. OFPPT), focusing on practical skills suitable for local labour markets rather than specialised engineering roles.

ECONOMIC DEVELOPMENT

200 FTE jobs

DIGITAL

N/A

CLIMATE MITIGATION⁸⁵

136,000 tCO₂/year

RESILIENCE CO-BENEFITS

Flood, Infrastructure failure/obsolescence

IMPACT INDICATORS

Number of uncontrolled dump sites closed and replaced by controlled engineered landfills (CEV)

Baseline: Majority of dump sites uncontrolled; 1 CEV realised; 2 CEVs under construction (80.59 MDH); 5 dump site rehabilitation projects

Targets: Close and remediate 4 dump sites (NDC 3.0) and 4 CEVs operational by 2031 (1 existing Guelmim + 2 under construction Tan-Tan & Sidi Ifni + 1 new for Assa-Zag).

Source: GCAP baseline data + PDR provincial waste master plans + SNRVD 2019-2030 Target: 100% urban wastewater treated by 2031+ (NDC A-1)

84. Integrated waste management strategy, waste auditing and communication campaign – USD 10 million, based on Arup internal projects benchmark; rehabilitation/closure of non-sanitary dump sites and existing landfills – EUR 23 million per landfill (20% closure / 80% construction), based on the Chisinau landfill revamp financed by the EBRD, applied to 4 landfills; landfill O&M – EUR 1,453,250 per year for a 38,000 t/year landfill, based on the EU waste management cost study; establishment of long-term monitoring systems – USD 2.4 million, based on an advanced environmental monitoring Arup internal projects benchmark; and maintenance of the monitoring system – USD 240,000/year (10% of Capex), based on the corresponding benchmark assumption used for ongoing system operation.

85. All cost benchmarks were adjusted for inflation, PPP indexation, or location-specific cost escalation factors. Estimated using a benchmark from the City of Cape Town Landfill Gas Extraction and Utilisation Programme of 34,050 tCO₂/year per landfill intervention; this benchmark was applied to 4 landfills assumed to be rehabilitated/controlled under the action.

WS2

Expansion and upgrade of waste collection and transfer infrastructure

AT A GLANCE

Upgrade mixed waste collection infrastructure and develop a network of waste transfer stations to improve service coverage across the region. This action will be developed and implemented considering the options for service delivery of public and private sector participation for infrastructure investment and service delivery.



SECTORS
Land Use, Transport



SPATIAL EXTENT
Regionally across all provinces

POLICY SYNERGIES

PDR

PDR B.2.1.1 – Urban upgrading programme for provincial cities

PDR B.3.1.2 – Upgrading programme for rural centres

NDC 3.0

Mitigation NDC 56: MBT & co-incineration of municipal waste

Mitigation NDC 16: Utilisation of fly ash

Mitigation NDC 57: Integrated methane capture and utilisation for energy recovery in large landfills

STRATEGIC GOALS



SG3
Transition to a circular economy with zero uncontrolled dumping and high resource recovery.



SG5
Promote green, and climate-adaptive urban development while protecting ecosystems



SG6
Retrofit and build climate-resilient, energy-efficient infrastructure for all



SG7
Build a more gender-inclusive region

RELATED GCAP ACTIONS

WS1 WS4

SCHEDULE OF IMPLEMENTATION

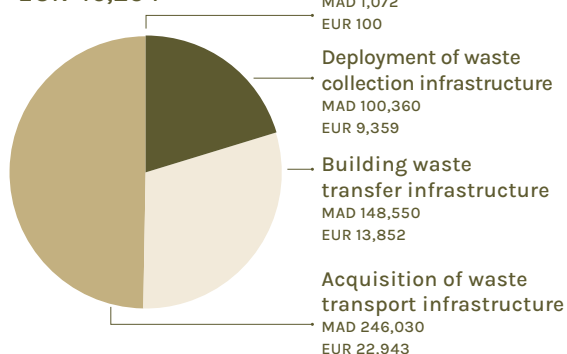
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Audit of current waste collection and transfer infrastructure						
Deployment of waste collection infrastructure						
Building waste transfer infrastructure						
Acquisition of waste transport infrastructure						

DETAILS ON IMPLEMENTATION⁸⁶

CAPEX (MAD/EUR'000)

MAD 496,012

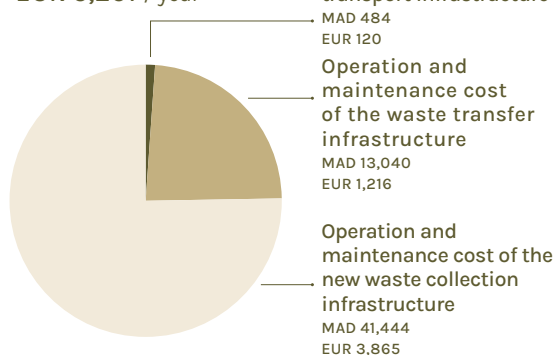
EUR 46,254



OPEX (MAD/EUR'000)

MAD 54,968 / year

EUR 5,201 / year



ACTION DESCRIPTION

OVERVIEW

The region faces a significant environmental challenge due to fragmented and inefficient waste collection, particularly in rural areas, where coverage often falls below 70%. Most waste is collected using diesel-powered vehicles, with little route optimisation, and informal practices result in inconsistent service and uncontrolled dumping. There is a pressing need to modernise and expand the waste collection systems to reduce pollution, lower waste emissions, and prevent environmental degradation.

The action will address these issues by introducing improved collection services including the use of low-emission waste collection vehicles across the region. Extending waste collection service coverage to remote and underserved areas will consider alternative micro-collection solutions (e.g. motorised tricycles and handcarts) and community waste collection points, fostering a cleaner and healthier environment throughout the region.

ACTION OWNER

Municipalities / Intercommunal Grouping (GCT)

DELIVERY PARTNERS

Ministry of Interior / DGCT

Regulatory framework & inter-communal coordination

Private operators – delegated services
Collection fleet & transfer stations

RGON
Co-financing & standards, through AREP where relevant

SRM GON
Implementation

MTEDD
Regulatory oversight & environmental monitoring

Women's cooperatives & INDH platforms
Inclusive recruitment

Ministry of Equipment and Water
Implementation

ACTION COMPONENTS

AUDIT OF CURRENT WASTE COLLECTION AND TRANSFER INFRASTRUCTURE

Conduct a detailed assessment of existing collection infrastructure, identifying service gaps, equipment needs, including assessing the condition, efficiency, and emissions of the existing waste collection vehicles, as well as the increased capacity requirements for the roll-out of organic waste collection. The study will also explore opportunities for private sector engagement including through public private partnerships for financing, operation and maintenance.

DEPLOYMENT OF WASTE COLLECTION INFRASTRUCTURE

Procure and deploy bins, containers, and collection points throughout both urban and rural areas. This will ensure that residents and businesses have convenient and reliable access to waste disposal services, while supporting the transition to clean and modern waste collection methods for improved environmental outcomes.

BUILDING WASTE TRANSFER INFRASTRUCTURE

Construct up to eight transfer stations at approved sites identified (two per province), including supporting infrastructure such as access roads and loading bays.

ACQUISITION OF WASTE TRANSPORT INFRASTRUCTURE

Purchase waste collection and transportation infrastructure to support efficient waste movement between collection points, waste transfer stations, and regional centres. This will involve acquiring modern, environmentally friendly low-emission waste collection vehicles alongside suitable bins, containers, and related equipment. The new fleet and infrastructure will ensure reliable, timely, and comprehensive waste collection services, particularly in hard-to-reach rural and underserved areas.

GENDER EQUALITY AND HUMAN CAPITAL



Inclusive recruitment and decent local jobs

Recruit women and youth from nearby communities into paid roles across the collection chain (drivers, crew members, transfer-station attendants, dispatch/support roles). Recruitment will be done via commune job centres, women's cooperatives, INDH platforms, with adapted shifts and work offered at local depots to reduce travel and care burdens. Operators will ensure safe, dignified conditions (PPE, facilities, clear contracts, suitable training).



