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Tourism carbon footprint and elaboration of a NAMA for the tourism sector in Morocco

Towards a climate friendly accommodation sector through energy efficiency and renewable energy

Summary note – December 2018

1. Context and objectives

The Moroccan Ministry of Tourism, with the collaboration of the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, the UNEP, and the UNDP, within the scope of the “International Climate Initiative” (IKI), have begun the assessment of the climate impact of tourism in Marrakech and the elaboration of a NAMA in order to reduce Greenhouse Gas (GHG) emissions related to the tourism sector in Morocco.

The main objectives of the project are:

- **To assess the carbon footprint of tourism** in Marrakech (and Morocco by extrapolation)
- To identify the **main mitigation actions**
- **To assess the vulnerability** of the tourism sector
- **To select and elaborate a NAMA for the tourism sector** in Morocco

2. Project milestones

The project started in December 2016 and ended in December 2018. A first phase of carbon footprint assessment took place in winter 2017. The results (carbon footprint and baseline) were presented in Morocco in May 2017. A first proposal of 5 potential NAMAs was described and discussed with 20+ stakeholders (SPEE, AMEE, HCEFLCD, Fondation Mohammed VI, MAECI, SIE, SMIT, SEAD, CRF, ONCF, etc.) in June 2017 in the office of the Ministry of Tourism, Air Transport, Crafts and Social Economy. A complementary note with evaluation details of these potential NAMAs was sent to the Ministry of Tourism,

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which had the final say on the components of the NAMA presented here. Additional individual interviews with tourism and energy-related stakeholders, locally implemented development agencies (GIZ, AFD, etc.), and state actors (ministries and state secretariats) were conducted, to gather important information about levers and obstacles for the implementation of the NAMA. The main report was written between September 2017 and February 2018. The initial dissemination activities began in September 2018. A final training geared towards capacity building is planned for 2019, in close cooperation with the output of the Affichage Environnemental¹ project.

3. Carbon footprint of tourism in Marrakech

In 2017, Carbone 4 and TEC Conseil, with the participation of international experts Paul Peeters and Stefan Gössling, performed the carbon footprint assessment of tourism in Marrakech for the year 2015. Different Moroccan organisms were solicited to collect the data needed for the carbon footprint calculation, particularly the Moroccan Ministry of Tourism, the Moroccan Airports Authority, and Marrakech town hall.

Key sources of emissions by Marrakech tourism take into account GHG emissions generated during a tourist's entire stay.



Figure 1: Sources of carbon emissions of tourism in Marrakech

As shown in the figure below, the **tourists' origin-destination transport is the largest source** of emissions, responsible for 54% of total GHG emissions:

- 71% of transport o/d emissions are related to transport of tourists coming from abroad
- 82% of transport emissions are related to air transport

¹ <https://www.betterfly-tourism.com/nos-projets/affichage-environnemental/hebergements-touristiques>

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Accommodation is the second largest source of emissions, 16% of total emissions are related to energy consumption in hotels, riads and others:

- Carbon emissions from accommodations are roughly equally shared between Riads, clubs, 4 and 5-star hotels and rented flats.
- Hence, it's necessary to work on all accommodation types in order to significantly reduce carbon emissions from the accommodation sector.

Next, 13% of emissions are linked to tourists' activities in Marrakech, such as cultural activities (museums for instance), the purchase of marketable handicrafts ...

- More than 70% of emissions generated by tourists' activities are linked to foreign tourists.
- The purchase of marketable handicraft products represents 55% of carbon emissions.

Waste generation and catering each represent 8% of total emissions.

Finally, around 1% of total emissions are related to tourists' mobility within Marrakech. Even if this source is low stakes in terms of carbon impact, it's important in terms of image and ratchet effect to establish mitigation actions in order to reduce the GHG emissions of domestic transport.

**GHG emissions of tourism in Marrakech
(2015)**

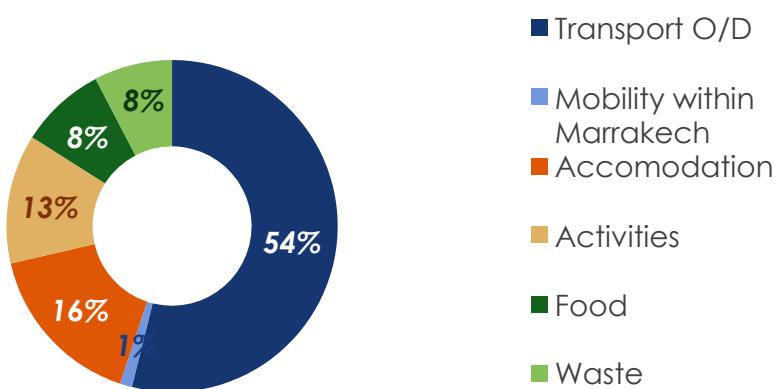


Figure 2: Breakdown of GHG emissions of tourism in Marrakech (2015)



4. A NAMA for the tourism sector

The NAMA selection process is **based on the vulnerability analysis** and the GHG emissions of the tourism sector in Morocco. Starting from an international benchmark, a set of measures were defined, then gathered and proposed to the stakeholders for discussion.

