

ROYAUME DU MAROC



Ministère des Habous
et des Affaires Islamiques

amee
Agence Marocaine
pour l'Efficacité Énergétique



MOSQUES AND ENERGY EFFICIENCY



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INTRODUCTION

God created the Earth and placed it at the disposal of humankind, which is called on to preserve it, nurture it and protect it from harm.

In Islam, the Earth and all the means of subsistence it provides are deemed to be blessings bestowed by God and gifts to be enjoyed. These blessings should elicit gratitude and encourage humankind to adopt an approach that is based on preservation and ongoing rehabilitation: pursuing a balance between human development needs and protecting the planet is an excellent way of getting closer to Allah.

In Surah Al A'raf, verse 56, God says:

«And do not do mischief on the earth, after it has been set in order»

This verse summarises Islam's position on the destruction of the environment, which is considered a sin. This verse also shows that it is not only necessary but wise to factor in religious and spiritual aspects when trying to raise awareness on protecting the environment and rationalising energy consumption. Given their importance as the primary place of worship and their symbolic value to the faithful who pray in them every day, mosques have an essential role to play in programmes designed to educate and engage the general public.

With this in mind, the Moroccan Ministry of Religious Affairs, the Ministry of Energy, Mines, Water and Environment, the Moroccan Agency for Energy Efficiency and the state Energy Investment Company have rolled out a programme to improve energy efficiency in mosques. The Energy Efficiency in Mosques programme aims to carry out energy upgrades in the Kingdom's mosques, with an initial target of 100 mosques equipped with energy-efficient technology by the end of 2016.

The programme also encompasses capacity building for senior staff of the Ministry of Habous and Islamic Affairs, and raising citizen awareness through imams and *mourchidates*¹.

1) *Mourchidates* are female preachers.

THE BASICS

What is energy?

Energy is the basis of all activity. It refers to the capacity to move and to produce light or heat. Moving from state A to state B requires an exchange of energy.

Energy is produced from fossil sources by the combustion of different types of fuels, the most well-known being oil, gas and coal. Renewable energy is obtained from natural sources such as the wind and the sun.



What is the difference between fossil fuels and renewable energy?

Fossil fuels, such as oil, natural gas and coal, are produced from fossilised rock. During combustion, they emit greenhouse gases, and their stocks are finite. At current consumption rates, reserves will be exhausted.

Our challenge is therefore to find alternative sources of renewable, clean energy that do not produce waste or pollution and that help to combat the greenhouse effect. Solar (photovoltaic and thermal), wind and biomass energy are examples of renewable energy sources.

Humankind is depleting fossil fuel reserves approximately one million times faster than nature is able to replenish them.



WHERE ARE WE TODAY

The current energy situation worldwide and in Morocco

» WORLDWIDE

In 2015, global energy production was 13,306 million tonnes of oil equivalent, compared with 9,242 in the year 2000. It therefore registered an increase of 30% in 15 years. Oil remains the preferred source of energy and currently accounts for almost 33% of energy consumption worldwide.

» IN MOROCCO

Morocco imports approximately 97% of the fossil fuels it needs to meet its consumption requirements; oil accounts for 86% of these fuels. Most of the country's electricity is produced by thermal power plants that run on imported coal or oil.

In the space of 10 years, the demand for electricity has doubled, rising from 16,779 GWh in 2003 to 34,413 GWh in 2015, a surge driven by major economic development and infrastructure projects.

What are the negative effects of inefficient use of energy?

Since the second industrial revolution, modern lifestyles have led to an increased use of fossil fuels, with a resulting rise in the atmospheric concentration of greenhouse gases. This has caused significant climate change and dramatic environmental degradation.



Furthermore, limited fossil fuel resources and the resulting price increases will trigger international tensions over energy resources in the future.

To combat climate change, we must consider the impact our activities have on the environment and re-examine our energy production and consumption. The use of renewable energy sources has become a compelling solution, along with improved energy efficiency.

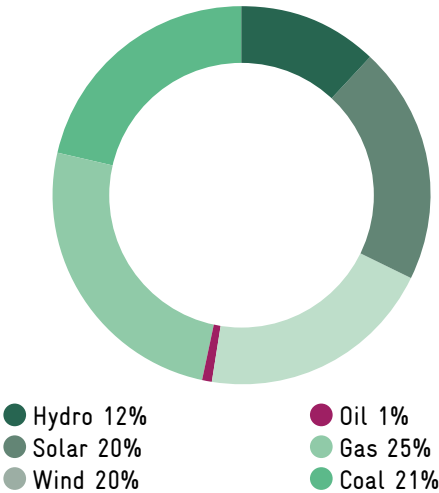


Deforestation caused by over-exploitation of timber

Building solutions: The transition towards sustainable energy in Morocco

Morocco has decided to implement a transition towards sustainable energy sources by launching a national renewable energy strategy. The goal is to achieve 52% installed renewable capacity by 2030.