Capacity building for low-emission operations

Deliver practical training for all groups on electric/low-emission vehicle operation, safety and basic maintenance, enabling inclusive access to new green jobs as the fleet modernises. Run refresher sessions as the EV fleet expands, ensuring women and youth can safely operate and maintain modern collection systems. Promote benefits of practical training among women, particularly younger women



Community-led route and site planning

Engage local communities, including women and persons with disabilities, in planning collection routes, bin placement, and transfer-station locations through neighbourhood meetings and on-site walk-throughs. This will capture daily mobility patterns, safety concerns, and accessibility needs, and reduce negative impacts (noise, odour, traffic) while improving coverage and reliability.

ECONOMIC DEVELOPMENT

300 FTE jobs

DIGITAL

Deploy digital monitoring and routing tools

CLIMATE MITIGATION⁸⁷

4,100 tCO₂/year

RESILIENCE CO-BENEFITS

Flood, Infrastructure failure/obsolescence

IMPACT INDICATORS

Waste collection coverage rate – urban areas (%)

Baseline: 60-70% urban coverage (2024); nationally 96% urban collection achieved

Target: 100% urban collection by 2030 (PNDM)

Waste collection coverage rate – rural areas (%)

Baseline: <70% rural coverage

Target: ≥50% rural coverage by 2030 (Estimation EBRD GCAP benchmark)

Number of transfer stations and collection points operational by province

Baseline: 0 formal transfer stations outside Guelmim

Target: 1 transfer station per province by 2028

86. Audit of current waste collection and transfer infrastructure – EUR 100,000, based on Arup internal projects; waste bins/containers – USD 65 per 240-litre bin, with washing costs of EUR 6.7/bin, based respectively on internal and the EU waste management cost study; large collection points – MAD 2.4 million per facility, with O&M of MAD 4.5 million per facility, based on Polish PSZOK recommendations study; waste transfer stations and equipment – EUR 2 million per station, with mechanical O&M of EUR 152,000, based on an EBRD benchmark and the EU waste management cost study; it is assumed that there will be 50 low-emission waste collection vehicles, but the exact number should be determined during the more detailed audit/scoping study – USD 530,000 per vehicle, with maintenance of USD 1,500/vehicle, based on Arup internal projects and the EU waste management cost study; fleet management software – USD 2,500 per vehicle, based on Tech.co.

87. It was estimated based on the shift from diesel waste collection vehicles to electric vehicles and supporting solar generation, using a diesel emission factor of 2.6988 kgCO₂/litre, a Moroccan electricity emission factor of 0.551 kgCO₂/kWh, annual diesel use of 1,560,375 litres for the equivalent conventional fleet, and annual electricity consumption of 5,954,062.5 kWh for the electric fleet; this gives emissions of 4,211.1 tCO₂/year for diesel vehicles and 3,280.7 tCO₂/year for electric vehicles, resulting in net savings of 930.5 tCO₂/year. The estimate also includes solar PV generation from a 2 MWp installation, using an average yield of 6.3875 kWh/kW/day and a grid emission factor of 689 tCO₂/GWh, resulting in additional savings of 3,212.7 tCO₂/year.

WS3

Development of organic waste treatment infrastructure, including composting, anaerobic digestion facilities and black soldier fly farming

AT A GLANCE

Develop infrastructure for the treatment and recycling of organic waste, including source-separated biowaste collection systems, building composting facilities and/or anaerobic digestion treatment centres complemented by black soldier fly farming, eco-sanitation systems and public awareness campaigns to support uptake. This action considers the role of the private sector in infrastructure investment and service delivery.



SECTORS
Land Use



SPATIAL EXTENT
Regionally across all provinces

POLICY SYNERGIES

PDR

PDR C.3.4.1 – Construction of sanitary landfills with resource-recovery functions

PDR D.2.2.1 – Support for creation of agricultural product processing & valorisation units

NDC 3.0

Mitigation NDC 58: Recovery of organic waste from the agri-food industry

Mitigation NDC 19: Use of non-recyclable household waste in cement industry as fuel

Mitigation NDC 56: MBT systems

STRATEGIC GOALS



SG3
Transition to a circular economy with zero uncontrolled dumping and high resource recovery.



SG5
Promote green, and climate-adaptive urban development while protecting ecosystems



SG6
Retrofit and build climate-resilient, energy-efficient infrastructure for all



SG7
Build a more gender-inclusive region

RELATED GCAP ACTIONS

WS1

WS2

WS4

SCHEDULE OF IMPLEMENTATION

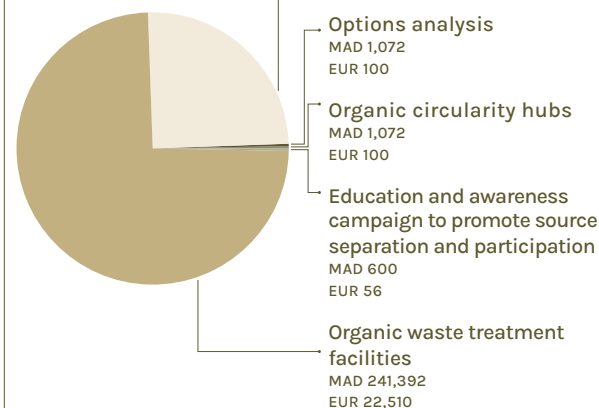
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Options analysis						
Organic waste treatment facilities						
Source-separated organic waste collection system						
Organic circularity hubs						
Education and awareness campaign to promote source separation and participation						

DETAILS ON IMPLEMENTATION⁸⁸

CAPEX (MAD/EUR'000)

MAD 325,246

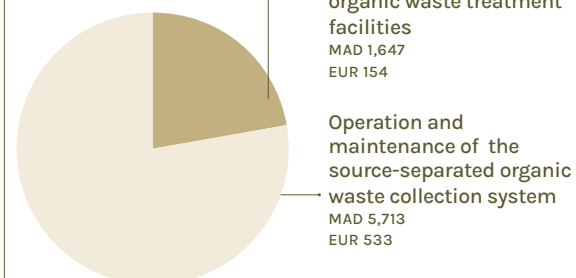
EUR 30,330



OPEX (MAD/EUR'000)

MAD 7,360 / year

EUR 687 / year



ACTION DESCRIPTION

OVERVIEW

The Guelmim-Oued Noun region currently faces a significant environmental challenge stemming from the absence of proper organic waste source separation and treatment capacity. Organic waste constitutes approximately 60-70% of household waste, yet there are no composting or anaerobic digestion facilities available in the area. As a result, organic waste is sent to landfill sites, where it becomes a source of harmful greenhouse gas emissions and leachate generation.

This action will build four organic waste treatment facilities locally, which will be supported and supplied by a source-separated organic waste collection system. The action will look to expand these to become organic circularity hubs, which are integrated centres that combine a range of co-located technologies designed to recover value from biological materials. Over time, these hubs facilitate the production of compost, biofuels and support pilot initiatives focused on bioplastic recovery. Additionally, it will pilot ecosanitation in rural areas as a mean to limit waste and water usage locally. By doing so, it aims to promote circular economy principles in agriculture and energy, supporting cleaner and more sustainable communities throughout the region.

88. Options analysis – EUR 100,000, based on Arup internal projects; organic waste treatment facilities – USD 6.5 million per facility (60k tonnes/year), based on a Gore Cover System composting plant benchmark referenced UTV AG; operating costs for treatment facilities – USD 3/tonne, based on the same UTV AG benchmark; source-separated organic waste collection bins – USD 65 per 240-litre bin, with washing costs of EUR 6.7/bin, based respectively on internal and the EU waste management cost study; organic circularity hubs / viability study – EUR 100,000, based on Arup internal projects; ecosanitation systems – USD 4,750 per commercial composting toilet, with maintenance of USD 50/month; based on the Green Building Alliance benchmark; and education / awareness activities – MAD 100,000 for a building-user awareness project and MAD 500,000 for a school awareness programme, based on Arup internal projects.

ACTION OWNER**Municipalities /
Intercommunal groupings****RGON****DELIVERY PARTNERS****Ministry of Interior / DGCT**Institutional framework &
inter-communal governance**Private composting &
biogas operators**Facility operations &
technology**Agricultural cooperatives**Compost off-take &
quality feedback**MTEDD**Environmental standards &
circular economy regulation**Women-led cooperatives**Compost resale &
quality training**Female farmers &****extension services**

Safe compost use

ACTION COMPONENTS**OPTIONS ANALYSIS**

Conduct an options analysis comparing composting and anaerobic digestion to determine the most suitable treatment pathways for the region and / or different provinces, depending on nature of organic waste (e.g. predominantly domestic, commercial or agricultural) and reuse potential of compost to close the nutrient cycle.

