

Energy

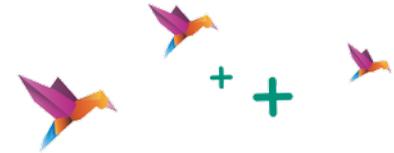
Transition

White Paper of the

Principality of Monaco



Gouvernement Princier
PRINCIPAUTÉ DE MONACO



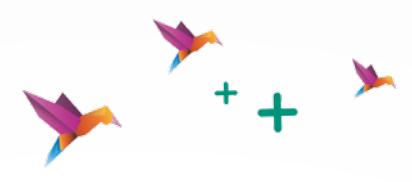
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Palais de Monaco

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For more than twenty years, the Principality has been actively engaged in the fight against climate change through the ratification of the United Nations Framework Convention on Climate Change, the Kyoto Protocol and more recently the Paris Agreement.

Our country's commitment to the collective effort against climate change is marked by a reduction in its greenhouse gas emissions of 50% by 2030 compared to 1990 levels and by the country's carbon neutrality by 2050.

In order to give us the means to achieve this ambition, I decided in 2016 to create the Mission for Energy Transition, whose role is to promote renewable energy and energy efficiency. I also wanted a National Green Fund to help finance identified actions to reduce our greenhouse gas emissions.

Monaco's energy transition will be conducted with determination and wisdom without hindering our development but instead by creating new opportunities. This means we need to think differently about our consumption methods and it cannot succeed without the mobilisation of the whole Monegasque community.

It is with this aim in mind that I wanted my Government to meet the Principality's key players to draft this White Paper on Energy Transition. I am convinced that this work, thanks to the participation and commitment of all, will give a new impetus to make Monaco an exemplary state in global climate action.

A handwritten signature in black ink, which reads "Albert de Monaco". The signature is written in a cursive style with a long horizontal stroke at the end.



Why this White Paper?

H.S.H. Prince Albert II has been a long-standing campaigner for environmental conservation and efforts to tackle climate change.



Both in Monaco and around the world, He is fully committed to pressing for the adoption of **ambitious targets** and the implementation of **practical initiatives**. The Principality has signalled its commitment to this cause on the global stage by ratifying the **United Nations Framework Convention on Climate Change** in 1994, the **Kyoto Protocol** in 2006, and the **Paris Agreement** in 2016.

His Serene Highness founded the **Prince Albert II of Monaco Foundation** immediately after succeeding to the throne, to support public and private projects in three areas – limiting greenhouse gas emissions and developing renewable energies, protecting biodiversity, managing water resources and combating desertification. In 2008, the Government introduced an energy and climate policy and launched a new **Energy and Climate Plan** under the leadership of the Department of the Environment. Determined to lead by example, the Government embarked on the **European Energy Award (EEA)** certification process in an effort to expand the reach of its Energy and Climate Plan across all departments, drive continuous improvement via a cross-cutting steering process, and showcase its policy on the European and global stage. Monaco received EEA certification in 2014 and will be applying again in 2018. In the wake of these actions, signing the Paris Agreement in 2016 represents a turning point with new, ambitious targets:

- **Cut greenhouse gas emissions by 50% by 2030**
- **Become carbon-neutral by 2050**

This new pledge will require a **change of pace** in light of recent greenhouse gas emission trends in Monaco.

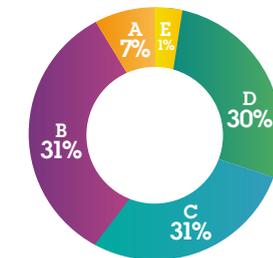
The Principality will need to cut emissions **four times faster** than the current rate if it is to achieve its goals. But the Government cannot meet these ambitious targets on its own. It will need the **backing of the entire Monegasque community** – public and private sectors combined – to bring about genuine behaviour change and develop projects that use less energy, produce fewer greenhouse gas emissions, and are more climate change-resilient.

For Monaco, the **energy transition** is about adopting new habits and evolving as a society.

People across the Principality have to consider energy and climate issues in everything they do – from routine activities to major projects. The Mission for the Energy Transition was founded in 2016 to spearhead this programme and to develop and finance the associated infrastructure.

The **Energy Transition White Paper** is the first in a series of measures to get the Monegasque community to engage with this issue – identifying local stakeholders' perceptions, initiatives and expectations, bringing them on board, and setting out a shared roadmap for the Principality for 2050.