Breakdown of installed capacity in 2030



This will be done by launching programmes aimed at increasing the country's capacity to produce electricity from renewable energy sources. The energy efficiency programme, aimed at the building sector, hospitals, industrial facilities, government and public buildings, aspires to democratise energy efficiency. This goal will be achieved through a series of regulations, financial incentives and energy audits, and by establishing energy performance standards and adopting support measures designed to raise awareness, promote quality and strengthen capacities throughout the country.

The strategy relies in particular on Morocco's considerable solar and wind energy capacity. In Morocco, the sun provides an average of over 5 kWh/m²/day and over 3,000 hours of sunlight per year, and wind energy offers an estimated exploitable potential of 25,000 MW.

In addition to the environmental aspect, Morocco's proactive plans also have a significant economic and social dimension. They promote job creation and local supply chains, the involvement of Moroccan businesses and vocational training.

Energy efficiency and the development of renewable energy sources are major priorities in Morocco's energy strategy. The strategy's aim is a 20% reduction in the country's energy consumption by 2030. To this end, energy efficiency action plans have been implemented in all key sectors, including transport, industry and construction.

Key concept: Energy efficiency

Energy efficiency consists of optimising energy use while maintaining the quality of the services provided to consumers.

By factoring the energy variable into our choice of homes and favouring better-designed appliances, we can increase our energy efficiency, protect the environment and save money.

Supporting the country's energy efficiency policies is a position that is now shared by all of Morocco's government officials.



LED light bulb

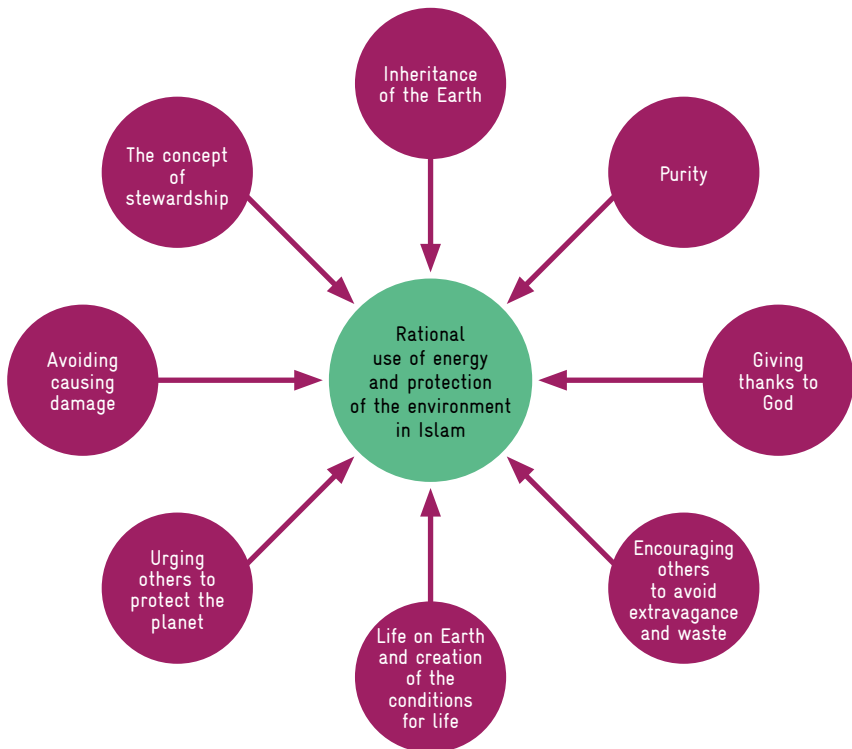
ENERGY EFFICIENCY: ITS PLACE IN ISLAM

Energy efficiency and environmental protection in Islam

» ISLAM IS A RELIGION BASED ON VALUES OF RESPECT, RESTRAINT AND MODERATION

These values are expressed both in the teachings of the Qur'an and in the tradition and the Hadiths of the Prophet (pbuh) through various principles that serve as a frame of reference for Muslim behaviour.

We have selected the following concepts as being particularly pertinent to Islam's position on protecting the environment.



» INHERITANCE OF THE EARTH

God created humans as his vicegerents on Earth and delegated to them the responsibility for protecting the Earth and everything it provides, requiring them to take care of it and not to plunder it. This notion is spelled out in several verses of the Qur'an, in particular the following three:

« And [mention, O Muhammad], when your Lord said to the angels, "Indeed, I will make upon the earth a successive authority." They said, "Will You place upon it one who causes corruption therein and sheds blood, while we declare Your praise and sanctify You?" Allah said, "Indeed, I know that which you do not know." »

AL BAQARAH, 29

« And remember when He made you successors after 'Ad (people) and gave you habitations in the land, you build for yourselves palaces in plains, and carve out homes in the mountains. So remember the graces (bestowed upon you) from Allah, and do not go about making mischief on the earth. »

AL ARAF, 73

« Then We made you follow after them, generations after generations in the land, that We might see how you would work. »

YUNUS, 14

» LIFE ON EARTH AND CREATION OF THE CONDITIONS FOR LIFE

God the Almighty placed extraordinary means of subsistence at humankind's disposal. The Qur'an and the Hadiths converge on the fact that it is our duty to preserve and nurture these blessings, so that the greatest possible number of people can benefit from them.