ORGANIC WASTE TREATMENT FACILITIES

Based on the options analysis, it is recommended that each province establish a dedicated organic waste treatment facility to process segregated organic waste, particularly food and agricultural waste. In urban areas, suitable organic waste treatment solutions include aerobic in-vessel composting systems such as the GORE® Cover System⁸⁹ (or similar technologies), anaerobic digestion and black soldier fly farming. In rural areas, aerobic windrow composting, with or without forced aeration, should be considered as a practical alternative to in-vessel composting.

The facilities will be required to manage the significant amount of organic waste produced by the region. Based on available data, Guelmim generates approximately 210 kg/capita/ year of municipal solid waste. With a population of 448,000, this equates to 94,080 tonnes of household waste per year, or 258 tonnes of municipal solid waste per day, with around 70% being organic. If waste collection rates increase to over 90%, the plants would need to have a minimum cumulative capacity of approximately 162 tonnes per day (excluding agricultural waste). These facilities will need to account for agriculture waste volumes from farms and oasis (palm trees) to be composted and used as fertilisers (e.g. for argan trees).

SOURCE-SEPARATED ORGANIC WASTE COLLECTION SYSTEM

Install source-separated organic waste collection infrastructure, including bins and containers for households, businesses and institutions. The action involves the installation of organic waste collection bins at neighbourhood markets, hotels, restaurants, cafés and food manufacturing and processing businesses. Markets and businesses will be equipped with appropriately sized storage capacity and bins to ensure that any negative side effects are minimised (i.e. odour during the hot season) and to increase public compliance. Waste will be collected at an appropriate frequency (i.e. daily or twice weekly) dependant on generation rates and seasonal variations. In rural areas, containers for organic waste derived from farm waste and oasis waste (palm trees) will be installed to facilitate composting and reuse for fertilising. The resale of compost can also be a source of income for women's cooperatives.

The action also includes the roll-out of a two-bin waste collection system across the region's households, public spaces and public buildings, allowing for the separate collection of organic and non-organic household waste streams.

ORGANIC CIRCULARITY HUBS

The action will also explore the viability of creating organic circularity hubs for producing biofuels and piloting bioplastic initiatives. The separate collection of wet organic waste and non-organic waste allowed by the implementation of better sorting practices will improve the quality of both the organic waste and the recyclables (e.g. plastic packaging, paper and cardboard, textiles and metals). This will ensure that the quality of the end products such as organic fertiliser (compost) and recyclables is high, which is unlocking the value of waste.

EDUCATION AND AWARENESS CAMPAIGN TO PROMOTE SOURCE SEPARATION AND PARTICIPATION

A large-scale awareness-raising campaign will focus on education around solid waste segregation and recycling, targeting residents, schools, universities and professionals (especially in food and agriculture industries). By leveraging digital solutions such as an informative platform/website and gamification, the campaign can engage and educate residents more effectively.

GENDER EQUALITY AND HUMAN CAPITAL**Female farmers and safe compost use**

Deliver field-based micro-modules with extension services and cooperatives on compost quality, safe application, and crop-specific rates; provide starter kits and a simple order/feedback channel for repeat purchases.

**Women-led resale**

Support women-led cooperatives to operate pickup points at souks/commune centres and to run weigh-and-pay mobile kiosks. Include a light business module (pricing, cashflow, stock rotation, basic contracts with farms/municipal landscaping) and preferential offtake

agreements from the plants. Where black soldier fly is adopted, offer micro-grants or concessional loans to pilot women-managed larvae/meal packing and local feed sales to smallholders.



Youth jobs in logistics and operations

Recruit local youth (including young women) as organics route assistants, transfer-bay attendants, reception quality controllers, and data clerks. Train on source-separation etiquette, odour/cleanliness protocols for hot seasons, PPE/HSE, and digital logging. Establish referral pathways from INDH/ municipal job centres and schedule shift patterns compatible with education/care duties.



Women-led training

Recruit local youth (including young women) as organics route assistants, transfer-bay attendants, reception quality controllers, and data clerks. Train on source-separation etiquette, odour/cleanliness protocols for hot seasons, PPE/HSE, and digital logging. Establish referral pathways from INDH/ municipal job centres and schedule shift patterns compatible with education/care duties.

ECONOMIC DEVELOPMENT

240 FTE jobs

DIGITAL

N/A

CLIMATE MITIGATION⁹⁰

16,800 tCO₂/year

RESILIENCE CO-BENEFITS

Flood, Infrastructure failure/
obsolescence

IMPACT INDICATORS

Number of composting units or biogas facilities operational (by province)

Baseline: 0

Target: 1 composting unit per province (4 units) by 2030 (NDC M-58)

89. [UTV AG GORE@ Cover System](#).

90. It was estimated by scaling a benchmark from the EBRD-supported Kyzylorda waste management project, which assumes annual emissions savings of 15,500 tCO₂/year for an organic waste treatment system handling 64,000 tonnes/year of organic waste; this benchmark was applied to the assumed organic waste volume in Guelmim of 59,130 tonnes/year.



WS4

Expansion of waste sorting and recycling capacity

AT A GLANCE

Recycling infrastructure development through sorting and recycling hubs development and supported by a long-term strategy taking into consideration opportunities to either delegate recycling to other regions or develop recycling and upcycling capacity for both regional and national waste.



SECTORS
Waste, Land Use, Industry



SPATIAL EXTENT
Regionally across all provinces

POLICY SYNERGIES

PDR

PDR C.3.4.1 – Construction of sanitary landfills (CEV) with sorting & valorisation components

PDR D.3.2.1 – Support programme for the valorisation & commercialisation of products of the social & solidarity economy (SSE)

PDR D.3.1.1 – Creation of an SSE competitiveness cluster

NDC 3.0

Mitigation NDC 16: Utilisation of fly ash

Mitigation NDC 56: MBT systems

STRATEGIC GOALS



SG3
Transition to a circular economy with zero uncontrolled dumping and high resource recovery.



SG5
Promote green, and climate-adaptive urban development while protecting ecosystems



SG6
Retrofit and build climate-resilient, energy-efficient infrastructure for all



SG7
Build a more gender-inclusive region

RELATED GCAP ACTIONS

WS1

WS2

WS3

SCHEDULE OF IMPLEMENTATION

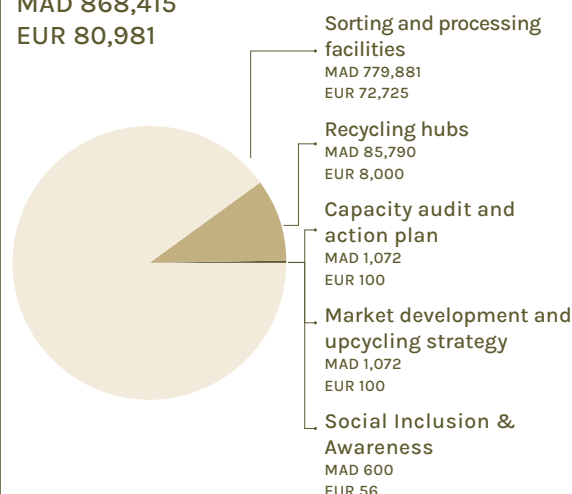
ACTION COMPONENTS	2026	2027	2028	2029	2030	2030+
Capacity audit and action plan						
Market development and upcycling strategy						
Sorting and materials recovery facilities construction						
Recycling hubs						
Social Inclusion & Awareness						

DETAILS ON IMPLEMENTATION⁹¹

CAPEX (MAD/EUR'000)

MAD 868,415

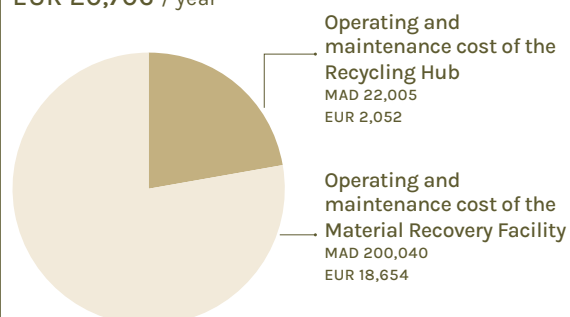
EUR 80,981



OPEX (MAD/EUR'000)

MAD 222,045 / year

EUR 20,706 / year



ACTION DESCRIPTION

OVERVIEW

Recycling rates in the Guelmim-Oued Noun region are notably low, with just 3% in urban areas and none in rural locations. The region lacks formal waste sorting facilities and materials recovery facilities (MRFs), and informal recycling or material reuse remains limited and unregulated. As a result, there is minimal value-added reuse or upcycling of waste materials, and circular economy activities are scarce. Significant waste streams such as textiles, plastics, and construction waste remain largely untapped, missing opportunities for resource recovery and economic benefit.

