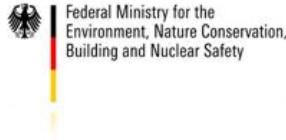




Royaume du Maroc
Ministère du tourisme



Implementation of a program to assess the environmental efficiency of tourist accommodation in Morocco

Pilot case study of the destination Marrakech

Synthesis of action plan proposals

I. Introduction

Environmental display is a reliable, official, and easily understood environmental measurement method that transparently informs clients of the efficiency of their tourist accommodation.

Morocco has always focussed on developing high quality tourism, and has harnessed it as part of its economic strategy. In this regard, the country committed itself very early to the implementation of this project, with the financial support of the **German government** through the International Climate Initiative (IKI), and in partnership with key stakeholders including: UNEP, UNDP and the Moroccan National Federation for Tourist Accommodation (FNIH).

Mandated by UNDP, the consulting firm **Betterfly Tourism** has provided support to the first 10 participating hotels¹ of this pilot project, in their approach of a responsible and sustainable development of their tourism activities.

In performing its duty, Betterfly Tourism first carried out **field audits**, from September to October 2016, in order to better understand each establishment's internal operating rules, and to collect data related to their consumption and environmental management.

Further the field audits, the company proceeded with the modelling phase between November and December 2016, consisted in integrating the collected data into the Winggy® calculation software. This important step allowed an assessment of the consumption per operating post within each establishment: (i) water consumption; (ii) energy consumption; (iii) life cycle water consumption²; (iv) resource consumption³; (v) greenhouse gas emissions; (vi) costs breakdown and (vii) use of organic products.

The modelling phase also facilitated the identification of the consumption rate applied to each operating post as well their environmental impacts. Based on these results, the month of January 2017 was dedicated to the **simulation of improvement action-plans**, offering the 10 participating hotels the possibility to increase their environmental efficiency whilst reaching the target figures of 5 to 22 Dirhams saved per overnight stay.

The results of these action plans were presented during conference calls organised between 24th January and

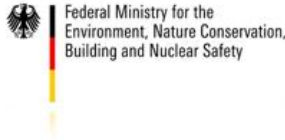
¹ Hôtel du Golf Palmeraie Resorts ; Hôtel Hapimag Palmeraie Marrakech ; Hôtel & Ryads Barrière Le Naoura Marrakech ; Hôtel Tigmiza Suites & Pavillons Marrakech ; Ibis Palmeraie Marrakech ; Kasbah du Toubkal ; Les Jardins de la Koutoubia ; Palais Aziza & Spa Marrakech ; Royal Mansour Marrakech ; Sofitel Palais Impérial Marrakech.

² 1 kWh electricity is equivalent to a water consumption of 42 L

³ This criteria includes the consideration of the environmental impoverishment in non-renewable mineral and fossil resources such as iron, zinc, natural gas, coal, oil, etc



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16th February as per the following road map: (i) background information on the methodology; (ii) analysis of the establishment; (iii) proposal of improvement action-plan; (iv) conclusion and presentation of the environmental tag delivered for the year 2016.

This synthesis aims to provide a **broad overview** of the analysis carried out by Betterfly Tourism on the 10 hotels; by the consolidation of statistics on the environmental impacts in respect with the promise of economic benefit between 5 and 22 Dirham per overnight stay.

II. Statement

1. Consumption

It is important to highlight the commitment of the 10 tourist accommodations from Marrakech which engaged in this pilot project. Indeed, each establishment demonstrated keen interest in this methodological approach. They are very much conscious of the impacts of their activities, within a socio-economic context where environmental issues are crucial for Morocco.

This paper illustrated the fact that water and air-conditioning are the most intensive in terms of energy consumption and have the least environmentally friendly impact. Indeed, water consumption is highly correlated to the use of swimming pools and watering green areas, both operating posts representing up to 85% of water consumption in some establishments.

The observation is similar for air-conditioning, principally due to the local climate in Marrakech but also because of some operating internal habits. The implementation of temperature settings based on visitor numbers would lead to an optimal use of this resource.