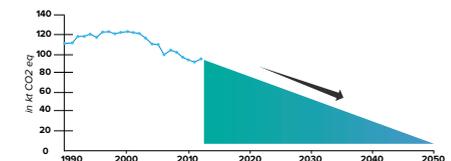
Greenhouse gas sources in Monaco



- A Industry
- B Transport
- C Buildings' combustion of heating oil and natural gas
- D Energy recovery from household waste
- E Other sources

Monaco's three main greenhouse gas sources are fossil fuel consumption for heating, energy recovery from household waste and fuel consumption for transport.

Greenhouse gas emission trends in Monaco



At the COP 21 conference, the Principality pledged to halve its greenhouse gas emissions by 2030 when compared with 1990 levels, i.e. four times faster than at the current rate. The scale of the challenge is such that the entire Monegasque community now needs to engage with this issue.

The White Paper approach

The Energy Transition White Paper embodies Monaco's energy transition methodology and objectives.

It reflects H.S.H. Prince Albert II and His Government's desire to get the entire Monegasque society behind the major energy transition project, through **in-depth dialogue with the Principality's main stakeholders**. The Government has taken stock of the conclusions and has supplemented, clarified and expanded a number of pre-existing measures with a view to accelerating and reinforcing its energy policy.

This Energy Transition White Paper is based on the interviews carried out by the Mission for the Energy Transition, drawing on the conclusions to reaffirm and flesh out Government measures.

59 organisations met during interviews between August and December 2016.

90 people interviewed.

5 industry-specific group workshops held in January 2017 to produce a shared diagnosis, identify drivers, and determine priority actions.

The interviews were carried out using a standard template, with a view to:

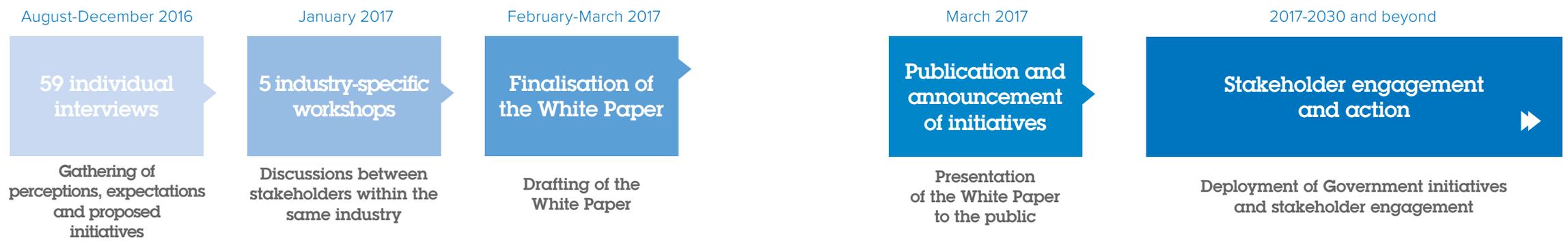


- identifying Monaco's **key energy transition challenges** ;
- pinpointing examples of **best practice** in Monaco's public and private sectors ;
- identifying **energy transition drivers** and drawing up a list of **proposed initiatives** for the short, medium and long terms ;

- launching a vast **information and awareness campaign** ;
- establishing an **appropriate framework for dialogue between the Government and stakeholders**, in the interest of monitoring and continuous improvement ;
- assessing **perceptions and the level of awareness of the Government's energy and climate policy**.

The Government would like to thank all the organisations and participants who attended interviews and group meetings for giving their time. The discussions were extremely useful and the initiatives identified will help step up the pace of Monaco's energy transition.

Timetable



Chapter #1 Perceptions of the energy transition and the Principality's existing initiatives



Most of the participants are well aware of the global climate change context and are able to identify the United Nations Framework Convention and the Kyoto Protocol. They are also aware of – and speak in positive terms about – Monaco's role in international negotiations.

Monegasque stakeholders welcome H.S.H. Prince Albert II's long-standing personal commitment to environmental conservation, agreeing that this is the most important driver of community-wide engagement towards meeting Monaco's targets.

Nobody in Monaco doubts that climate change is happening. Everyone recognises that this is a key challenge facing both the Principality and the world at large. There is strong support for H.S.H. Prince Albert II's targets, as well as a widespread desire to help achieve them.