A baseline was computed out of the initial carbon footprint, taking into account socio-economic aspects and assumptions on the **development of the tourism sector from now until 2030**. Although energy efficiency will supposedly increase in the future (and the related emissions diminish), the development of tourism and the expectations for a sizable increase in tourists coming from new distant destinations (Russia or China) result in an **increase of 80% of the initial carbon footprint**, and an evolution of the breakdown towards a greater percentage of emissions from transport.

In the case of the tourism sector in Morocco, 5 different potential NAMAs were presented, based on the main emission sectors:

- A NAMA based on the energy and emissions optimization of the accommodation sector (renovation, renewable, catering)
- One based on mobility within the country and the possibilities of developing low carbon transport means (tramways or train use)
- A third based on the emissions of arrivals in the country (airplane emissions and network efficiency)
- A fourth one based on the promotion of sustainable and low carbon tourism
- A last one based on food for tourism purposes and the ways to optimize food production and food waste management

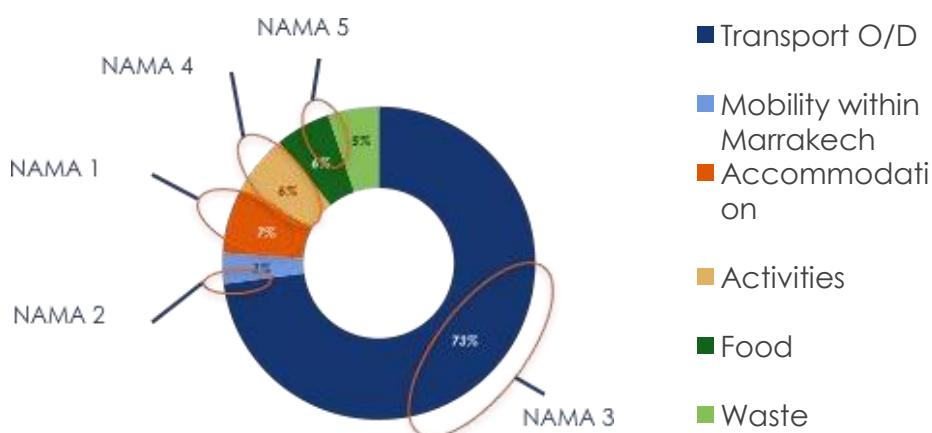


Figure 3: Evolution of the breakdown of GHG emissions (estimated baseline for 2030) and emissions targeted by each potential NAMA

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Choosing a NAMA implies weighing numerous criteria, so as to anticipate the possible constraints linked to the implementation phase. As such, a **multi-criteria analysis** was carried out for each of these propositions. Co-benefits, mitigation plan, implementation possibilities, legal and technical aspects, measuring and reporting processes, possible finance plans and global consistency were evaluated in cooperation with the Ministry of Tourism and a selection of implicated actors hailing from public and private institutions.

5. Towards a climate friendly accommodation sector through energy efficiency and renewable energy

Considering these aspects, the choice of the main NAMA for the tourism sector in Morocco settled upon the proposal for a low carbon accommodation sector, for which a number of actors and regulations were already available on the field. This NAMA was considered the most likely to be implemented with success.

This NAMA proposes to '**eliminate' emissions from an entire subsector**, accommodation, which in 2015 represented 10% of emissions from Moroccan tourism. This will make a significant contribution to emission reductions, specifically considering the anticipated **growth of the sector** with another 200,000 beds by 2030. The NAMA will also **generate global attention**, as Morocco would be the **first country** in the world to pursue a **sector-wide decarbonization strategy in tourism**. As the following description highlights, the cost of achieving this goal is moderate, and provides the simultaneous benefit of reducing operating costs and vulnerabilities related to future fluctuations in energy cost, while also improving national energy autonomy.

Should the NAMA be fully implemented by 2030, it would correspond to the mitigation of 4.2 MtCO₂ (7% of anticipated emissions of 37.3 MtCO₂e in 2030). The implementation of the NAMA will follow a specific procedure: accommodation establishments will receive **technical assistance and capacity building in order to implement mitigation measures that are feasible and show a high impact**. Technical and behavioral measures are included. To implement these measures, a systemic capacity building and financing program is necessary, and will in turn enhance accommodation operating and the **efficient use of resources**.