Welcoming and food products are also included in this inventory. The use of individual formats or single-use products boosts waste production and therefore diminishes environmental efficiency. As for food products, although good practices are already implemented internally, such as the local supply of foodstuffs, the low level of using bulk format and/or organic products affects negatively the environmental efficiency. Moreover, the wide choice of food products available on buffet tables and the large quantities offered increase the quantities consumed and their associated impacts (water, electricity, CO2 emissions etc...).

Also, good practices are already applied in some of the tourist accommodations, benefiting the environmental grade attributed to them:

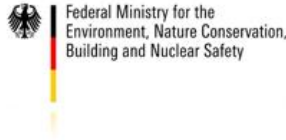
- Air-conditioning or heaters turned-off when rooms are not occupied (Hôtel Hapimag Palmeraie Marrakech);
- Magnetic cards used as air-conditioning power switches when the client is not in the room (Hôtel du Golf Palmeraie Resorts);
- Reduction of swimming pool filtration when riads are not occupied (Royal Mansour Marrakech);
- Boilers fueled by olive pits (Hôtel & Ryads Barriere Le Naoura Marrakech and Royal Mansour Marrakech);
- Use of eco-certified cleaning products (Ibis Palmeraie Marrakech);
- Use of solar-powered water heating systems. (Palais Aziza & Spa Marrakech).

2. Key figures

The following statistics highlight the main observations across the 10 tourist accommodations according to the various indicators.



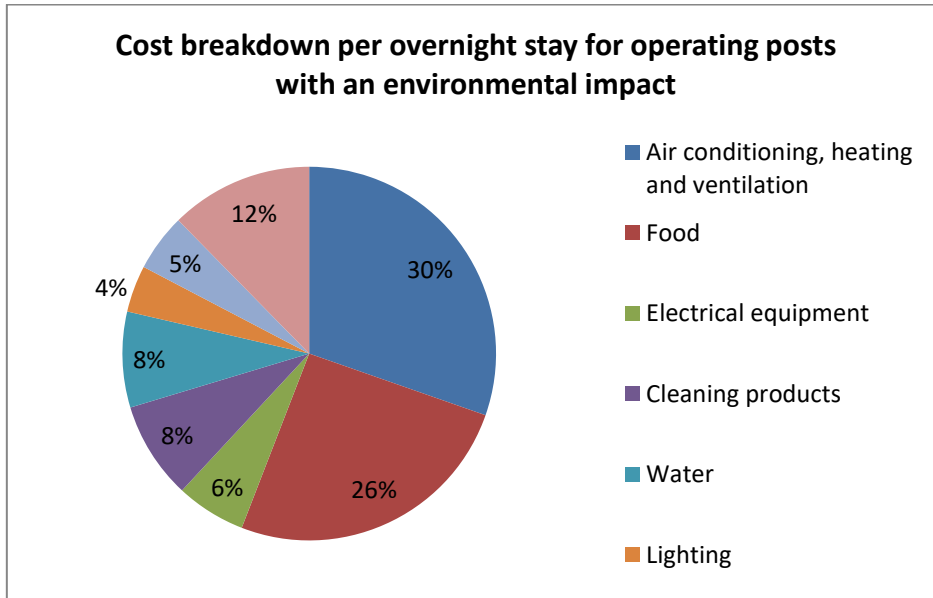
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a) Cost indicator

Both heating/air-conditioning operating posts and food produce represent more than 55% of spending, respectively 30% for the first one and 26% for the second. Costs related to welcoming products represent 12% of spending; thus averages of **184 Dirhams/overnight stay** for the panel.