Although there is common ground on the challenges and targets, the participants are

“ There is strong support for H.S.H. Prince Albert II's targets ”

unsure about their individual and collective implications. They ask for more detail on the practical measures to achieve them, wonder what resources would need to be mobilised, and question what life would be like in a carbon-neutral Monaco.

The participants have markedly different levels of understanding of energy transition concepts and measures, i.e. rational energy use, energy efficiency and the development of renewables. Only those working in the sector or with dedicated energy policies or staff are able to describe these concepts accurately.

In many cases, people have a better understanding of energy management than renewables because of a shortage of communication about existing projects.

The most commonly mentioned energy transition initiatives are as follows:

Seawater heat pumps

Seawater heat pumps are thermodynamic systems that recover heat from deep below the surface of the sea to meet heating and cooling needs, significantly cutting fossil fuel use in the process. The Principality is a pioneer in this field, having installed its first

seawater heat pump in the 1960s. It now has more than 70 units, along with a public heating network.

The electric bicycle scheme

The service continues to expand in Monaco, with 15 stations, around 100 electric bicycles and more than 500 users. This is the most

visible and one of the most commonly mentioned initiatives.

Hybrid and electric vehicle purchase support schemes

The Prince's Government offers financial assistance to help individuals and businesses buy new, environmentally friendly vehicles registered in Monaco.

Environmental events

Each year, Monaco hosts a number of environmental events, including the EVER Conference, Formula E, the Monte Carlo E-Rally, and Monacology.

Chapter #2 Participants' perceptions of challenges specific to Monaco

General challenges, barriers and weaknesses

The participants identified some of the general challenges that could hamper Monaco's efforts to push through its energy transition. The main issues are listed below:

Individual and collective behaviour

Everything we do – at work and in our day-to-day lives – has an effect on the amount of energy we consume and the volume of greenhouse gases we emit. The participants stress the need to raise awareness among Monaco's residents, commuters and visitors in an effort to promote more environmentally friendly behaviour.

They note that the lack of regular, local public transport makes it hard to encourage people to leave their car at home, and that the Principality's buildings and shops do not have enough waste sorting bins.

Moreover, Monaco's appeal to residents, visitors and tourists is founded on its reputation for comfort. The participants note that people might be put off by burdensome environmental regulations, especially restrictions on heating and air-conditioning temperatures in apartments or hotel rooms.

People also tend to use their car even for short trips in the Principality.

Lack of regulation

The participants take the view that Monaco's environmental regulations fall short of requirements, are unclear and, in some cases, are outdated. They suggest that the Principality's new targets should be enshrined in law (which is not currently the case).

They say the existing regulations are hard to understand and that they often have to refer to different pieces of legislation – a time-consuming task, even for people who are



“ Adopt more environmentally friendly behaviour ”

committed to the cause but non-specialised. The Environmental Code will help formalise the Principality's environmental ambition and bring all relevant provisions together in one place. However, the interviewees who mention this new body of legislation call for an acceleration of the process and a prompt adoption.

Limited publicity around the Government's energy and climate policy

The Government has pursued an energy and climate policy for many years. It published its first Energy and Climate Plan in 2008. It obtained the European Energy Award certification in 2014, when it revised the plan to include a more ambitious set of targets and actions.

However, the participants note that the Government does not do enough to publicise its Energy and Climate Plan and most people in the Principality are unaware of its existence.

They also say that the financial support programmes for energy efficiency and renewables schemes are largely unknown or too complex to obtain.



“ The energy transition is a driver of change ”

Shortage of information

Access to information and knowledge is one of the main challenges raised during the White Paper approach. The participants say they get most of their information and knowledge from mass media, TV and press titles, and that this information mostly concerns general themes and issues, with few contextual details specific to Monaco (with the exception of Monaco Info, its La Ligne Verte programme, and Government press releases). Many interviewees mention that there is no dedicated resource and information centre for environmental, energy and climate matters, and that people find it hard to get information on these topics – especially Government initiatives and current environmental conditions in the Principality. The results of the Energy and Climate Plan are not widely publicised, and anyone looking for guidance and advice on implementing environmental initiatives finds it hard to obtain information and feedback. The participants see this as a

major barrier to taking action on the energy transition and spreading best practice in Monaco.