« And to Thamud (people, We sent) their brother Salih (Saleh). He said: "O my people! Worship Allah, you have no other Ilah (God) but Him. He brought you forth from the earth and settled you therein, then ask forgiveness of Him and turn to Him in repentance. Certainly, my Lord is Near (to all by His Knowledge), Responsive. »

HUD, 60

« He it is, Who has made the earth subservient to you (i.e. easy for you to walk, to live and to do agriculture on it, etc.), so walk in the path thereof and eat of His provision, and to Him will be the Resurrection. »

AL MULK, 16

« There is none amongst the Muslims who plants a tree or sows seeds, and then a bird, or a person or an animal eats from it, but is regarded as a charitable gift for him. »

Sahih Al Boukhari

« When a Muslim plants a tree or cultivates a crop, no bird or human being eats from it without its being accounted as a rewardly charity for him. »

Sahih Muslim

« If the Final Hour comes while you have a palm-cutting in your hands and it is possible to plant it before the Hour comes, you should plant it. »

Al Boukhari 'la Véritable Education' et 'Ahmed'

» URGING OTHERS TO PROTECT THE PLANET

As well as valuing the Earth and treating its blessings with care and respect, humans are called upon to spread these values and encourage those around them to do the same.

« And of mankind there is he whose speech may please you (O Muhammad), in this worldly life, and he calls Allah to witness as to that which is in his heart, yet he is the most quarrelsome of the opponents. And when he turns away (from you "O Muhammad"), his effort in the land is to make mischief therein and to destroy the crops and the cattle, and Allah likes not mischief. »

AL BAQARAH, 202-203

« And do not do mischief on the earth, after it has been set in order, and invoke Him with fear and hope; Surely, Allah's Mercy is (ever) near unto the good-doers. »

AL ARAF, 55

« But seek, with that (wealth) which Allah has bestowed on you, the home of the Hereafter, and forget not your portion of legal enjoyment in this world, and do good as Allah has been good to you, and seek not mischief in the land. Verily, Allah likes not the Mufsidun (those who commit great crimes and sins, oppressors, tyrants, mischief-makers, corrupts). »

AL QASAS, 77

« Evil (sins and disobedience of Allah, etc.) has appeared on land and sea because of what the hands of men have earned (by oppression and evil deeds, etc.), that Allah may make them taste a part of that which they have done, in order that they may return (by repenting to Allah, and begging His Pardon). »

ARRUM, 40

» AVOIDING CAUSING DAMAGE

One of the fundamental values of Islam is to refrain from hurting others, causing physical or mental harm to those around one and damaging the environment. The Prophet (pbuh) said:

« The Muslim is the one from whose tongue and hand the Muslims are safe. »

Reported by Al Boukhari and Mouslim

« Iman(faith) has sixty odd or seventy odd branches. The uppermost of all these is the Testimony of Faith: La ilaha illallah' (there is no true god except Allah) while the least of them is the removal of harmful object from the road. And shyness is a branch of Iman. »

Sahih Mouslim

» GIVING THANKS TO GOD

There is nothing more natural for a Muslim than to thank God for all his blessings. Thanking God, the ultimate symbol of gratitude, remains at the core of the Muslim faith. A Muslim is also required to acknowledge and be thankful for everything the Earth has to offer.

« And (remember) when your Lord proclaimed: If you give thanks (by accepting Faith and worshipping none but Allah), I will give you more (of My Blessings), but if you are thankless (i.e. disbelievers), verily! My Punishment is indeed severe. »

IBRAHIM, 9

« No servant is blessed by Allah and says, "Al-HamduLillah", except that what he was given is better than that which he has himself acquired. »

Sunan Ibn Maja

» ENCOURAGING OTHERS TO AVOID EXTRAVAGANCE AND WASTE

Islam calls for restraint, moderation and a responsible approach to consumption. It forbids excess and waste and promotes a modest way of life, based on simplicity – values that are consistent with the principle of responsible energy consumption.

« And it is He Who produces gardens trellised and untrellised, and date-palms, and crops of different shape and taste (its fruits and its seeds) and olives, and pomegranates, similar (in kind) and different (in taste). Eat of their fruit when they ripen, but pay the due thereof (its Zakat, according to Allah's Orders 1/10th or 1/20th) on the day of its harvest, and waste not by extravagance . Verily, He likes not Al-Musrifun (those who waste by extravagance). »

AL ANAM, 142

« And indeed, there came to them Our Messengers with clear proofs, evidences, and signs, even then after that many of them continued to exceed the limits (e.g. by doing oppression unjustly and exceeding beyond the limits set by Allah by committing the major sins) in the land! »

AL MAIDAH, 34

« O Children of Adam! Take your adornment (by wearing your clean clothes), while praying and going round (the Tawaf of) the Ka'bah, and eat and drink but waste not by extravagance, certainly He (Allah) likes not Al-Musrifun (those who waste by extravagance). »

AL ARAF, 29

« Verily, spendthrifts are brothers of the Shayatin (devils), and the Shaitan (Devil - Satan) is ever ungrateful to his Lord.»