Below is the cost breakdown per overnight stay for operating posts with an environmental impact:



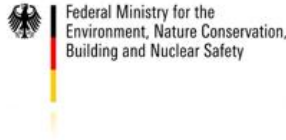
Source : Betterfly Tourism for the Ministry of Tourism of Morocco, February 2017

b) CO₂ indicator

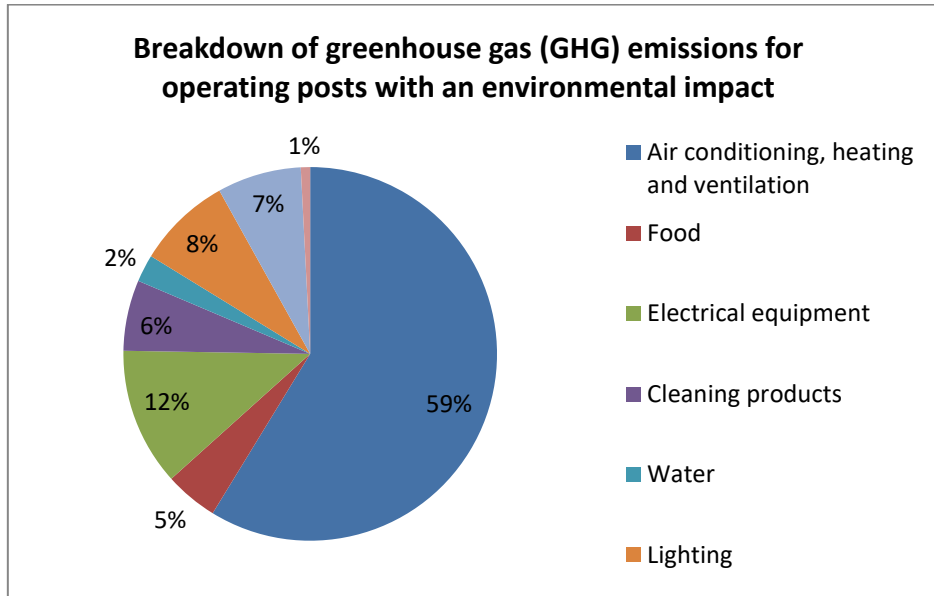
On average, the 10 hotels emit the equivalence of around **75kg CO₂ equivalent/overnight stay**, which roughly represents the emissions produced by a 375 km car ride (a little more than the distance between Marrakech and Rabat). Most of these emissions (up to 60%) are due to air-conditioning and heating. Indeed, most of the equipment observed is electrically -powered, and therefore has high rates of greenhouse gas emissions, considering that 1 kwh of electricity generates around 1 kg of CO₂. Furthermore, 20% of the emissions come from electrical installations and lights. The impact of water heating on this indicator is minor mainly due to the use of solar panels observed in some of the 10 hotels (Hôtel Hapimag Palmeraie Marrakech ; Palais Aziza & Spa Marrakech) or due to the use of olive-pit biomass boilers.



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Below is a breakdown of GHG emissions for operating posts with an environmental impact:



Source : Betterfly Tourism for the Moroccan Ministry of Tourism, February 2017

c) Energy indicator

Primary energy consumption is almost exclusively due to the use of electrical devices, bearing in mind that 1kWh of electricity used on a site represents the consumption of 3.6 kWh of primary energy (pe) throughout the lifecycle; which represents an average consumption of **227 kWh pe/overnight stay** across all the panel.

d) Water indicator

As mentioned above, water consumption is mostly due to the use of swimming pools (40%), but also watering green areas (27%). A good practice already adopted by most the sites - the use of flow control valves in showers and taps in bathrooms - allows the sites to maintain the direct consumption of water to **770L/overnight stay**.

e) Water indicator LCA (Life cycle analysis)

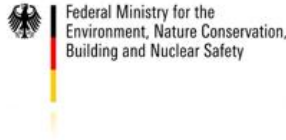
It is important to note that the production of 1 kWh of electricity requires 42L of water; therefore, water consumption in a life cycle analysis is 6 times higher than the water consumption on site. For our panel, the average consumption of water during a life-cycle goes up to **4.4m³/overnight stay**.