Dialogue deficit

The energy and climate policy has not been developed on the basis of a dialogue between the Government and local stakeholders. They also note a similar lack of dialogue within industries and explain that, other than in a few exceptional cases, individual organisations pursue their own initiatives without thinking to share best practice or consider other potentially interested parties. The overriding view is that dialogue is an important driver of energy transition information and knowledge-sharing, but that the existing dialogue framework is too narrow and limited to institutional meetings and informal discussions.

Lack of a forward-looking vision

The participants do not grasp the meaning of a carbon-neutral Monaco in 2050, as they were not brought to think about this subject until now. They say that the Government needs to do more to support reflection on this topic, so that the energy transition drives change towards a shared vision of the future.

Financial capacity

The ambitious nature of the targets and the need to act quickly inevitably raise questions about what the energy transition will cost and how it will be funded. The participants identify a broad range of individual and organisation-wide initiatives, but find it hard to determine what investment would be needed. Opinions are split on Government support. Some participants want the Government to establish technical and financial support systems. Others, meanwhile, say that any investment would quickly pay for itself through substantial energy consumption and efficiency gains, arguing that most

stakeholders in Monaco have the financial capacity to meet the targets. Most participants are unaware of – and do not apply – the total cost of ownership (TCO) concept, whereby upfront investment in building design pays for itself through energy savings down the line. They also cite a lack of interest in this subject, stating that energy is not generally seen as a major cost centre. Moreover, they say that there is little incentive to improve energy performance because of lax regulation.

Space management

Monaco’s high population density makes it difficult to implement major energy transition projects such as renovating large buildings, developing renewables (solar, geothermal, heating and cooling networks), redeveloping roads to accommodate active mobility and dedicated-lane public transport systems, and managing waste.

Monaco's appeal

The Principality has substantial drawing power and its businesses and organisations are major employers. In 2015, it had a population of 38,400 residents and 52,000 people in paid employment, with 76% of private-sector employees living in France and 14% in Monaco.

The Principality is a popular tourist destination and it also hosts and organises many cultural, sports and professional events. These traits come at an environmental and energy cost in terms of transport, energy demand and waste production. The Principality also faces air quality and marine environment conservation challenges.

However, the participants do not necessarily see a trade-off between economic and population growth and energy transition challenges.



The need for closer cross-border cooperation

The participants are quick to mention that Monaco’s territory borders and lack of space poses major, but not insurmountable, challenges for energy transition initiatives. The Principality stands within a much larger region that shares similar mobility and housing problems. The participants agree on the need for stronger local cooperation on these themes of common interest. As well as suggesting cooperation with the surrounding communes, they see opportunities in teaming up with neighbouring French authorities (region, department, Nice metropolitan area), but say they are unsure how this would work in practice, at least on energy transition themes.

Thematic issues



The participants were asked to identify the most important challenges for Monaco's energy transition from a predefined list. The results are shown in the figure below.

The top three themes are mobility, buildings and waste

Without prompting, the participants say that individual and collective behaviour change is a “cross-cutting” priority across all themes. Some participants – especially those working in the energy sector or for organisations that consume large volumes of energy – also mention energy supply, due to the underlying issue of securing electricity supply in the eastern Provence-Alpes-Côte d’Azur region.

Air quality is not mentioned as a top priority, chiefly because many of the participants feel that this issue is intertwined with mobility, which comes out high on the list. In all likelihood, this can be attributed to a limited understanding of the subject and a lack of awareness of Monaco's air quality network.

Coastline and biodiversity conservation are mentioned less frequently, since these issues are not generally associated with the energy transition.

Most commonly mentioned issues (by more than 70% of participants)

- ▶ Mobility
- ▶ Buildings
- ▶ Individual and collective behaviour change
- ▶ Waste

Regularly mentioned issues (by 30-50% of participants)

- ▶ Monaco's energy supply
- ▶ Health
- ▶ Air quality

Less frequently mentioned issues (less than 10% of participants)

- ▶ Marine environment protection
- ▶ Biodiversity conservation



Mobility

Mobility is the most commonly mentioned theme in terms of impact, pollution and behaviour.

Because Monaco has more **commuters** than permanent residents, **access** and **internal traffic** are both cited as areas of major concern, with access coming out way ahead of other issues at the top of the list. Large numbers of commuters travel to work in Monaco by car, and this causes the roads leading to the Principality to become quickly saturated. The low vehicle occupancy rate makes matters worse.