AL ISRA, 27

« And let not your hand be tied (like a miser) to your neck, nor stretch it forth to its utmost reach (like a spendthrift), so that you become blameworthy and in severe poverty. »

AL ISRA, 29

« And those, who, when they spend, are neither extravagant nor niggardly, but hold a medium (way) between those (extremes). »

AL FURQAN, 67

« When Prophet (peace be upon him) made ablutions, he would use a quantity of water that could fill cupped hands (mudd), and when he took a full bath, he would use four times that much (sâ`). »

Muttafaq `alayh - (Agreed upon)

« The Messenger of Allah passed by Sa'd when he was performing ablution, and he said: 'What is this extravagance?' He said: 'Can there be any extravagance in ablution?' He said: 'Yes, even if you are on the bank of a flowing river. »

Ahmed and Ibn Majah

» PURITY

Purification of the body and soul is one of the key elements of Islamic religious practice. This search for clarity and purity, encouraged by God and valued by the Prophet (pbuh), is inherent to a Muslim's daily life, from their ablutions to attention paid to dress. Protecting the Earth from pollution is therefore at the core of this value.

« Truly, Allah loves those who turn unto Him in repentance and loves those who purify themselves. »

AL BAQARAH, 222

« O you who believe! When you intend to offer As-Salat (the prayer), wash your faces and your hands (forearms) up to the elbows, rub (by passing wet hands over) your heads, and (wash) your feet up to ankles . If you are in a state of Janaba (i.e. had a sexual discharge), purify yourself (bathe your whole body). »

AL MAIDAH, 6

« And your garments purify! »

AL MUDDATTIR 4

« Purification is half of the faith. The phrase al-hamdullilah ('All praises be to Allah ') fills the scale. The phrases sub-haanallaah ('High is Allah above every imperfection and need; He is pure and perfect') and al-hamdullilah ('All praise be to Allah') fill together – or each fill – what is between the heavens and earth. Prayer is a light. Charity is a proof. Patience is a brightness. The Qur'an is either an argument for you or against you. And everyone goes out in the morning and sells himself either freeing or destroying himself. »

Sahih Mouslim

« None of you should urinate in standing water that does not flow and then bathe in it. »

Reported by Al Boukhari and Mouslim

» THE CONCEPT OF STEWARDSHIP

Respect for others, which is strongly promoted by Islam, is reflected in an emphasis on protecting everything under our responsibility. The Earth does not belong to us but to all past and future generations. It is entrusted to us, and we must take care of it.

« And those who keep their trusts and covenants. »

AL MAARIJ, 32

« Truly, We did offer Al-Amanah (the trust or moral responsibility or honesty and all the duties which Allah has ordained) to the heavens and the earth, and the mountains, but they declined to bear it and were afraid of it (i.e. afraid of Allah's Torment). But man bore it. Verily, he was unjust (to himself) and ignorant (of its results). »

AL AHZAB, 72

« Every one of you is a shepherd and is responsible for his flock. The leader of people is a guardian and is responsible for his subjects. A man is the guardian of his family and he is responsible for them. A woman is the guardian of her husband's home and his children and she is responsible for them. The servant of a man is a guardian of the property of his master and he is responsible for it. No doubt, every one of you is a shepherd and is responsible for his flock. »

Reported by Al Boukhari

« Whoever has the following four (characteristics) will be a pure hypocrite and whoever has one of the following four characteristics will have one characteristic of hypocrisy unless and until he gives it up: Whenever he is entrusted, he betrays. Whenever he speaks, he tells a lie. Whenever he makes a covenant, he proves treacherous. Whenever he quarrels, he behaves in a very imprudent, evil and insulting manner. »

Reported by Al Boukhari and Mouslim

« The signs of the hypocrite are three: when he speaks he lies, when he promises he breaks his promise and when he is entrusted he betrays the trust. »

Sahih Al Boukhari

The Energy Efficiency in Mosques programm

In 2014, the Moroccan Ministry of Habous and Islamic affairs, the Moroccan Ministry of Energy, Mines, Water and Environment, the Moroccan Agency for Energy Efficiency and the state Energy Investment Company launched the Energy Efficiency in Mosques programme.

The programme aims to contribute to securing a sustainable energy future for Morocco, by carrying out energy upgrades in the country's mosques, which number more than 51,000. By the end of in 2016, the first group of 100 mosques were equipped with energy-efficient technology.

Rationalising energy consumption in mosques will result in savings of up to 40%, which will allow the investment earmarked for the project to be recovered and save money in the long term.

The programme focuses on installing new technology that considerably reduces energy consumption. It also aims to raise the general public's awareness of the importance of energy efficiency by training religious leaders (imams and *mourchidates*), who will play a pivotal role and act as a vehicle for citizen outreach.