f) Non-renewable resources consumption indicator

The non-renewable resources consumption indicator takes into account the environmental impoverishment in non-renewable mineral and fossil resources such as iron, zinc, natural gas, coal, oil, et. Therefore, as part of this analysis, several criteria were taken into account to assess the “equipment” operating post (heating, light, electrical devices, water): energy and water as well the manufacturing of electrical installations; and for “consumables” (food produce, complementary products, cleaning products, textiles): production and transport resources. For the entire panel we obtained an average value of **0.3g Sb/overnight stay** for the



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impoverishment of non-renewable resources. Cleaning products counting for 25% of this average causing by the use of chemicals are used when manufacturing these products.

g) Waste indicator

The average quantity of waste produced by the 10 hotels is **210g/overnight stay**, representing 80 tons of yearly waste attributed to wrappers and equipment, an average of 8 tons per year, per hotel. Please note that that food waste is not considered in this estimation.

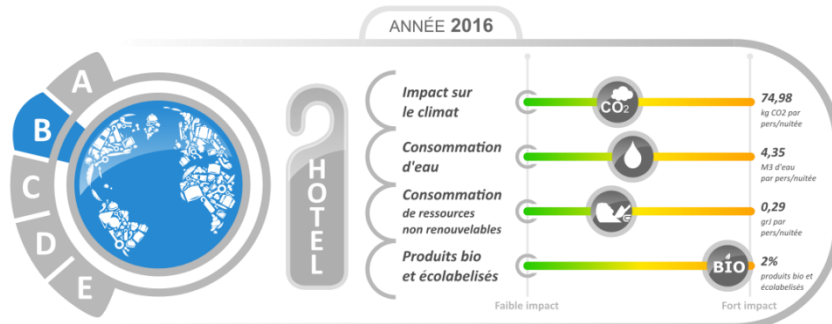
h) Environmentally-friendly/organic product indicator

The low use of environmentally-friendly and organic products in the different establishments means that only 2% of purchases are certified. The implementation of collaboration between hoteliers and environmentally-friendly/organic certified suppliers in Morocco would drastically improve this ratio.

3. Environmental label for the panel

The below environmental label shows the impacts of an overnight stay on the overall average of the panel following this inventory:

Impact environnemental
d'une nuit à Marrakech



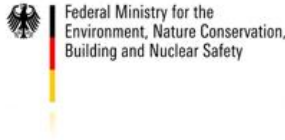
* Barrière Le Naoura - Hapimag Resort - Hôtel du Golf Palmeraie Resorts - Ibis Palmeraie Kasba du Toubkal - Les Jardins de la Koutoubia - Palais Aziza- Royal Mansour Sofitel Palais Impérial Marrakech - Tigmiza Marrakech

III. Proposal of improvement action-plan

Further this inventory which allowed a greater understanding of the origins of the environmental and economic impacts on the panel, each hotel has been provided with a personalized action plan, in order to perform their consumption and reach their environmental and economic objectives.