“Traffic conditions in Monaco come out at the top of the list”

but also say it is a problem because it attracts too many cars into the Principality. Traffic conditions in Monaco also comes out at the top of the list. The participants say that congestion mainly occurs during peak commuting hours, but that **frequent road works** and regular events in the Principality tend to aggravate the situation. Drivers using cars to travel **extremely short distances** is also raised as a recurring problem, despite Government efforts to promote alternative forms of mobility such as walking (network of mechanised pedestrian links), electric bicycles and public transport.

Many of the participants cite **SNCF rail service standards** as a cross-border issue, saying that this makes the Principality harder to access. Some commuters have stopped travelling by train altogether because of poor service reliability (delays, incidents and strikes) and quality (packed carriages, ageing rolling stock and service frequency). The Principality has ample **parking** and the interviewees say the facilities are of a high standard, although it is sometimes hard to find a space. They believe that parking facilities are one of Monaco's strengths,

Some participants feel that the lack of rapid charging points is hampering efforts to expand electric mobility in the Principality.



Buildings

Alongside mobility, building environmental and energy performance is one of the most prominent issues.

The participants are critical of the construction sector and cite a range of **untapped opportunities**.

They feel that Monaco's **thermal regulation** is outdated and does little to encourage the sector to design projects that align with the Government's targets. They also say that the industry needs to do more to encompass **high environmental quality, certifications** (HQE, BREEAM, BDM) and **renewables** in their projects.

The lack of cross-industry dialogue is often cited as a barrier and the participants feel that more could be done for architects, developers, building firms, managers and occupants to share feedback.

The dialogue process happens at two levels. The first level involves the sharing of energy transition targets and drivers between the Government and sector professionals. The second level concerns dialogue within the profession – between those who design, manage and occupy residential and tertiary-sector buildings. Effective dialogue at both

“ A total cost of ownership approach would drive practices towards better environmental performance ”

levels would help ensure that projects better reflect the Government's targets, improve the sharing of best practice, and allow future projects to capitalise on feedback from managers and occupants.

In terms of construction sector **finance**, most participants feel that the additional money needed to design new High Energy Performance buildings is a drop in the ocean compared with general property prices in the Principality. However, they agree that money is a crucial issue for renovation projects, which necessarily involve collective decisions by joint owners.

The participants say it is often difficult to get **non-occupant owners on board**, since they take little interest in the cost benefits of energy-efficient design as tenants pay their energy bills and costs. Some interviewees call for a change in the law to force owners to carry out thermal renovation work and help property management companies make the case to owners.

Some jointly owned properties require heavy investment to switch from heating oil to alternative fuels, but the participants say that other types of work could be carried out at the same time (e.g. installing bigger pipes to combine the heating and air conditioning systems).

The participants say that **total cost of ownership (TCO)** is an under-developed practice in the construction sector. Running costs account for around 80% of a building's total cost over its lifetime, but these expenses tend to be overlooked during the project design and specification phase. A total cost of ownership approach would drive practices towards better environmental performance.

Many participants call on the Government to lead by example when designing its own projects (public and state-owned buildings). However, they give the Government credit for introducing high environmental quality (HQE) requirements for all new public projects in 2008. The interviewees also expect the Government to promote flagship projects in Monaco (such as passive or positive-energy buildings), arguing that this would have a beneficial knock-on effect on private-sector practices.

The quality of energy services is another common theme, with many participants arguing that existing provision is both insufficient and under-developed. They say that many services are limited to energy facility maintenance (heating and cooling systems) and that there is little in the way of innovation. The overriding

“ Change the law to force owners to carry out thermal renovation ”

view is that existing services do not include energy management for energy efficiency and environmental benefits, or that providers offering these services do not give value for money. The participants credit some property management companies for being proactive and including energy services in their specifications, but say that there is not enough discussion or sharing of best practice within the profession.

The participants say that the facility management reports produced by service providers need to be more **instructive** and that providers could be more proactive on energy matters. Small property management companies consider themselves insufficiently skilled and equipped to examine proposals properly or draw up ambitious specifications, and argue that they need **unbiased advice** to help them provide optimal energy management.

The participants also call for **energy planning to be included in urban planning**, pointing to the fact that, when considering energy options, designers could be influenced by forthcoming public infrastructure projects such as **district heating and cooling networks**. Because these networks use renewable energy, connecting buildings to these systems is an alternative to using energy sources with higher greenhouse gas emissions. For example these considerations apply to existing buildings that still use heating oil and for which a system replacement is considered. Connecting these buildings to a public heating network is one possible option, but property managers can find it hard to make decisions because of uncertainty around the timetable and location of future networks.