In addition, this programme provides for capacity building in renewable energy and energy efficiency for senior staff of the Ministry of Habous and Islamic Affairs, which is undertaken by The Moroccan Agency for Energy Efficiency. It also monitors the quality of the equipment being installed by issuing energy labels to mosques that have completed the upgrades.

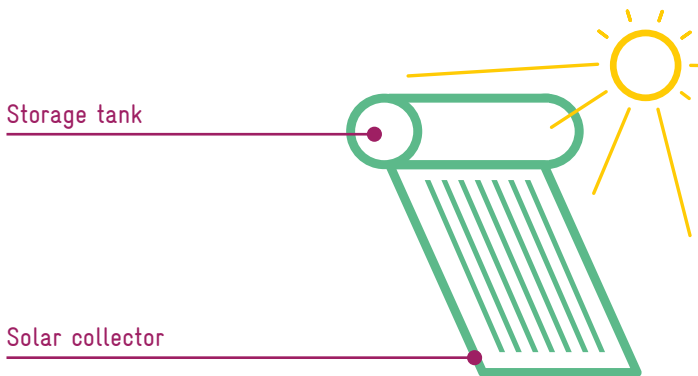


» ENERGY UPGRADES IN MOSQUES

Technology: The energy upgrades in mosques will involve installing the technology described below:

Solar water heaters harness the sun's energy to heat water. This type of heating reduces the effects of greenhouse gases by supplementing or completely replacing hot water systems that use polluting sources of energy (e.g. gas). A solar water heater is not only environmentally friendly but also cost-efficient. After several years of use, the purchase price is recouped and water can then be heated at no expense.

The heater includes a solar collector, which traps the heat from the sun's rays and transfers it to the water. The hot water is then stored in a thermally insulated tank so it can be used both during the day and at night.

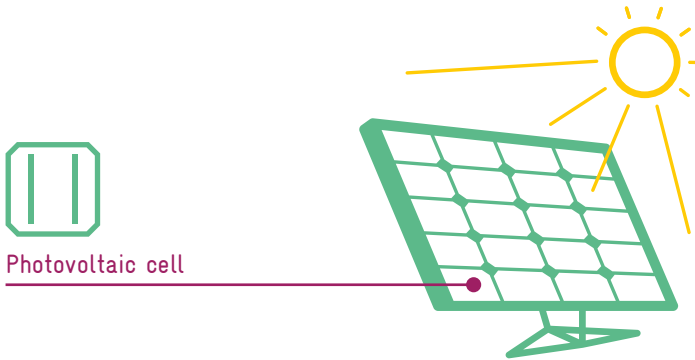


MAINTAINING YOUR SOLAR WATER HEATER:

- Have it serviced regularly to ensure it is working correctly and use a qualified professional for any repairs;
- Clean the solar collectors regularly as rainwater and dust can reduce the amount of energy absorbed;
- Ensure there is nothing nearby casting shade on the water heater.

A **photovoltaic panel** is a device made up of photovoltaic cells that converts the sun's rays into electricity. The photons in the sun's rays cause the electrons in the photovoltaic cell to flow and produce an electrical current. As well as being environmentally friendly, photovoltaic panels are cost-efficient as the cost of installation is recouped after several years thanks to the free electricity they produce. In Morocco, electricity produced by photovoltaic panels is currently only used for self-consumption. The publication of a decree on feeding electricity into the grid could soon make photovoltaic technology significantly more cost-efficient.

A photovoltaic installation is made up of several photovoltaic modules, which themselves are made up of a number of photovoltaic cells. They produce electricity instantly when exposed to the sun's rays. Photovoltaic electricity can be stored in batteries or used directly.



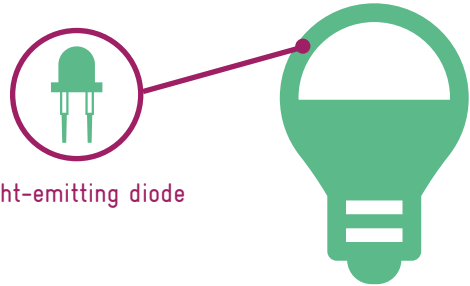
Photovoltaic cell

MAINTAINING YOUR PHOTOVOLTAIC PANEL:

- Clean it several times a year (or several times a month in dusty areas) using water and a soft sponge;
- Check the equipment and inspect the cables once a year;
- Carry out regular checks of the meter and inverter.

Avoid hard water, very cold water on a hot panel, high-pressure water, solvents and detergents.

LEDs (light-emitting diodes) are electronic components that emit light when an electrical current flows through them. Commonly referred to as low-energy light bulbs, LEDs are now the most energy-efficient form of lighting. LEDs have a longer life than other bulbs and do not heat up, damage ceilings or attract dust. They require very little maintenance.



