

## MOROCCAN HIGHWAYS' ROADMAP FOR SUSTAINABLE MOBILITY



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## **ABSTRACT**

The transport sector is one of the most polluting in the world, due to the continuous emissions into the atmosphere of greenhouse gases. Climate change is exacerbating the situation, and sustainable mobility had become a real challenge and a priority in the fight against climate change.

Morocco's highway company (Autoroutes du Maroc), as the main highway developer, puts environmental protection in the center of all the preoccupations. Within this framework, ADM set up a roadmap in order to structure and integrate sustainable development at the center of all preoccupation. A sustainable development strategy was elaborated around seven pillars : water optimisation, the integration of renewable energy, waste management and valorisation, mobility and road safety, mitigation risks, training and capacity building, and a cycle of conference around sustainable mobility.

In particular, ADM had identified a portfolio of green projects, adapted to climate finance. Some of these projects were already launched and are starting to show results on the ground: facing flooding and landslide risk zoning, Al ard project to overcome soil erosion, a tree for the climate, dry compaction technology, clean and renewable energy, selective waste collection and recovery project, the set up of an Intelligent Transportation Systems, and the launch of the ADM Academy.

Finally, today, ADM is confirming itself as a leader in sustainable mobility in Morocco, and in Africa. It continues to share its experience and know-how with other international partners, and distinguish itself as a leader in all aspects of sustainable mobility.

## **INTRODUCTION**

The transport sector is one of the most polluting in the world, due to the continuous emissions into the atmosphere of greenhouse gases. Climate change is exacerbating the situation, and sustainable mobility had become a real challenge and a priority in the fight against climate change.

In particularly, in the case of Morocco, the effects of climate change are starting o be sensed through the road network. In order to overcome these challenges, Morocco's Highway Company—Les Autoroutes du Maroc (ADM) has identified 380 km of the road network, as been categorized as "very exposed" and three watersheds considered "flooded". Thus, ADM has implemented several projects and initiatives to mitigate these possible risks.

In addition, ADM invested significantly in Research and Development, as a way for sustainable development and to encourage innovation, as well as the conception of environmentally friendly solutions. In fact, ADM has developed several solutions and processes that are the subject of major environmental projects related to the water and energy sectors, as well as vegetation.

Finally, in order to confirm itself as a leader in sustainable mobility, ADM defined a roadmap for projects related to sustainable development. The set of projects were defined to form a portfolio of green projects, as a way to confirm ADM in its commitment to sustainable development and to the fight against climate change.

## **1. A STRONG ENGAGEMENT OF MOROCCO TO SUSTAINABLE DEVELOPMENT**

In this global tendency, countries around the world were mobilized to respond to the engagement that was launched by the Secretary General of the United Nations, that limits world temperature increase to less than 2 degree Celsius. Morocco announced an ambitious objective of 52% of renewable energy by 2030—which represents an installed capacity of 10 GW. His Majesty King Mohamed VI announced this strategic objective for Morocco, during the Conference of the Parties (COP21). A confirmation of these engagements was reiterated during COP22, which was chaired by Morocco.

This announcement positioned Morocco as an example and a model at the international level, for the development of an energy mix, with the integration of green sources: wind, solar as well as hydropower; there are various efforts undertaken by Morocco to fight against climate change.

## **2. AN INTEGRATED SUSTAINABLE DEVELOPMENT STRATEGY FOR ADM**

ADM prioritizes the environment before any corporate motivation. Within this framework, it set up a roadmap in order to structure and integrate sustainable development at the center of its preoccupation. This roadmap was also a way to better communicate around its realizations during the Conference of the Parties (COP22) held in Morocco in November 2016.

### **2.1 The main missions of ADM**

The government of Morocco, with the objective to ensure the construction, the maintenance and the exploitation of Morocco's roads and highways, established Autoroutes du Maroc. Its mission can be summarized as follow:

- The construction, the maintenance and the exploitation of the highways network, as a responsibility of ADM through concessions or contracts,
- The management, protection and the conservation of the public domain, as part of the transportation network which has been established,
- The creation and the exploring of the touristic services, hotels and all the other services, which are close geographically to the road network,
- The management of all real estate and infrastructure along the highways

### **2.2 ADM commitment to Social and Environmental Responsibility**

The ADM is committed to include all the social and environmental aspects in all the initiatives and projects ADM carries, confirming itself as a real socially and environmentally responsible institution. In fact, it includes social responsibility at the heart of its strategy and pays attention in the way it undertakes all the activities.