Waste

The participants agree that waste poses a major challenge. They correctly identify the links between the energy transition and greenhouse gas emissions from the waste sector as a whole, mentioning prevention, sorting, collection, treatment and recovery.

However, the **lack of information and communication** about the waste situation in the Principality triggers doubts and assumptions.

One area of concern is a lack of **detail on the future of the Fontvieille waste treatment and recovery unit**, which converts heat into electricity and is connected to the district heating and cooling network.

The participants also cite a shortage of information and communication around **waste sorting**, saying they are unsure about current sorting standards in the Principality. Some do not know what types of waste are recycled, collected or actually recovered by specialist firms. They say that the information they receive is sometimes contradictory and call on the Government to improve communication on this subject.

When thinking about waste sorting, the interviewees focus in particular on two themes: the **lack of space for waste sorting bins** in existing buildings, and **sorting practices at major sports, cultural and professional events**.

Some participants also talk about the **circular economy** and mention the prospect of developing new waste recovery programs in Monaco. Although there have been no studies looking directly at this issue, many participants say that this sector is lacking

“ There are numerous examples worth sharing and opportunities for joint action ”

in Monaco because land is so expensive, space is in short supply, and the volume of recyclable material is limited.

There is little in the way of **biomass recovery** (waste food and green waste) in Monaco, and these types of waste are currently incinerated in the Principality or exported to France. Some stakeholders see this as a major barrier to their environmental certification, while others believe that Monaco is missing an opportunity.

The interviewees also say that there is not enough **sharing of best practice** in sectors such as tourism, leisure, events, culture and health.

The interviews reveal that private firms are taking **innovative steps** to sort their waste more effectively, limit the amount of waste they produce, or recycle waste not treated by SMA. However, they say more needs to be done to **promote and disseminate** these initiatives, citing numerous examples worth sharing and opportunities for joint action.



Energy supply

The Principality of Monaco is located in the eastern part of the Provence-Alpes-Côte d’Azur region, which is considered to be an “electric peninsula”.

There are only a handful of power plants in the region, making it difficult to maintain sufficient voltage across the grid. Moreover, the region’s buildings have more electrically powered heating and air conditioning systems than elsewhere in France, meaning that electricity consumption is highly dependent on temperature variations. The Principality imports almost all of its electricity. While the region’s energy supply has improved in recent years, the participants take the view that Monaco needs to do more to tap into local energy production potential. Monaco also imports fossil fuels such as natural gas and heating oil. However, the Fontvieille network and seawater heat pumps mean that Monaco is more self-sufficient when it comes to thermal energy, although the participants believe there is untapped potential in many neighbourhoods.

The key challenge of the energy transition will be to reduce energy consumption as the Principality’s economy continues to grow, and to increase the share of renewables in its energy mix. Monaco needs to look ahead to the future and set targets on energy consumption and the energy sources it

“ Increase the share of renewables in the Principality’s energy mix ”

intends to harness to satisfy demand (energy mix). This **energy programme** will need to be incorporated into the Principality’s urban planning.

The participants say that, overall, more could be done to promote an **energy efficiency culture** in Monaco, and that there is insufficient communication around targets and expected benefits. The stakeholders from the hospitality, events and tourism sectors are better informed about energy efficiency – and are more proactive on this subject – than those from other industries.

The interviewees from energy-sector organisations are strongly supportive of H.S.H. Prince Albert II’s energy transition policy, arguing that the initiative will help **clarify the framework** and **raise awareness among all stakeholders**.

Chapter #3 Drivers and priority initiatives proposed by the participants

Drivers identified by the participants

The participants were asked to identify the drivers that they believe Monaco could harness to address energy transition barriers and weaknesses, without prompting and without picking options from a predefined list.

The most commonly mentioned drivers are as follows:

H.S.H. Prince Albert II's commitment to the cause

There is unanimous backing for His Serene Highness' campaigning on environmental conservation and climate change issues. The participants say that strong support for the Prince's values will help drive motivation and push forward action on Monaco's energy transition.