Light-emitting diode



Pilot mosques

Three mosques of great historic and symbolic value have been chosen as pilots for this project: As-Sunna in Rabat and Koutoubia and Kasbah (Moulay El Yazid) in Marrakesh.

Assunnah

Built in 1765, the Assunnah Mosque was renovated and reopened in 1969 by His Late Majesty King Hassan II. It can accommodate 5,000 people. Before its energy upgrade, it used up to 99.63 kWh per day, resulting in an average monthly bill of MAD 5,500.

The energy upgrade work involved:

- Installing photovoltaic panels to produce its own electricity supply;
- Installing solar water heaters for hot water;
- Using LED light bulbs for efficient lighting.

Consumption at the Assunnah Mosque dropped to 62.95 kWh a day, which represents 41% saving on its original consumption, reducing its monthly bill to MAD 2,000.



Koutoubia

Built in 1120, the Koutoubia Mosque is a prominent example of the Almohad style and a symbol steeped in the history of Marrakesh.

It is estimated that the energy upgrades will save over MAD 152,950 a year and cut greenhouse gas emissions by over 69.3 tonnes a year. The work involved:

- Installing photovoltaic panels to produce its own electricity supply;
- Installing solar water heaters for hot water;
- Using LED light bulbs for efficient lighting.



Kasbah (Moulay El Yazid)

The Moulay El Yazid Mosque in Marrakesh is the work of Yaqub al-Mansur. It was the mosque of the Almohad Caliphate's Palace.

The energy upgrade work involved:

- Installing photovoltaic panels to produce its own electricity supply;
- Installing solar water heaters for hot water;
- Using LED light bulbs for efficient lighting.

It is estimated that the energy savings will amount to over 77 300 MAD a year and reduce greenhouse gas emissions by over 35 tonnes a year.



» RAISING AWARENESS

Disseminating information

Rationalising energy consumption, which is supported by Islam, encouraged by economists and strongly advocated by environmental experts, requires strong citizen engagement and public awareness of the issues involved.

The imams and *mourchidates* were therefore introduced to the subject through workshops that trained them to prepare and hold presentations and increase awareness of energy efficiency among the faithful.

In these presentations, they highlight Islam's position, which supports rational consumption, as can be seen in the religious texts mentioned above, and, based on the material provided to them, give energy-saving tips on a series of simple, small and conscious changes to one's daily life, which can have a considerable overall impact.



The imam, who is central to and at the heart of Muslim religious practice, is one of the most influential conduits for raising awareness. In faith-based communities, the Imam is the reference point and advisor on religious and secular affairs. He serves as an ethical and religious model. This is alluded to in the Qur'an, Surah Al-Furqan, verse 74:

« And those who say: "Our Lord! Bestow on us from our wives and our offspring who will be the comfort of our eyes, and make us leaders for the Muttaqun ».

I make a contribution every day in the office, in the mosque, on the road and at home:



▶ I take public transport or do carsharing with colleagues when I go to the mosque or to work. By doing this, I help to reduce greenhouse gas emissions and the impact of congestion in towns and cities.



▶ I choose appliances that are of the right size for my needs and according to their energy label. I favour appliances with a class A++ energy rating or higher.



▶ I position my fridge away from any source of heat and defrost and clean it regularly. I avoid opening it too often and only put food in it that has completely cooled down.



▶ I clean my heating and air conditioning filters regularly (a system that is clogged-up can use up to 20% more energy).



▶ I limit the temperature settings to 18°C for heating and 25°C for air conditioning.



▶ I make sure my oven is airtight, and clean the seals to prevent excessive energy consumption. I fill the dishwasher and washing machine before using them. I use the 'Eco' programme and wash at lower temperatures.



▶ In the winter, I draw the curtains and close the blinds at nightfall to minimise heat loss.



▶ I use a power strip to turn off electrical equipment that is not being used.



▶ I use the on/off button to turn off the television as it continues to use electricity when turned off using the remote.



▶ In the kitchen, I cover pots on the stove and turn off the rings several minutes before I have finished cooking as they remain hot for some time afterwards.



▶ I only switch on lights after nightfall and make the most of natural daylight.



▶ I replace traditional light bulbs with energy-saving bulbs, such as LEDs.



▶ I turn off the lights in rooms that are not being used.



▶ I turn off the air conditioning 15 minutes before I leave a room.



▶ I save up to 25% on my annual electricity bill by making improvements to my home:

- Orientation in relation to the sun;
- Natural ventilation;
- Shade and protection from the sun (awnings);
- Thermal insulation in partitions, ceilings and walls depending on the country's climate zones;
- Installing energy-efficient glazing (double glazing, triple glazing);
- Installing seals to ensure windows are airtight;
- Dealing with thermal bridges;
- Insulating hot water pipes.

I use eco-driving techniques to cut my fuel expenses by 15%: I avoid sudden braking by anticipating speed changes when approaching red lights or stopping for any other reason, and I turn the engine off if stationary for more than 30 seconds.