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1. Key Figures

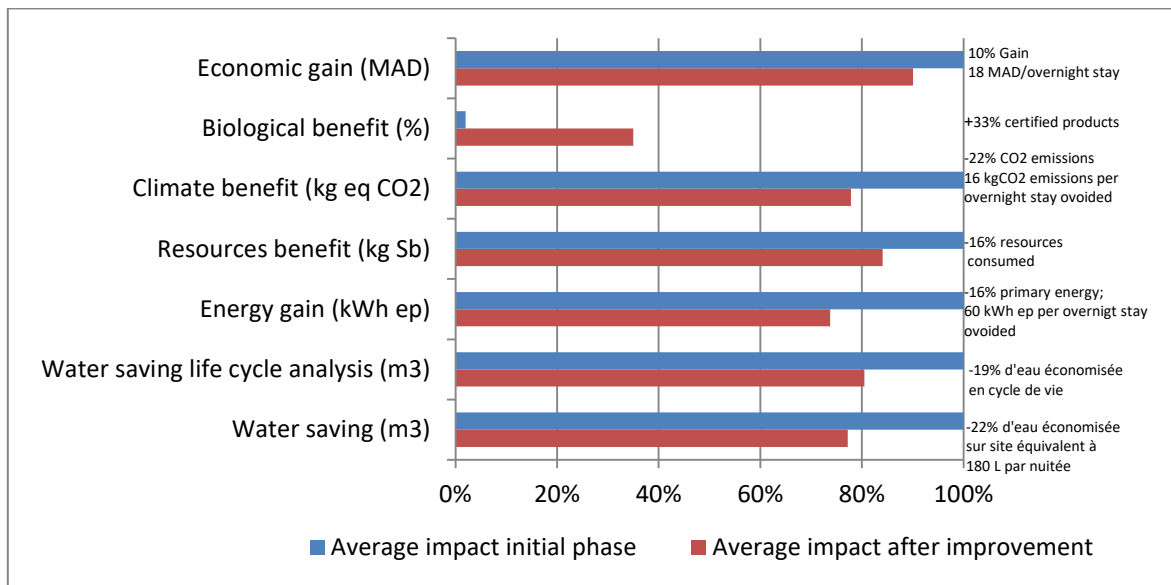
The initial promises for environmental and economic gains – after the implementation of the recommendations extracted from the action plans and based on the methodology and the Winggy® software – are as follows:

- 5 to 22 Dirhams saved per overnight stay;
- 20% reduction in water consumption onsite ;
- 22% reduction in energy consumption ;
- 17% reduction in CO₂ emissions ;
- 30% rise in environmentally-friendly and organic certified products.

The study demonstrated that the implementation of all the actions proposed to the panel would lead to the following results:

- An average of **18 Dirhams saved per overnight stay**, per year, representing 10% of operating costs
- **22% reduction in water consumption onsite** (19% reduction of water during the life-cycle)
- **26% reduction in energy consumption**
- **22% reduction in CO₂ emissions**
- **16% reduction in non-renewable resources consumption**
- **33% rise in use of environmentally-friendly and organics certified products**

Below is a visual illustration of economic and environmental gains related to the implementation of improvement action-plans for the panel:

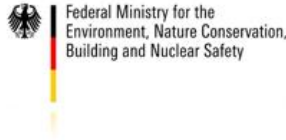


Source : Betterfly Tourism pour le Ministère du tourisme du Maroc, février 2017

On average, 21 Dirhams per overnight stay will be required to start with the implementation of the improvement action-plans; leading to a quick return on investment estimated to one year.



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2. Improvement action-plan

Below are listed the main actions for improvement for the panel, organised per operating posts.

a) Heating/Air-conditioning

Reviewing set point temperatures for air-conditioning should be implemented the following way: not below 22°C when rooms are occupied; 25°C when they are vacant; air-conditioning should be turned off as much as possible when business is low. These measures, which require training the staff on good practices, can lead to a decrease of 30% in the energy bill.

Installing humidity sensitive extractor fans (that reduce air renewal if the rooms are vacant) as well as circuit-breaker systems or remote control of heaters and air-conditioners can also contribute to 15 to 20% energy gains.

b) Water

Water consumption, quite high for this panel, can be optimised by the implementation of several actions:

- Use of **water from small treatment plants** to water outdoor green areas. The Tigmiza Marrakech Hotel uses this method and observed a 6000m³-decrease in its water consumption, equivalent to 77,000 Dirhams savings in one year;
- Use of cellulose products on the ground to optimise watering whilst spacing it. This group of products are fertilizers and water-retention products. Each grain will capture the water and store up to 300 times its initial weight while reducing evaporation. This innovation cuts water needs by half ;
- Use of **drain water heat recovery system** (non-drinkable water from showers for instance) in order to pre-heat the water;
- Installing **solar panels** for domestic hot water heating can cut by 80% the energy cost allocated to water heating;
- Use of **pool covers** to reduce evaporation;
- **Reduced pool filtration system speeds** during low seasons.

c) Textile

Although the study highlighted good practices in the audited establishments, reducing the weight of towels or using textiles longer would guarantee better energy and environmental efficiency. It would also be relevant to build partnerships with dry-cleaners that had difficulties reporting their water and energy consumption.