The secondary element of the NAMA is to **reduce emissions from food use and waste generation** (the contribution of food is estimated to 9% of sector wide emissions). To improve food sourcing, this NAMA proposal focuses on the development of green belts around cities, the promotion of sustainable procurement of food, the promotion of Moroccan gastronomy and vegetarian meals, and the optimization of food waste management (through specific

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recycling processes and methanation to make use of biogas).

The NAMA will take into consideration the life cycle approach of energy use in the accommodation sector and integrate the use of fossil fuels with aspects of resource production (food) and waste avoidance. This approach will support sustainable production-consumption loops, thus contributing to the **development of circular business models.**

6. NAMA components

The NAMA is currently structured in 5 components:

1. Capacity-building of the accommodation sector towards low carbon and resource efficient operations
2. Finance and Investment mechanisms to support the transition to renewable energy and energy efficient operations, and technologies
3. Sustainable procurement of goods and services (food and technical), from construction materials to room features
4. Awareness campaigns for customers and employees
5. Consumer information through labels and promotion of basic energy efficiency standards in the entire accommodation sector

Component (1) is about the provision of **training programs for energy consultants** towards the implementation of energy efficiency measures in accommodations and restaurants catering to tourists, awareness campaigns and a joint **research program** to develop the necessary technology at a local level.



Component (2) refers to the **creation and management of specific funds for investment** to be used for zero interest loans and covenants for energy feed-in tariff, based on **competitive advantages for managers in the accommodation sector.**



Component (3) will build capacity and create a **community of practice for procurement experts in the hospitality industry**, materialized by an **exchange platform**. It will help to identify key products and services with high emissions intensity, key mitigation technologies, **share lessons learned** and **facilitate collective identification** of recommendations on how best to leverage procurement practices to reduce greenhouse gas emissions, improve resource efficiency and accelerate the shift towards a more resilient, resource efficient development of the tourism sector.



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Component (4) focuses on **awareness campaigns for tourists and employees** through specific information campaigns, specific dedicated events, awareness tools and a promotion campaign of good practices aimed at tourist-awareness, which will be based on existing programs.



Component (5) aims to **strengthen existing labels** for hotels in the country and to propose **audits of accommodations** and **recommendations for the implementation of measures** (technical and process oriented) for energy efficiency, renewable energy production and sustainable food management. Energy audits and technical support for low energy devices, self-supply systems, and negotiation contracts with energy and food providers are some examples of this audit's output.



7. Co-benefits

The co-benefits include **sustainable development benefits**, changes in **economic structures** towards green growth including **employment opportunities**, as well as significant environmental benefits in terms of **energy/emissions reductions** and **water use**. More details can be found in the table here below.

Co-benefits	Indicators
Economic <ul style="list-style-type: none">- Financial savings for participating businesses (energy)- Avoided cost (waste)- Increasing energy independence through renewables, with long-term cost decline- Regional multiplier effects through local food sourcing- Reputational gains for Morocco as a green destination, for leading de-carbonization efforts- Reducing vulnerabilities through local production of food, energy (lower dependency on imports)	<ul style="list-style-type: none">- Cost of energy/bed night- Cost of waste/bed night- Share of renewable power used- Share/amount of local food use- Media reports on NAMA- Share of local production
Environmental <ul style="list-style-type: none">- Avoidance of greenhouse gas emissions (accommodation, transportation of food, waste)- Local food production- Circular economy models developed to maximize use of resources and waste- Lower consumption of non-renewable resources	<ul style="list-style-type: none">- Emissions of GHG (total/bed night)- Share/amount of local food production- Volume of water consumed- Density of air pollutants- Amount of waste/bed night