Investing in sorting centres and robust recycling infrastructure would not only decrease landfill dependency but also foster the creation of green jobs and support Morocco's National Waste Reduction and Recovery Strategy (SNRVD), which targets a 20% recycling rate of household waste and a 70% recycling rate for plastic by 2030. Additionally, developing upcycling initiatives could encourage local entrepreneurship, reduce overall waste volumes, and enable the production of sustainable goods, helping to diversify and innovate the regional economy. This presents an opportunity for the Region to emerge as a national leader in upcycling activities.

91. Capacity audit and action plan – EUR 100,000, based on Arup internal projects; market development and upcycling strategy – EUR 100,000, also based on Arup internal projects; sorting and processing facilities – USD 21 million based on Arup internal projects on dirty materials recovery facility; O&M for material recovery facilities – based on the Material Recovery Facility Capital Cost Summary, which provides OPEX scenarios of USD 3.46–4.82 million per facility, translated in the average Opex/Capex ratio of c. 26%; recycling hubs / solid waste management centres – EUR 8 million per centre, based on an EBRD benchmark for a new solid waste management centre in Bosnia and Herzegovina; and social inclusion / awareness activities – MAD 100,000 for a building-user awareness project and MAD 500,000 for a school awareness programme, based on Arup internal projects.

ACTION OWNER	
Municipalities / Intercommunal groupings	RGON
DELIVERY PARTNERS	
Ministry of Interior / DGCT Institutional & legal framework	Private recycling industry MRF operations & material markets
MTEDD Recycling regulations & circular economy policy	Women & youth informal recyclers Formalisation, PPE, skills training
Recycling cooperatives – SSE Formal integration of informal recyclers	

ACTION COMPONENTS

CAPACITY AUDIT AND ACTION PLAN

Conduct a comprehensive audit of current waste sorting and recycling capacity at regional and national levels. Use findings to develop a solid waste management action plan targeting a 20% recycling rate by 2030, aligned with circular economy principles and Morocco's sustainability goals.

MARKET DEVELOPMENT AND UPCYCLING STRATEGY

Conduct market studies to identify off takers for recyclable materials and assess opportunities for regional and national partnerships. The study should also consider opportunity for upcycling of waste from specific sectors in the region and for broader potential waste coming from other regions to become an upcycling hub for Morocco.

SORTING AND MATERIAL RECOVERY FACILITIES CONSTRUCTION

This action will build four dirty Materials Recovery Facilities (MRFs) which will process mixed residual waste collected from residential and commercial sources, reducing the amount of waste going to landfill and supporting circular economy efforts by sourcing recyclable materials for recycling.

The facilities' capacity to handle construction and demolition waste will also be assessed to account for future urban areas expansion and increased construction. The feasibility study will consider co-locating these facilities with landfill sites to ensure efficiencies and reduce double handling.

RECYCLING HUBS

Establish regional recycling hubs for treatment of non-organic waste derived from the implementation of better sorting practices and MRFs which will improve the quality of both the organic waste and the recyclables (e.g. plastic packaging, paper and cardboard, glass, textiles and metals) as well as construction waste.

Support pilot projects with advanced upcycling technologies for high-value recovery, such as graphene from plastics, and explore ship recycling opportunities to create new economic activities and strengthen circular economy practices.

SOCIAL INCLUSION AND AWARENESS

Integrate informal waste collectors into the formal system through cooperatives, training, and partnerships. Combine this with public awareness campaigns on waste segregation, impacts of illegal dumping, and the role of taxes in waste management to foster behavioural change and community engagement.

GENDER EQUALITY AND HUMAN CAPITAL

Formalisation of work in recycling

Integrate informal recyclers, especially women and youth, into the formal system through cooperatives or service contracts linked to sorting centres, MRFs and recycling hubs. This will include registration, basic labour protections, access to PPE, and skills training in material sorting, quality control and health and safety, enabling a transition from unsafe informal practices to stable, dignified work.

Employment in sorting, recycling and facility operations

Prioritise the recruitment of women and youth from nearby communities into paid roles across MRFs and recycling hubs (manual sorting lines, materials handling, weighbridge operation, data recording, light maintenance). Job design will consider safe working conditions, suitable training, adapted shifts and on-site facilities, enabling women's participation in operational roles.

Women-centred awareness and behaviour change for source separation

Co-design public awareness campaigns with women's groups, recognising women's central role in household waste sorting and disposal decisions. Campaigns will use local languages and practical demonstrations (markets, schools, community centres) to improve sorting at source, reduce contamination of recyclables, and increase participation in rural and peri-urban areas. Engage local women in awareness campaigns directly.

Accessible collection points in underserved neighbourhoods

Install well-lit, accessible collection points for dry recyclables in underserved areas, with placement informed by women's daily mobility patterns (near markets, schools, water points). Designs will consider safety, ease of use, and signage for low-literacy users to maximise uptake and inclusion.

Entrepreneurship and upcycling pathways

Provide business support, including micro-loans, PPE and training to women, youth, artisans and marginalised groups engaged in upcycling pilots and recycling-based enterprises, strengthening circular-economy livelihoods.

CLIMATE MITIGATION⁹²31,000 tCO₂/year**RESILIENCE CO-BENEFITS**Flood, Infrastructure failure/
obsolescence**ECONOMIC DEVELOPMENT**

400 FTE jobs

DIGITAL

N/A

IMPACT INDICATORS**Recycling rate for targeted waste streams (%)**

Baseline: ~6% recycling; 3% in urban Guelmim

Target: 20% recycling and 10% energy valorisation by 2030; 70-80% for specific streams (e.g. plastic from 25% to 70%) (SNRVD 2030 national targets and NDC 3.0)

Number of sorting centres constructed and operational by province

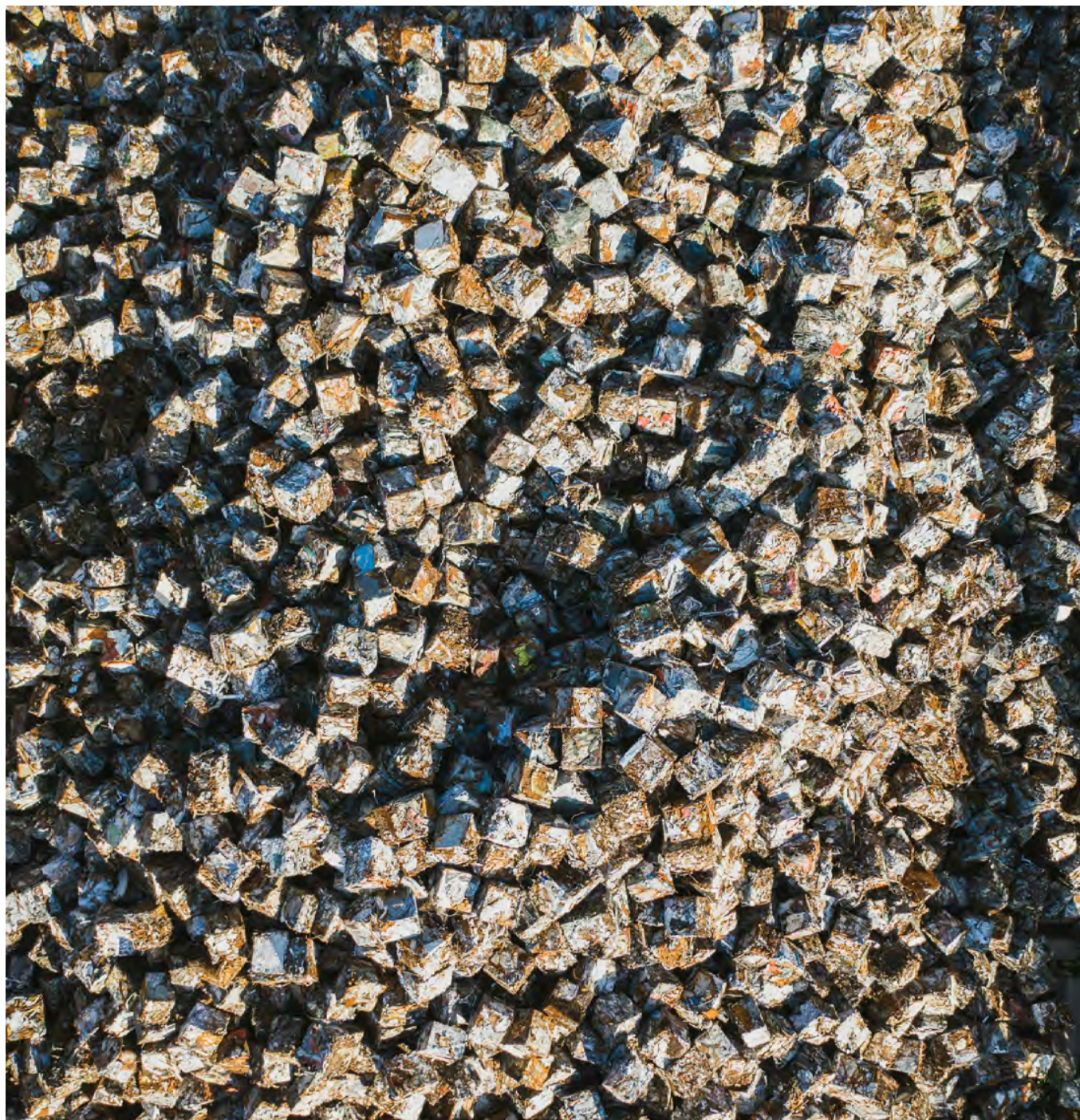
Baseline: 0 formal sorting centres in GON; 3% recycling in urban Guelmim