Based on an average mileage of 15,000 km/year, the savings are up to MAD 3,000 for petrol and MAD 2,000 for diesel, which could for example cover the cost of insurance. In addition to lowering my expenses, I cut emissions of CO₂ and other noxious gases and reduce the risk of accidents by 15%.

» TESTIMONIALS

As well as helping to protect the environment and reducing the mosques' bills, this programme is of particular interest as it creates a virtuous circle and momentum for change at local level.

This is important for professionals operating in this sector (installers), but also for the citizens and religious actors who benefit from it. We have gathered the following testimonials, which reinforce the vision of this ambitious programme.



Mourad Hajjaji
Deputy Director
of Strategy and
Development, AMEE

« As part of its mission to promote energy efficiency, AMEE is working with stakeholders in all sectors, providing training and raising awareness. This programme, which is being carried out with MHAJ, is particularly special as the participants have swiftly and enthusiastically taken on board the challenges of saving energy and protecting the environment. This is without doubt due to the imams' and mourchidates' awareness of this issue, given that our religion encourages us to respect the environment and conserve resources. »



Meriem Hatim
Technician
at The Ministry of
Habous and Islamic
Affairs

« The Energy Efficiency in Mosques programme is part of a national strategy that aims to reduce energy consumption. The training and awareness-raising workshop I attended allowed me to find out about technologies that reduce energy consumption, such as low-energy light bulbs, solar power and renewable energy in general. Above all, the programme has convinced me of the role religious leaders can play in raising awareness of the importance of renewable energy and energy efficiency. »



Jawad El Youmni
Collaborator on the
Energy Efficiency
in Mosques
programme

« *It is often said that the first step is the most important one. In my experience, that is an understatement.*

Spurred on by the considerable drop in LED prices, I began by replacing the 27 incandescent light bulbs I had at home and immediately saw a 30% reduction in my electricity bill. I was so impressed that I managed to convince my building's management company to replace the light bulbs in common parts with LED ones.

We also installed motion sensors and saw electricity bills fall from an average of MAD 1,000 to MAD 500 a month – a 50% saving just by upgrading the lighting. I am very happy to be able to make a contribution to protecting the environment at no additional cost to my family and neighbours. »



Abdelkrim Chtioui
Imam Morchid

« *Religious discourse has a considerable impact on people. Islam has a holistic and clear approach to the environment and energy efficiency. »*



Younes El Fouih
Manager of Trusted
Energy, the
company in charge
of installations at
Kasbah (Moulay
El Yazid) and
Koutoubia Mosques

« *It is an honour for us to be part of a project in which mosques implement energy-efficient solutions, reduce their energy consumption, raise awareness and set an example for citizens to follow.*

For example, during our work at Kasbah (Moulay El Yazid) Mosque, we were able to combine two fundamental aspects of energy efficiency: reducing energy consumption and improving user comfort. We upgraded the lighting and installed photovoltaic panels and solar water heaters to provide the congregation with hot water for their ablutions. The mosques play a symbolic role in setting an example to Moroccan and Muslim society. I hope these measures will be extended to other types of buildings. »

TEST YOUR KNOWLEDGE: GENERAL QUIZ

I. Definition of energy and its sources

» Please answer YES or NO

		OUI	NON
1	Energy is the capacity to produce heat, light or movement		
2	Fossil fuels are extracted from the ground or water		
3	Energy sources are constantly being renewed, regardless of how much energy we consume		
4	Energy can take several forms, such as electrical and chemical		

» Please select the correct answer

	Renewable energy	Non-renewable energy
1. Coal-fired power		
2. Wind power		
3. Geothermal (heat from the ground) power		
4. Hydropower (dams)		
5. Oil-fired power		
6. Nuclear power		
7. Solar power		

II. The consequences of excessive energy consumption

» Please answer YES or NO

		OUI	NON
1	Renewable energy is the main source of energy in the world today		
2	Approximately 50% of the energy Morocco requires comes from abroad		
3	Excessive energy consumption pollutes the environment, including the air, water, ground and forests		

III. Definition of energy saving

» Please answer YES or NO

		OUI	NON
1	Energy efficiency consists in reducing energy consumption		
2	Energy saving is about minimising the wasteful use of energy resources without compromising user comfort and needs		
3	Energy efficiency is about adopting practices that limit the freedom to use energy sources		
4	Energy efficiency requires responsible practices		

IV. Energy efficiency at home

» Please answer YES or NO

		OUI	NON
1	An incandescent light bulb loses approximately 50% of its energy as heat. This energy cannot be turned into light		
2	Low-energy LED light bulbs are the most efficient form of lighting		
3	You can improve your fridge's energy consumption by adopting some good practices		
4	Defrosting your fridge periodically improves its energy consumption		
5	Adjusting the thermostat on electrical heating extends the life of the equipment		
6	Turning off the air conditioning approximately 15 minutes before leaving a room saves energy without sacrificing comfort		
7	The amount of energy washing machines use depends on how full they are. For example, if the machine is half full, it uses half the energy		
8	You can save energy by dispensing with the automatic drying cycle on your dishwasher		
9	Energy-efficient electrical appliances can be identified by a label that shows its level of energy consumption		