<ul style="list-style-type: none"> - Optimization of the use of water thanks to the improvement of environmental performance <p>Social</p> <ul style="list-style-type: none"> - Local development benefits (tourism, food production) - Empowerment of staff through enhanced knowledge base and integration in planning of low-carbon operations - Empowerment of women in new low-carbon knowledge economy 	<ul style="list-style-type: none"> - Recycling rate <ul style="list-style-type: none"> - Employment in tourism (direct/indirect) - Number of employees trained - Share of female employees
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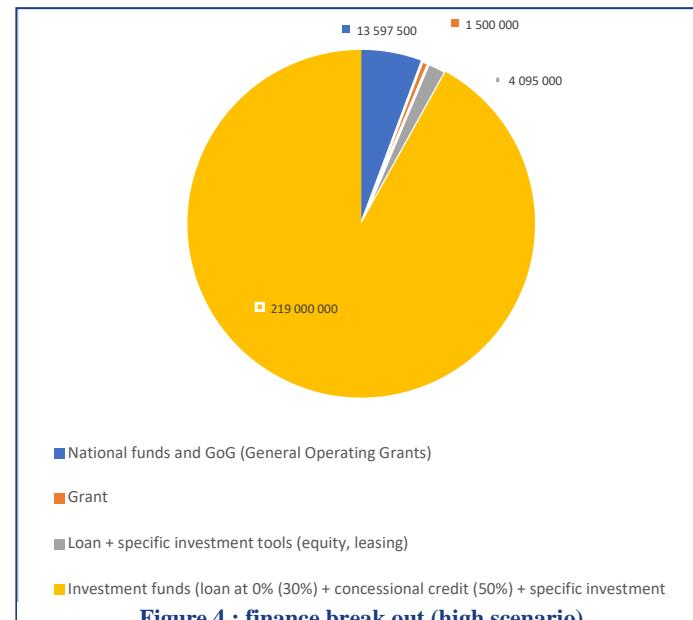
8. Finance plan

The cost of the suggested NAMA ranges **from ~ 140M€ to 290€** and is based mainly on **loans for investment tools** to fund accommodation managers' projects. The timeframe for the full implementation of the national policy on mitigation in the tourism sector is fixed at 8 years. The finance plan is currently suggested to follow **2 phases**:

- a first phase of preparation, set-up and pilot implementation (3 years, est. 1,7 to 6,5 M€), which will focus on the validation of the whole NAMA process for a representative panel of accommodation located in a pilot zone (Marrakech for instance)
- a second phase of national implementation and scaling up (4 years, est. 128 to 254 M€).

The aforementioned specific investment funds bear a central role in this finance plan. This will require an **upgrade in the regulatory and legal framework** (legal obligations and targets, practices and penalties). Financial instruments will also be as detailed as required for the **specific needs and investment methods of the accommodation sector** (feed-in tariffs, power purchase agreements).

It is highly recommended to set-up **Public-Private Partnerships**





(PPP) in order to boost components related to energy efficiency and production. The PPP's functioning, through a competitive dialogue, will induce competition between private partners in order to support the development of public utility projects. The instruments within the PPP could include **soft loans and private equity**.



Figure 5: NAMA components finance breakdown

This financial analysis is based on expected gains for the accommodation sector. Different sources estimate **high savings** for different sets of energy efficiency measures implemented in hotels. The average economy per bed (18 MAD/bed. Night) given by the AMEE and results from different case studies were our principal sources for this analysis. Occupation rates were also factored in.

9. MRV (Measurement, reporting and verification) and management systems

In order to ensure an efficient running of the project and the implementation of actions, a Measurement Reporting and Verification system is suggested. It will be useful in managing the various actions. **Quantitative and qualitative** variables have been listed, such as entities responsible for the monitoring. As far as possible, this monitoring will rely on **existing processes and actors**. Some Moroccan hotels possess their own tools for monitoring energy and water consumption according to end use. This allows the NAMA MRV system to rely on a numerous list of existing measured variables. Several types of reporting (quarterly, semi-annual or annual) have been laid down to ensure continuous reporting.

The management of the NAMA requires **giving actors specific roles**. The Ministry of Tourism is in charge of following the main implementation steps and maintaining contact with every possible implicated actor. These actors, in turn, will fulfill the following roles:

- Governance to lead the main implementation steps and tasks.

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- Technical support for capacity building, definition of technical needs
- Financial support for the management and fundraising pertaining to the investment fund

Different actors have already been identified in the NAMA report, such as the stakeholders required for updating the legal and organizational aspects.

10. Conclusion

This NAMA allows global **evolution of the quality** of the accommodation sector, its comfort, and the knowledge of energy efficiency in Morocco, easily applicable to other economic sectors.

The emergence or reinforcement of existing or **new markets** (food management, energy efficiency, and renewable energy above all), on a national scale, could give Morocco a **leading role in the promotion of sustainable tourism** when border countries are required to include similar programs in their national development plan.

With the energy needs of the accommodation sector being comparatively high, compared to the rest of society, aiming to reduce energy consumption will also contribute to a **change in the energy mix** of Morocco and be a step forward for energy autonomy.

This NAMA project illustrates the process of the **energy transition** in Morocco, in a world influenced by the Paris Agreement. The idea is to move from a situation where energy is relatively cheap and abundant (and even often subsidized, in the case of fossil fuels), to a situation where on the one hand it becomes costlier, but where, on the other hand, gains in both energy efficiency and excellence in environmental management lend Morocco a competitive advantage. In this perspective, it is the root of a paradigm shift.