Target: 4 Materials Recovery Facilities (1 per province)

Informal waste collectors formally integrated into the regional waste management system (%)

Baseline: 0 formal integration schemes

Target: Formalise 50% of informal waste collectors (SNRVD 2030)



92. It was estimated based on the sorting of mixed waste instead of landfilling, using an assumed treatment capacity of 100,000 tonnes/year and an emissions saving factor of 0.31 tCO₂ per tonne of mixed waste sorted.

Gender Action Plan

The Gender Action Plan (GAP) is a core component of the Guelmim-Oued Noun Regional GCAP, ensuring that gender equality and social inclusion are embedded throughout the region's transition to a sustainable future. Its purpose is to translate the findings of the Gender Assessment into concrete, actionable measures that address systemic barriers faced by women and girls in accessing infrastructure, services, green jobs including leadership positions, and decision-making processes. By doing so, the GAP promotes equitable participation and leadership in urban development and guarantees that the benefits of green investments are shared fairly across all segments of society.

GAP DEVELOPMENT PROCESS

The GAP is grounded in the GCAP baselining and stakeholder process (including local evidence from workshops, deep-dive interviews, site visits and the online survey) and was reviewed through direct partner inputs. Consultations with UN Women informed the use of Safe Cities tools, the need for gender-disaggregated monitoring, and attention to care-economy barriers in training and employment pathways. Discussions with IWMI prioritised wastewater treatment and reuse (including pilots with constructed wetlands/NBS), recommended cost-benefit analysis for reuse projects and highlighted the role of remote-sensing/AI to support strategic water modelling and siting. These insights are reflected across actions, for example, public lighting and transport hubs (safety and user-led design), wastewater reuse pilots, and talent pathways in energy and buildings (from training to placement and progression into supervisory and leadership roles).

ENVIRONMENTAL CHALLENGES AND GAP DELIVERY THEMES

Addressing the complex challenges facing Guelmim-Oued Noun requires responses that are both technically robust and socially inclusive. Pressures such as water scarcity, inadequate waste management, limited transport options, rapid urbanisation and energy insecurity do not affect all groups equally: women, youth and other underserved populations often experience greater exposure to service gaps, safety risks and time and care burdens. To respond to these dynamics in a systematic way, gender and social inclusion considerations have been integrated into the planning, governance and implementation of every GCAP action.

Each GCAP action therefore includes a set of gender equality and human capital sub-actions, structured around five cross-cutting themes that translate the Region's inclusion objectives into practical entry points for delivery:

1. Inclusive Participation and Co-design

Meaningful roles for women, youth, and underserved groups in site selection, service design, and governance, including opportunities for women to take on facilitation, coordination and leadership roles within community and project-level processes.

2. Universal Accessibility and Safety

Step-free access, clear sightlines and lighting, safe waiting areas, and user-centred layouts that enhance real and perceived safety.

3. Access to Skills and Economic Opportunities

Targeted outreach, gender-sensitive training, mentoring, and on-the-job pathways that build a female talent pipeline into green and public-service jobs, including progression into supervisor roles, technical leadership and decision-making positions, supported by inclusive workplace standards in GCAP contracts and across implementation providers (e.g. service providers).

4. Financial Inclusion and Affordability

Lifeline tariffs, simplified connection/application processes, tailored green-finance windows, and support for women- and youth-led SMEs.

5. Awareness and Behaviour Change

Locally tailored campaigns (including local languages and low-literacy formats) on safe reuse, efficient resource use, and user rights, supported by clear feedback channels.

Table 11 summarises how these five GAP delivery themes are applied across each priority environmental challenge, linking the themes to specific GCAP actions and implementation measures.

DELIVERY MANAGEMENT AND PARTNERS

Implementation of the GAP is structured around clearly defined institutional roles and partnerships across the region, combining regional coordination, technical delivery, and community-level outreach to ensure effective implementation and accountability.

- **Regional GAP Lead**

RGON (PMO) designates a Gender and Inclusion Lead to coordinate planning, procurement clauses, and reporting. Municipalities act as focal points for local delivery. A quarterly GAP coordination meeting reviews progress on placements, training cohorts, women's representation in leadership roles, and KPI trajectories, and agrees corrective actions for the next quarter; an annual GAP note feeds the GCAP Monitoring Report.

- **Technical and training**

OFPPT, AMEE, ONEE (Eau/Électricité), ABHDON, utilities/operators, and accredited installers provide training, site placements and mentors.

- **Civil society and outreach**

Women's cooperatives, youth associations, disability organisations, INDH platforms and local universities support recruitment and community engagement, and the identification of emerging women leaders. UN Women and IWMI remain reference stakeholders for periodic advisory input.

MONITORING APPROACH

All GAP sub-actions should be linked to indicators, milestones and contract clauses. Progress should be reviewed quarterly (for course-correction) and consolidated annually in the GCAP Monitoring Report. Data should be reported by action owners/operators, quality-checked by municipal focal points, and consolidated by the RGON PMO.

The KPIs and targets below are illustrative and will be refined by the RGON PMO, action owners and delivery partners during inception and early implementation. Suggested KPIs have been mapped against each challenge in Table 12.

REGION-WIDE TARGETS

- **12–24 months (pilot phase)**

- ◊ At least 3 sectors running women-focused training with paid traineeships (e.g., water W2/W5/W6; transport T3/T4; buildings E4/E6).
- ◊ Inclusion and safeguarding clauses embedded in all relevant tenders.
- ◊ Baselines and year-1 targets set for women in traineeships, entry-level hires, technical roles and supervisor/leadership positions (by sector/province).

- **36–60 months (scale-up)**

- ◊ At least 50% of traineeships held by women across targeted actions; at least 25% trainee-to-hire conversion in participating entities.
- ◊ At least 70% of relevant contracts reporting gender-disaggregated workforce data; at least 70% of sites audited for inclusive workplace standards (PPE/facilities, safe transport, equal opportunities policies).