V. Solar power

» Please answer YES or NO

		OUI	NON
1	Solar power can be photovoltaic or thermal		
2	Photovoltaic solar power is primarily used to produce hot water		
3	Photovoltaic solar power can be used to produce electricity in remote rural areas or to pump water		

ANSWERS

I. Definition of energy and its sources

1	2	3	4
YES	NO	NO	YES

1	2	3	4	5	6	7
Non-renewable energy	Renewable energy	Renewable energy	Renewable energy	Non-renewable energy	Non-renewable energy	Renewable energy

II. The consequences of excessive energy consumption

1	2	3
NO	NO	YES

III. Definition of energy saving

1	2	3	4
YES	YES	NO	YES

IV. Energy efficiency at home

1	2	3	4	5	6	7	8	9
YES	YES	YES	YES	NO	YES	NO	YES	YES

V. Solar power

1	2	3
YES	NO	YES

GLOSSARY

Biomass: The total mass or amount of organic material produced by living organisms in a particular area at a given time.

Capacity building: Process of strengthening or developing human resources, institutions, organisations or networks.

Chemical energy: Energy produced when bonds between atoms forming molecules are broken down by a chemical reaction.

Class A++: An energy efficiency rating for appliances on a scale ranging from class G to class A+++ (A+++ being the most efficient).

Climate change: Change of climate which is attributed to human activity that alters the composition of the global atmosphere.

Climate zone: A zone characterised by a specific type of climate, the main features of which are shared by the whole area.

Double glazing: A glass panel made up of two pieces of glass with an air gap between them used for thermal and sound insulation.

Eco-driving: Driving a vehicle in a fuel-efficient and environmentally friendly way.

Electrical power: Energy transferred or stored by electricity.

Energy audit: A check on energy consumption in a building, factory, etc. carried out by a professional.

Energy efficiency: Reducing energy expenditure while maintaining the same quality of service for the consumer.

Energy Efficiency Building Code programme: Designed by the Moroccan Agency for Energy Efficiency (formerly the Moroccan Agency for Renewable Energy and Energy Efficiency – ADEREE) in collaboration with GEF/UNDP, this programme aims to incorporate energy considerations for buildings into key areas of Morocco's development policy: housing, health, the hospitality industry and state education.

Energy-hungry: requiring large amounts of energy to function.

Energy label: Provides information on the energy efficiency of equipment and appliances.

Energy performance standard: A set of measures that lay down energy performance requirements for buildings, equipment, etc.

Energy transition: A move from our current mode of production and consumption to a new, more sustainable and economical energy model.

Environmental protection: The environment encompasses all land and marine biodiversity, in other words, all animal and plant species, as well as the ecosystems they live in. Protecting the environment involves implementing everyday measures to reduce waste, minimise pollution and conserve resources to preserve these species and sustain life on Earth.

Fossil fuels: Buried combustible geological deposits of organic materials that have been converted into crude oil, coal, natural gas or heavy oils by exposure to heat and pressure.

Geothermal energy: Heat generated within the Earth.

Gigawatt-hour (GWh): A unit for measuring energy (usually electrical).

Greenhouse gases: Gases present in the atmosphere that retain heat and prevent the Earth from cooling down.

Hydropower: Use of the power of water courses, waterfalls and tides to produce electricity.

Incandescent light bulbs: An electric light bulb in which the electrical current passes through a filament and heats it until it becomes incandescent and produces light.

Industrial revolution: The 19th-century historical process of change from a predominantly agricultural, handicraft society to a commercial and industrial one.

Inverter: A component that transforms the direct current output of photovoltaic modules into an alternating current.

kWh (kilowatt-hour): A unit for measuring energy (usually electrical) used to calculate electricity consumption and facilitate accurate billing.

kWh/m²/day: A unit of measure used to quantify solar power per square metre per day.

Motor fuel: A fuel used to power heat engines.

Nuclear power: Electricity produced through the fission of uranium atoms.

Photovoltaic solar energy: Transformation of the sun's rays into electrical energy using photovoltaic cells.

Solar collector: A device designed to capture solar energy transmitted by radiation and transfer the heat to a heat transfer fluid.

Solar power: Energy produced by converting solar radiation into electricity or heat.

Solar thermal energy: Transformation of solar energy into thermal energy to produce hot water, heat a building or for other purposes.

Thermal bridge: A specific or linear zone in the building envelope that shows lower thermal resistance (for example, where two walls join).

Thermal insulation: Material installed in the structure of buildings (walls, roofs and floors) and around windows and doors to prevent heat loss.

Thermal power plant: A power plant that produces electricity from a heat source.

Tonne of oil equivalent: A unit of energy measurement equal to the calorific value of one tonne of crude oil.

Wind power: Energy generated from wind.

<http://www.greenfacts.org/glossary/index.htm>

<http://www.consonéo.com/lexique/#b> (in French only)

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