ADM had integrated progressively, since its creation in 1989, several objectives related to social and environmental development have been integrated as part of a global vision, which integrates the concepts of sustainable development.

This new positioning initiated in the beginning 2010 by the creation of a charter for Sustainable Development, which enumerated the different actions as they relate to sustainable development.

## 2.3 Environmental Preoccupation

ADM is very keen in ensuring the protection of the environment throughout its endeavors. In fact, ADM ensured that all the recommendations of environmental impact studies were included.

ADM had enriched continuously the other already engaged actions, by including the environmental aspects. Thus, ADM defined and set up environmental standards, which could be applied to its activities.

To ensure the optimization of the natural resources throughout the road network, ADM has set up several water and energy related optimization program. In addition, it encourages recycling, the recuperation and the use of ecological products.

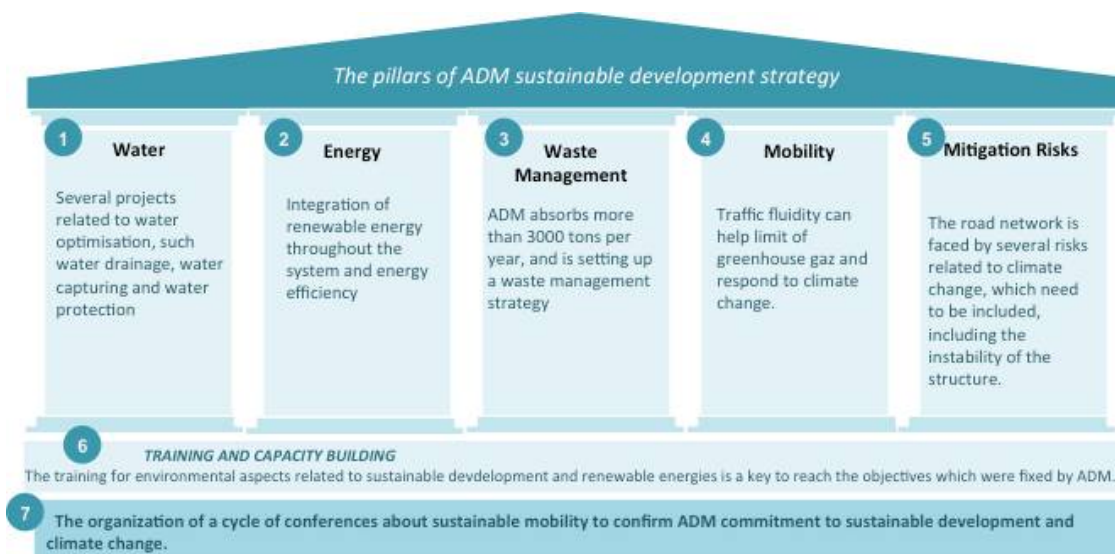
### 3. ADM STRATEGY FOR SUSTAINABLE DEVELOPMENT

In order to confirm its a positioning as a leader in sustainable mobility, ADM established a road map in order to highlight all the steps which are required to integrated the different aspects of climate change mitigation and adaptation. Thus, the Planning department defined a portfolio of twelve green projects, which could be carried by ADM and its partners, in order to ensure the integration of the different aspects of climate change and sustainable development.

Thus, ADM launched a sustainable development strategy around seven pillars:

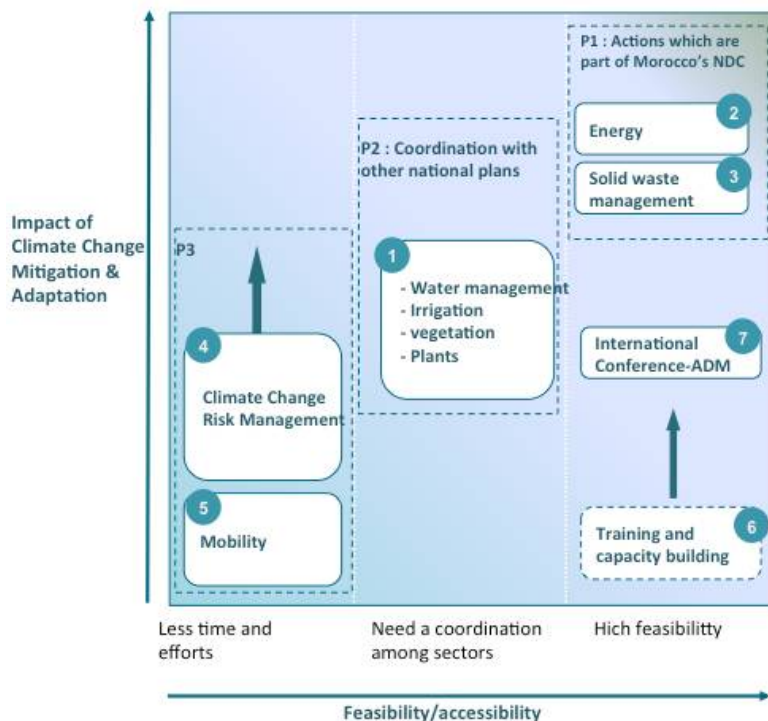
- Water
- Energy
- Waste management
- Mobility
- Mitigating risks
- Training and capacity building
- A cycle of conference around sustainable mobility

Each of these pillars is well developed into several projects that form a green portfolio of ADM.



Depending on the ease to implement the different projects, three categories can be considered, as follow:

- P1: The list of projects which have been included in the Nationally Determined Indices (NDCs) of Morocco, as presented at COP21 and confirmed during COP22
- P2: The initiatives which are developed as part of Morocco's Green Plan
- P3: Actions, which are necessary, yet complex with a potential impact on climate change mitigation and adaptation.



### 3.1 Water at the heart of sustainable development

ADM has developed several projects to optimize water management and ensure minimal use of the resource. In addition to the implementation of water harnessing projects along the highways. The structuration of projects which make it possible to highlight the importance ADM has for water, and which allow the realization of several water related projects to ensure its projection and sustainable development. And in this sense, three important initiatives are to be cited:

- ADM is the world leader in dry compaction techniques. ADM has received the award of excellence in Korea, for the research and development that has been undertaken by its teams. This technique should be put forward as it allows compaction in the areas with the scarcest water resources.
- ADM implements rainwater-harvesting projects in the vicinity of its highway network. The resource could be used for irrigation of the surrounding areas and fields along highways.
- ADM has implemented a stabilization project for embankments using native plant species with limited water consumption. These plants play a dual role in stabilizing the motorway and contribute to reducing carbon emissions without excessive water consumption.

### 3.2 The Integration of Renewable Energies

Energy is one of the main sources of the production of greenhouse gases responsible for global warming. ADM confirmed its commitments as a socially responsible player. It is setting up projects to produce energy from renewable sources such as the sun. Furthermore, ADM is also implementing energy efficiency actions to rationalize the consumption of WMD installations. Thus, two essential objectives are operationalized:

- Auto production of renewable energies: the toll stations are equipped with Installation of PV panels to supply the toll stations and the rest areas along the “Autoroutes du Maroc”.
- Energy efficiency: electricity consumption is optimized along highways in Morocco via the LED lighting installations and the adoption of an energy efficiency approach.

### 3.3 Waste Recovery

The amount of waste that is thrown along the highways exceeds 3000 tons per year, which is equivalent to the amount generated during a day by a large city. ADM also integrates the following initiatives in its strategic actions that aim to contribute to the sustainable development of Morocco:

- ✓ Installation of selective waste bins at highway rest areas. These colored containers make it possible to distinguish different types of waste.
- ✓ Installation of waste recovery centers
- ✓ Establishment of an autonomous waste management to allow its self-financing.