CHALLENGE	 THEME 1 INCLUSIVE PARTICIPATION AND CO-DESIGN	 THEME 2 UNIVERSAL ACCESSIBILITY AND SAFETY INFRASTRUCTURE OR SERVICES	 THEME 3 ACCESS TO SKILLS AND ECONOMIC OPPORTUNITIES	 THEME 4 FINANCIAL INCLUSION AND AFFORDABILITY	 THEME 5 AWARENESS AND BEHAVIOUR CHANGE
SEVERE AND INCREASING WATER STRESS	Ensure women, youth, nomadic groups, and marginalised communities participate in all water-related planning, governance, feasibility studies, and community consultations. W1 W2 W3 W4 W6 W7 Involve communities, including women and youth, in monitoring water networks, detecting leaks, and overseeing infrastructure performance. W2 W3 W4 W7	Ensure water supply, wastewater, and desalination infrastructure are accessible and safe for all, including women, nomadic communities, people with disabilities and other underserved groups. W1 W2 W3 W4 W6 W7	Provide technical training for women and youth on operation, maintenance, digital monitoring, DMA systems, fog-harvesting equipment, wastewater treatment, and desalination processes. W1 W2 W3 W5 W6 W7 Support the creation and empowerment of women-led cooperatives for fog harvesting, water resource management, and monitoring. W3 Hire and train women and local youth in desalination plant operation and in industrial wastewater treatment roles. W6 W7	Develop equitable water allocation and tariff schemes ensuring underserved communities, women-led households, and rural users can afford water services. W1 W2	Implement culturally sensitive awareness campaigns (local languages, inclusive formats) focused on water conservation, reuse practices, and infrastructure benefits. W2 W3 W4 W6 W7
LIMITED ENERGY SELF SUFFICIENCY AND RESILIENCE	Engage women, youth, and underserved communities in co-design of clean energy interventions, including hammam upgrades, public lighting, agrivoltaics, and energy communities. E2 E3 E5 E6 E7	Ensure energy infrastructure including lighting, public buildings, and hammams is designed for universal accessibility, especially for elderly women and persons with disabilities. E4 E5 E6	Provide targeted training for women and youth on renewable energy systems, PV installation, energy management, operation & maintenance, and green entrepreneurship. E1 E2 E3 E4 E5 E6 E7 Prioritise economic opportunities for women, youth, and marginalised groups in the deployment of public lighting upgrades, rooftop solar, and agrivoltaic systems. E3 E4 E5 E7	Provide financial incentives for women- and youth-led SMEs and households to adopt renewable energy, efficiency measures, and clean technology. E2 E3 E4 E7	Conduct community outreach campaigns on energy efficiency, RE adoption, and safety, using inclusive communication formats. E2 E3 E5 E6

Table 11. Gender-related actions responding to identified GCAP priority challenges in the Guelmim-Oued Noun region

CHALLENGE	 THEME 1 INCLUSIVE PARTICIPATION AND CO-DESIGN	 THEME 2 UNIVERSAL ACCESSIBILITY AND SAFETY INFRASTRUCTURE OR SERVICES	 THEME 3 ACCESS TO SKILLS AND ECONOMIC OPPORTUNITIES	 THEME 4 FINANCIAL INCLUSION AND AFFORDABILITY	 THEME 5 AWARENESS AND BEHAVIOUR CHANGE
UNDER-PROVISION OF PUBLIC TRANSPORT AND LOW-CARBON MODES	Co-design transport infrastructure, routes, and hubs with women, youth, elderly persons, and underserved communities. T1 T2 T3 T4 T5	Ensure all mobility infrastructure such as footpaths, cycle lanes, buses, hubs are accessible and safe for women, children, elderly persons, and persons with disabilities. T1 T2 T3 T4 T5 T6	Provide training and access to economic opportunities for women and youth in the operation, management, and maintenance of electric mobility systems, charging stations, and shared mobility services. T1 T2 T3 T4 T6	Introduce affordable fare schemes and tiered pricing for low-income users, especially women, youth, and vulnerable households. T3 T4	Conduct mobility-awareness campaigns promoting safe walking, cycling, EV charging use, and accessible travel information in inclusive formats. T2 T3 T4 T6
ACCELERATED URBANISATION	Engage women, youth, elderly, people with disabilities, and community groups in designing public spaces, green areas, oasis restoration, and shading solutions. U1 U2 U3 U4 U5 Integrate traditional knowledge from nomadic communities in urban greening and oasis preservation planning. U4	Ensure public spaces, parks, shaded zones, and heritage areas are fully accessible to women, children, elderly people, and persons with disabilities. U1 U2 U3	Provide training and economic opportunities for women and youth through tree planting, oasis restoration, ecotourism, and artisan cooperatives. U1 U2 U4 U5	Establish seed funds for women-led ecotourism and cultural SMEs with simplified applications and access to regional booking/ marketing channels. U5	Conduct environmental education and community campaigns on urban greening, fire risk, sustainable tourism, and ecosystem preservation. U2 U4 U5
FRAGMENTED SOLID WASTE COLLECTION AND DISPOSAL	Engage women, youth, and local communities in planning landfill sites, collection routes, transfer stations, and recycling infrastructure. WS1 WS2 WS4	Ensure waste sites, sorting centres, and recycling points minimise environmental and safety risks for marginalised communities, including nomadic populations. WS1 WS3 WS4 Install accessible collection points for recyclables in underserved neighbourhoods. WS4	Provide training and secure employment opportunities for women and youth in waste collection, sorting, composting, anaerobic digestion, landfill operations, and recycling cooperatives. WS1 WS2 WS3 WS4 Formalise and integrate informal recyclers, especially women and youth, into cooperatives or contracted services. WS4 Train women farmers and rural youth in compost use, ecological sanitation, and organic fertiliser application. WS3	Provide micro-grants or concessional micro-loans to women- and youth-led cooperatives (sorting, compost resale, upcycling), bundled with TA for registration, HSE compliance and contracts. WS3 WS4	Conduct inclusive public awareness campaigns on waste sorting, compost use, and safety, tailored to rural, peri-urban, and underserved groups. WS3 WS4

KPIs	CHALLENGE 1 SEVERE AND INCREASING WATER STRESS				CHALLENGE 2 LIMITED ENERGY SELF- SUFFICIENCY AND RESILIENCE				CHALLENGE 3 UNDER-PROVISION OF PUBLIC TRANSPORT AND LOW-CARBON MODES				CHALLENGE 4 ACCELERATED URBANISATION				CHALLENGE 5 FRAGMENTED SOLID WASTE COLLECTION AND DISPOSAL PRACTICES		
PIPELINE AND JOBS																			
Number of women enrolled and qualified	W1	W3	W5	W7	E1	E2	E6	E7	T1	T4	T6		U1	U2	U3	U4	WS1	WS2	WS3
													U5						
Number of paid traineeships (and percentage held by women)	W1				E1	E4	E7		T1	T4			U2				WS1		
Trainee-to-hire conversion rate (%), disaggregated by province and sector	W1	W5	W6		E1	E2	E4		T1	T4	T6		U2						
Number of individuals (male and female) with improved access to skills as a result of training	W1	W2	W3	W4	E2	E3	E4		T1	T6			U1	U2	U3	U4	WS1	WS2	WS3
	W6	W7			E6	E7							U5				WS4		
Number of training programmes developed	W1	W2	W3	W4	E1	E2	E3		T1	T6			U1	U4	U5		WS1	WS2	WS3
	W6	W7			E4	E6	E7												
Partnerships with educational providers, private sector actors, and CSOs established	W1	W3	W5	W6	E1	E2	E7		T1				U1	U4	U5		WS1		
Number and share of women in supervisor, technical, and leadership roles, disaggregated by province and sector	W1				E2	E6	E7						U4						
STAKEHOLDER PRACTICES AND INSTITUTIONAL CAPACITY																			
Number of contracts/sites meeting inclusion clauses (anti-harassment, gender-appropriate PPE/facilities, safe shift transport, equal opportunities policies)	W1				E1	E3	E4		T1	T4			U1	U3			WS1	WS2	WS4
Stakeholder practices improved (inclusive infrastructure, equal opportunity policies and practices, skills development, women’s participation in technical committees and management roles)	W1				E2	E3	E4	E7	T1	T4			U3				WS1	WS2	WS4
ACCESS AND AFFORDABILITY																			
Accessibility standards improved (externally verified)	W4	W5	W6		E5	E6			T1	T2	T3	T4	U1	U2	U3		WS4		
									T5	T6									
Number of households accessing lifeline tariffs or vouchers	W1	W4																	
Number of women-/youth-led SMEs receiving green-finance or start-up support	W3				E3	E4	E7		T6				U1	U5			WS3	WS4	
Number of people accessing improved infrastructure or services (male and female)	W1	W3	W4	W5	E2	E3	E4		T1	T2	T3	T4	U2	U3	U5		WS4		
	W6	W7							T5	T6									
Improved quality of infrastructure, including safety, reliability, and user experience (qualitative and/or scored assessments)	W1	W4	W5	W6	E2	E3			T1	T2	T3	T4	U1	U2	U3	U5	WS1	WS2	WS4
									T5	T6									
PARTICIPATION AND SAFETY																			
Number of co-design and outreach participants (share of women, youth, and people with disabilities)	W1	W2	W4	W5	E1	E2	E5	E6	T1	T2	T3	T4	U1	U2	U3	U4	WS1	WS2	WS4
	W6	W7							T5				U5						
Number of night-time safety audits completed and actions implemented					E5				T2										

Table 12. Action-indicator mapping matrix (Indicative KPIs)

05

Delivery,
monitoring and
evaluation

Delivery

FUNDING AND FINANCE

The delivery of this GCAP will require the combination of sources of funding and finance available to support the Region in implementing the actions (Table 13). These include instruments suitable for larger revenue-generating investments (i.e. lending), as well as complementary sources for smaller interventions (i.e. crowdfunding). The make-up of the funding mix will be further defined at the pre-feasibility stage of each action.