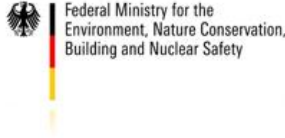
d) Consumables (food, welcoming products, cleaning products, textiles)

The first part of the study highlighted the low rate of environmentally-friendly and organic products. Increasing the use of these types of products would definitely lead to an improvement of environmental impacts whilst promoting a responsible allocation of financial resources. Other measures are recommended by the study in order to improve economic and environmental impacts such as:

- Use of large packaging instead of individual packaging (for shower gel for instance);
- Implementation of dilution dispensers for cleaning products;
- Use of natural products such as white vinegar or baking soda for some cleaning tasks would limit the purchase of chemical products.



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e) Lights

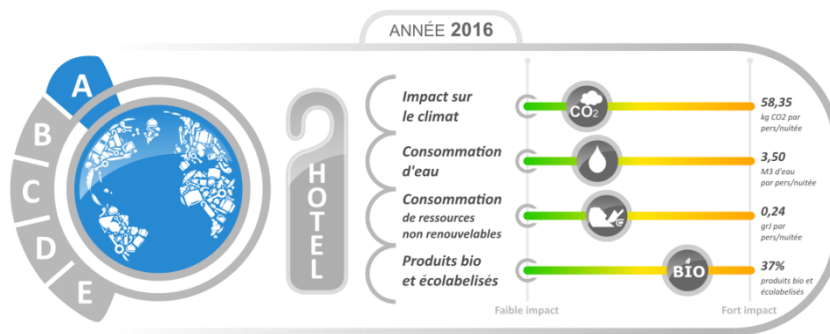
In general, good lighting practices were observed across the panel. Most of the hotels use **LED lights** in guest areas. However, some additional savings could be made by implementing the following actions:

- Removal of halogen lamps especially outside;
- Replacement of fluorescent lamps with LED tubes with brightness dimmers, and motion sensors especially in areas reserved for staff. It could lead to a 70% savings on energy consumption for some of the establishments.

3. Environmental Label for the sample group

The below environmental label shows the impacts of an overnight stay for the overall average of the pane; following the implementation of the above-mentioned improvement action-plans actions:

Impact environnemental d'une nuit à Marrakech



* Barrière Le Naoura - Hapimag Resort - Hôtel du Golf Palmeraie Resorts - Ibis Palmeraie Kasba du Toubkal - Les Jardins de la Koutoubia - Palais Aziza- Royal Mansour Sofitel Palais Impérial Marrakech - Tigmiza Marrakech

IV. Conclusions

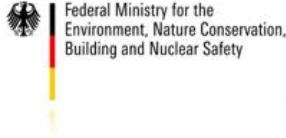
The study carried out by Betterfly Tourism highlighted the opportunities for tourist accommodations willing to “go green and save money”; with an average of **18 Dirhams** per overnight stay saved and a 22% cut in CO₂ emissions, among other indicators.

The study also reveals the innovation and precision of Winggy® software. The relevant improvement action-plans were positively welcomed by the managers of the 10 tourist accommodations that participated in this pilot project for the Marrakech destination. They also mentioned they would like to better understand the software, in order to monitor internally changes related to their consumption and to increase their economic and environmental impacts. Betterfly Tourism is available to provide training sessions on Winggy® to those interested.

Moreover, the study brought to light new partnership opportunities, towards the improvement of environmental and economic results of the tourism sector activities. Here are some of them:



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- Working with local suppliers for welcoming, food and cleaning products to benefit from local produce, sold in bulk, and certified;
- Working with industrial laundries in order to better understand their consumption and to reduce life-cycle consumptions; or to look into opportunities to work with a textile rental company that would be sustainable and resource-efficient.