### 3.4 Mobility and Road Safety

The fluidity of traffic is an important factor in limiting the greenhouse gases responsible for global warming. Thus, ADM implements projects in order to streamline traffic:

- ✓ Establishment of a radio station to communicate on the state of the traffic of the network in real time as well as the means of transmission of interactive messages to the users of the highway network of ADM
- ✓ Implementation of actions to raise awareness of road safety in order to provide users with a safer network

### 3.5 Managing Risks Related to the Effects of Climate Change

The highway network is subject to the effects of climate change. Indeed, because of its position, the highway network constitutes an obstacle to the flow of rainwater. Thus, it has to face very heavy bed loads, which weakens the network and constitutes a risk of erosion that is significant for embankments (instability, which impacts the integrity of the highway). Consequently, surface and structural instabilities represent significant risks

These phenomena are accentuated by the violence and concentration of rainfall in Morocco over the past decades. ADM deploys an important research and development program for better risk management, including:

- Mapping of the hotspot zones which are in danger of undesirable field movements
- Management of the risk of flooding and water erosion on highways in Morocco

- Development of innovative techniques based on biological engineering for the fight against water erosion and soil fixation

### 3.6 The know-how and capacity building

Training on environmental aspects related to sustainable development and renewable energies is key to achieving the objectives set by ADM. It is within this framework that ADM has launched a work stream of reflection in order to set up a chain dedicated to climate change.

The aim is not only to benefit its own human resources but also to open this course to interested people outside ADM.

### 3.7 A Sustainable Mobility conference cycle

ADM launched a cycle of conferences around sustainable mobility starting with a COP22 labeled event, which gathered international and national highway companies and their partners and stakeholders to discuss the importance and challenges of sustainable mobility. The second edition was organized in partnership with the International Road Federation, with a focus on the challenges facing Africa.

## 4. SEVERAL PROJECTS IDENTIFIED AS PART OF COP22 PROCESS

Morocco was mobilized in 2016 as it was preparing for the organization of COP22 in November 2016 in Marrakech. All sectors of the economy showed their commitment to climate change and their contribution to sustainable development. In particular, ADM had identified a portfolio of green projects, presenting very attractive financial characteristics. Such a portfolio is a great investment opportunity for the different financial vehicles, which were launched during COP22 by the international institutions and specialized investors.



Some of these projects were already launched and are starting to show results on the ground, among them:

- **Facing flooding and landslide risk zoning:** ADM identified 380 km of network considered as "highly exposed" and 3 watersheds considered "flooded" for which it has set up protection and prevention projects to overcome these possible risks.
- **AI ARD project to overcome soil erosion:** based on the increase of wild seeds by farmers along the highways, it aims to plant up to 10000 hectares of land and thus create jobs.
- **A tree for the Climate:** ADM has a plant heritage of about three million plant units and through its "A tree for the Climate" initiative, ADM will give schoolchildren the opportunity to plant 5000 palm trees at the level of Service areas adjoining the city of Marrakech.
- **Dry compaction technology:** Water is also a rare resource that must be preserved. It is in this sense that ADM, thanks to the dry compaction technique, saved 4 billion Liters of water on an arid zone during the construction of the Skhour-Agadir highway section.
- **Clean and Renewable Energy:** ADM has set up solar-based electricity generating stations at the toll stations in the road network; has generalized and reinforced the energy efficiency of highways especially through the use of LEDs and affirming the ambition of a highway self-producing energy.
- **Selective waste collection and recovery project:** approximately 3,000 tons of wastes are disposed of each year along the highway network. In order to reduce the impact of this phenomenon on the environment, ADM has set up a waste collection project to upgrade to reusable products in the operation of highways: cones, beacons, shock absorbers, fence walls, etc.
- **Intelligent Transportation Systems (ITS),** a tool essential to streamline traffic, improve highway safety, and reduce GHG emissions.
- **The launch of ADM Academy** was a way for ADM to invest in Research & Development in the fields of environment, climate change, road safety, geotechnics, eco -construction and mobility. This institution capitalizes on the experience and internal knowledge of ADM, with the objective to transfer the know how throughout the African continent.

## 5. CONCLUSION

ADM is striving to become a leader in green transport and sustainable mobility. The sustainable development roadmap was elaborated to help define a portfolio of green projects. Some projects have already been launched as part of the COP22 process and others are perfect investment opportunities for climate finance.

Today, ADM is confirming itself as a leader in sustainable mobility in Morocco, and in Africa. It continues to share its experience and know-how with other international partners, and distinguish itself as a leader in all aspects of sustainable mobility.