IMPLEMENTATION

Implementation of the actions will be led by the Region of Guelmim-Oued Noun and other local actors such as SRM GON. The implementation of the actions will mostly take place during the first five years of the GCAP. Collaboration with government agencies, municipalities, provinces, local providers, SMEs and civil society will be crucial to ensure that the actions deliver the best environmental, social and economic outcomes.

The governance of the plan will be led on by the Commission de l'Aménagement du Territoire. This commission would therefore have a dual role:

- Validation of the Plan
- Piloting, follow-up, and implementation of the actions over the coming 3–5 years

INSTRUMENT CATEGORY	INSTRUMENT	SEVERE AND INCREASING WATER STRESS	LIMITED ENERGY SELF-SUFFICIENCY AND RESILIENCE	UNDER-PROVISION OF PUBLIC TRANSPORT AND LOW-CARBON MODES	ACCELERATED URBANISATION	FRAGMENTED SOLID WASTE COLLECTION AND DISPOSAL PRACTICES
Regional own source revenue (OSR) and policy steering instruments	Land or Infrastructure leasing					
	Taxes					
	Charges and pricing for actions and services					
Land value capture (LVC)	Development-based land value capture (LVC)					
National government transfers	Intergovernmental transfer					
	Revenue support					
International climate finance	Technical assistance grants					
	Dedicated credit lines					
	Blended finance vehicles					
National, regional and municipal funds	City climate funds					
	Revolving funds					
	Green investment funds					
	Regional development funds					
Debt financing	Commercial loan					
	Regional bond					
Public-private partnerships	PPP					
Leasing and asset finance models	Operating lease finance					
	As-a-service models					
	Pay-as-you-save / On-Bill Repayments					
Individual and community financing	Crowdfunding					
	Philanthropic organizations and charities					

Table 13. Sources of funding and finance by challenge

Monitoring and evaluation

Monitoring and evaluation of the GCAP is critical to understand the impact delivered by the GCAP actions towards reducing greenhouse gas emission and mitigating climate change in the Guelmim-Oued Noun region. Two types of monitoring will be undertaken with the GCAP:

1. Monitoring of the implementation process, which will focus on how the actions are implemented against the timeframe, budget and components of each of the actions. The aim of the implementation monitoring is to ensure that the actions are delivered in keeping with the original aim of each action, that the right data is collected to ensure further monitoring and that lessons learnt are shared between actions.
2. Monitoring of the results, evaluating whether the implemented actions are bringing the expected benefits. This will be done through the analysis of quantitative and qualitative data collected during and post implementation of the action, and compared with the baseline analysis presented in this GCAP (see baseline section)

COMPONENTS OF IMPLEMENTATION PROCESS MONITORING

The monitoring of the implementation process will contain several components:

ORGANISATION

The Commission de l'Aménagement du Territoire will be in charge of overseeing the implementation and coordination of the GCAP actions. This will not necessarily be the action owner. Each action owner will be responsible for the implementation and collection of data, which will be fed back to the central GCAP commission. Action implementation will sit with the relevant divisions, while the “governance, internal inspection and Communal Action Plan monitoring service” will perform the function of GCAP unit. The Commission de l'Aménagement du Territoire will oversee the integration of GCAP actions between themselves and with wider policy interventions within the region, such as Regional Development Plan (PDR).

REPORTING AND MONITORING FRAMEWORK

For each action, the Commission will create a reporting and monitoring framework, as detailed in Figure 24. The framework will detail the action owner's responsibilities, timelines for implementation processes, and methods and arrangements for tracking of progress. The framework will build on the information and implementation timeline provided for each action. It will include a schedule of indicators to be collected and agreement over periodic reporting of data from the action owner to the Commission.

BUDGETING

Each action owner will be responsible for creating a budget for each action with internal and/or external funds and for monitoring financials. These will be reported periodically to the Commission to ensure uniform reporting between different actions.

COMPONENTS OF RESULTS MONITORING

Monitoring the results of the action will be an important part of understanding the impacts and outcomes delivered by the GCAP actions. The on-going monitoring of these results will allow to track change over time and to adjust investment and actions to ensure that the expected outcomes are reached.

REPORTING AND MONITORING FRAMEWORK

Throughout the implementation of the actions, the Commission will have developed a reporting and monitoring framework, which will include a results monitoring section. The development of the requirements for the two phases in parallel will ensure continuity of data collection between the implementation and operational phases of the action. The framework will measure the achievement and change derived from the implementation of the action, based on the expected benefits of each action and the relevant strategic goals.

INDICATOR DATABASE

The indicators collected as part of the drafting of the GCAP will be used as the baseline for an indicator database. Through annual reviews, indicators will start being collected during the implementation phase of the actions. This will give the opportunity to put in place the mechanisms needed to ensure the right data is collected, both through the implementation of the action and into the operational phase of the action.

RESPONSIBILITIES

Data collection will be the responsibility of the action owner through the implementation of the action. Following completion, transitional arrangements will need to be put in place to ensure that the operator is aware of the monitoring duties highlighted in the framework.

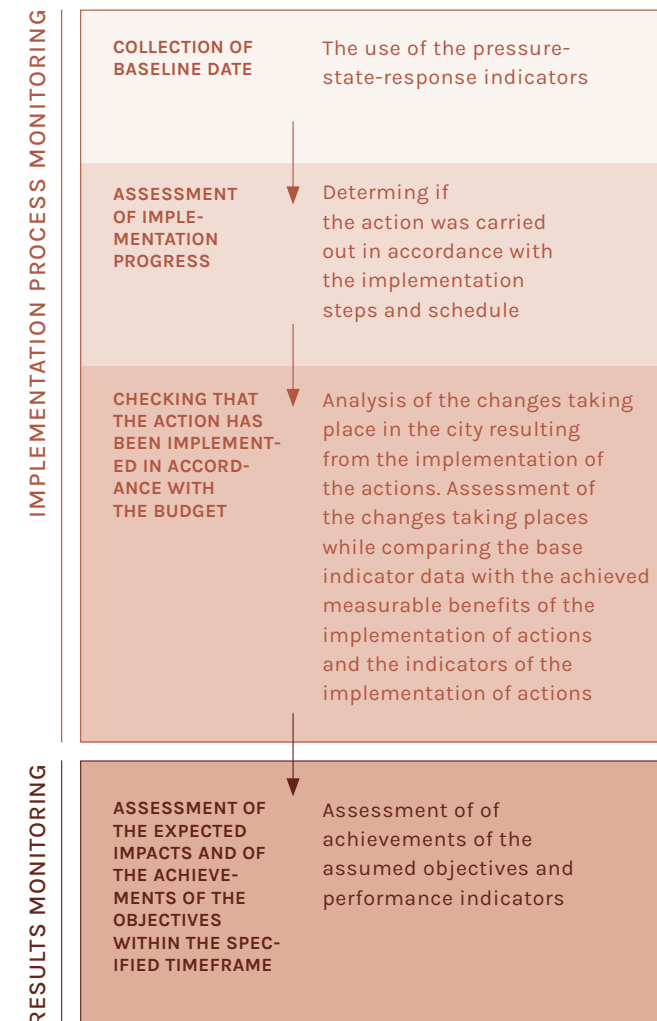


Figure 25. Monitoring and evaluation framework

References

1. Agence du Bassin Hydraulique de Draa Oued Noun, Actualisation du Plan Directeur d'Aménagement Intégré des Ressources en Eau des Bassins de Drâa Oued Noun, 2022.
2. Agence Marocaine pour l'Efficacité Energétique (AMEE), Elaboration du Plan Régional d'Efficacité Energétique et de Décarbonation – Mission 1, 2024.
3. Direction Régionale de l'environnement Guelmim-Oued Noun, Diagnostic Economie Verte, n.d.
4. Earthquake List, Guelmim-Oued Noun Earthquake Report, 2025. [The complete Guelmim-Oued Noun, Morocco earthquake report \(up-to-date 2025\).](#)
5. International Federation of Red Cross and Red Crescent Societies, Morocco: Floods 2014 Emergency Plan of Action (EPoA) Operation n° MDRMA006 Update, 2015. [Morocco: Floods 2014 Emergency Plan of Action \(EPoA\) Operation n° MDRMA006 Update – Morocco | ReliefWeb.](#)
6. Maaroufi, Youssef. Les personnes à besoins spécifiques au Maroc d'après les données du Recensement Général de la Population et de l'Habitat de 2014, Recensement général de la population et de l'habitat 2014 (RGPH2014), 2014. https://rgph2014.hcp.ma/Les-personnes-a-besoins-specifiques-au-Maroc-d-apres-les-donnees-du-Recensement-General-de-la-Population-et-de-l-Habitat_a382.html.
7. OECD, Empowering and Confident Youth in Morocco, 2021. [Empowering and Confident Youth in Morocco | OECD.](#)
8. Royaume du Maroc, Ministère de l'Energie, des Mines et de l'Environnement, DIRECTION DES CHANGEMENTS CLIMATIQUES, DE LA DIVERSITE BIOLOGIQUE ET DE L'ECONOMIE VERTE (DCCDBEV) - Etude d'Elaboration du Plan Climat Territorial -PCT- de la Région de Guelmim-Oued Noun - Mission 1: Analyse de la Situation Territoriale face au Changement Climatique, 2022.
9. Royaume du Maroc, Ministère de l'Energie, des Mines et de l'Environnement, DIRECTION DES CHANGEMENTS CLIMATIQUES, DE LA DIVERSITE BIOLOGIQUE ET DE L'ECONOMIE VERTE (DCCDBEV) - Etude d'Elaboration du Plan Climat Territorial -PCT- de la Région de Guelmim-Oued Noun - Mission 3: Conception et Elaboration d'un Plan d'Adaptation Prioritaire (PAP), 2022.
10. Royaume du Maroc, Ministère de l'Energie, des Mines et de l'Environnement, DIRECTION DES CHANGEMENTS CLIMATIQUES, DE LA DIVERSITE BIOLOGIQUE ET DE L'ECONOMIE VERTE (DCCDBEV) - Etude d'Elaboration du Plan Climat Territorial -PCT- de la Région de Guelmim-Oued Noun - Mission 4: Plan de sensibilisation et d'information en matière de Changements Climatiques, 2022.
11. Royaume du Maroc, Ministère de l'Energie, des Mines et de l'Environnement, DIRECTION DES CHANGEMENTS CLIMATIQUES, DE LA DIVERSITE BIOLOGIQUE ET DE L'ECONOMIE VERTE (DCCDBEV) - Etude d'Elaboration du Plan Climat Territorial -PCT- de la Région de Guelmim-Oued Noun - Mission 5: Elaboration du Plan Climat Territorial de la Région de Guelmim-Oued Noun et mise en place d'un dispositif de suivi-évaluation, 2022.
12. Royaume du Maroc, Haut-Commissariat au Plan, Direction Régionale de Guelmim, Monographie Régionale Guelmim-Oued Noun, 2022. hcp.ma/region-guelmim/docs/docs/monographie_regionale_2022.pdf
13. Royaume du Maroc, Haut-Commissariat au Plan, Direction Régionale de Guelmim Région de Guelmim-Oued-Noun, La Situation démographique et socio-économique de la femme, 2020. hcp.ma/region-guelmim/attachment/2043081/.
14. Royaume du Maroc, Haut-Commissariat au Plan, Recensement Général de la Population et de l'Habitat, Caractéristiques démographiques et socioéconomiques de la population. Note sur les principaux résultats, 2016. hcp.ma/region-guelmim/attachment/874817/.
15. Royaume du Maroc, Ministère de l'Aménagement du Territoire National, de l'Urbanisme, de l'Habitat et de la Politique de la Ville, Schéma Directeur d'Aménagement Urbain du Littoral de Sidi-Ifni – Guelmim – Tan-Tan, 2018.
16. Royaume du Maroc, Ministère de l'Intérieur, Wilaya de la Région de Guelmim Smara, Etude du plan directeur provincial pour la gestion des déchets ménagers et assimilés de la province de Guelmim – Mission 1: Analyse critique de la situation actuelle et définition des objectifs, 2012.
17. Royaume Du Maroc, Ministère de la Transition Énergétique et du Développement Durable & Direction Régionale de l'environnement Guelmim-Oued Noun, Étude et Élaboration du Plan Directeur Relatif à la Gestion des Déchets Ménagers et Assimilés de la Province d'Assa-Zag - Mission 2: Choix du/ des Sites de Mise en Décharge, de Traitement, de Recyclage et de Transfert des Déchets, 2018.
18. Royaume Du Maroc, Ministère de la Transition Énergétique et du Développement Durable & Ministère de l'intérieur Province de Tan-Tan, Etude et Elaboration du Plan Directeur Relatif a la Gestion des Dechets Ménagers et Assimiles pour la Province de Tan-Tan – Mission 2 : Choix des Sites de Mise en Decharge, de Traitement, de Recyclage, de Transfert et du Scenario d'Opérationnalisation des Objectifs Retenus, 2022.
19. Royaume Du Maroc, Ministère de la Transition Énergétique et du Développement Durable & Ministère de l'intérieur Province de Tan-Tan, Etude et Elaboration du Plan Directeur Relatif a la Gestion des Dechets Ménagers et Assimiles pour la Province de Tan-Tan – Mission 3 : Rédaction de la Proposition du Plan Directeur Provincial de Gestion des Déchets Menagers et Assimiles Conformément a la Loi 28-00, 2023.
20. Royaume Du Maroc, Ministère de la Transition Énergétique et du Développement Durable, Etat d'avancement de la Situation des Plans directeurs provinciaux et Régional de la Région Guelmim-Oued Noun, n.d.
21. Royaume du Maroc, Ministère de la Transition Énergétique et du Développement Durable, Étude pour l'Élaboration d'un Plan Directeur Régional de Gestion des Déchets Industriels, Médicaux et Pharmaceutiques Non Dangereux et des Déchets Ultimes, Agricoles et Inertes pour la Région Guelmim-Oued Noun – Mission 1: Diagnostic de la Situation Actuelle de la Gestion des Déchets Industriels, Médicaux et Pharmaceutiques Non Dangereux et des Déchets Ultimes, Agricoles et Inertes, 2022.
22. Royaume du Maroc, Ministère de l'Interieur, Region de Guelmim-Oued Noun, Étude d'élaboration du PDR de la région Guelmim-Oued Noun: Mission 3 programme de développement régional, 2019.

23. Royaume du Maroc, Secrétariat d'Etat auprès du Ministre de l'Energie, des Mines et du Développement Durable, chargé du Développement Durable, Stratégie Nationale de Réduction et de Valorisation des Déchets, 2019. [Stratégie Nationale de Réduction et de Valorisation des Déchets](#).
24. United Nations Development Programme, Gender Inequality Index (GII), 2025. [Gender Inequality Index | Human Development Reports](#).
25. World Bank Group, Kingdom of Morocco: Governing Towards Efficiency, Equity, Education and Endurance – A Systemic Country Diagnostic, 2018. [World Bank Document](#).
26. World Bank, Climate Change Knowledge Portal, [Morocco - Climatology, 2025. Morocco - Climatology | Climate Change Knowledge Portal](#).
27. World Bank, Climate Change Knowledge Portal, Morocco - Country Specific Information, 2025. [Morocco - Summary | Climate Change Knowledge Portal](#).
28. World Bank, Climate Change Knowledge Portal, Morocco - Mean Projections Expert, 2025. [Morocco - Mean Projections Expert | Climate Change Knowledge Portal](#).

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