Regulatory changes

As indicated in the list of barriers and weaknesses, the participants feel that the Principality's existing environmental regulations are under-developed and unclear, and lack ambition. Almost all of the interviewees call for stronger environmental regulations and, in particular, the inclusion of ambitious environmental requirements in sector-specific regulations (urban planning, housing, mobility, waste, etc.).

Given the timescales involved and the level of effort needed to attain the targets, they see regulation as the best way to accelerate flagship project implementation and bring about eco-responsible behaviour. However, while the participants are in favour of regulation, they also caution that it would need to be easy to understand and apply.

They call for the Environmental Code to be adopted, but say it would first need to be updated to reflect Monaco's new targets.

A shared vision and targets

People who are unfamiliar with energy and climate concepts find it hard to understand

“ Better understand the targets and the implications of the energy transition ”

how they apply on a small scale in Monaco, and even more so at an individual level. For many people, targets such as “halving greenhouse gas emissions by 2030” and “becoming carbon-neutral by 2050” sound like little more than major obstacles, bringing with them limits and restrictions.

The participants suggest taking steps to give individuals and organisations a better understanding of the targets and the implications of the energy transition. In addition to information and awareness-raising campaigns, some participants call for an **inclusive forward-planning exercise** to help individuals and businesses **look ahead to the future**.

Information, awareness and communication

All of the participants say that the Government is not doing enough to publicise its environment, energy and climate policy.

They call for more communication about ongoing initiatives. One proposal is to provide context-based information that ties in with the targets. Several interviewees also suggest producing an interactive map of flagship projects in Monaco, to enable people to identify public and private-sector projects and the organisations behind them.

They also call for regular updates on progress towards the targets, i.e. published data on energy use and greenhouse gas emissions in Monaco.

The participants want to see an ambitious plan to raise awareness among all stakeholders, to help them better understand the challenges and solutions, and their expected contribution. The proposal includes a general awareness-raising campaign, along with a specific component addressing different members of Monaco's community (commuters, residents). Some interviewees even call for formal education and Continuing Professional Development programmes covering the environment and the energy transition.

Cross-industry dialogue

One of the positive outcomes of the White Paper consultation process is the fact that Monaco already has **extensive best practice and innovative initiatives** to support its energy transition locally. All too often, however, these initiatives are limited to individual organisations and are not shared with other stakeholders in the same industry. The participants call for more efforts to promote and share these initiatives so they can be replicated elsewhere. They also say that, rather than simply talking about what they do, organisations should engage in direct dialogue, as this is the only way to develop detailed feedback and establish a practical implementation framework. The participants say dialogue could be facilitated by the Government, professional organisations or associations.

“ Highlight the stakeholders’ commitment and keep them engaged in the long term. ”



Participation and engagement

All of the organisations interviewed during the White Paper exercise signal their support for the initiative, saying it is an effective way to gather perceptions, opinions and proposals from stakeholders involved in the Principality’s energy transition roadmap, based on real-life experience. They also argue that the consultation process will help drive greater awareness – a factor key to the transition’s success.

The participants say they want to be involved in **monitoring implementation** of the policy, in the interest of **continuous improvement**. In other words, they see the publication of the White Paper and the roadmap as a means to an end, rather than an end in itself – the start of a new movement in which they want to play a part. One proposal is to organise an **annual meeting** to share progress on the Principality’s energy and climate policy and to disseminate best practice. Another suggestion is to set up **thematic workshops or committees**, allowing stakeholders from a particular sector or facing similar challenges to work on practical, joint initiatives. The participants stress that thorough preparation will be needed to ensure that decisions are taken quickly and ideas are put into action.

Some of the more enthusiastic participants even suggest drawing up a **voluntary charter**, which stakeholders could sign to signal their support for the energy transition. They say that this move will help identify local stakeholders’ contributions to national targets and annual initiatives, and strengthen monitoring and evaluation work. In some cases, the participants also call for a **network, website or certification scheme** for energy transition stakeholders, saying that this would highlight their commitment and keep them engaged in the long term.

Some participants ask for technical and financial support to help them develop **eco-responsible approaches** (such as ISO 14001 or ISO 50001). The business stakeholders express an interest in a coordination and support scheme for **small businesses and**

retailers, offering independent advice to help them implement waste, energy and mobility initiatives. Some also suggest their professional bodies could voluntarily raise awareness through events such as business breakfasts, conferences and workshops, and talk about the subject in their communication materials.

Stakeholders from Monaco’s health sector call for efforts to develop an industry-specific environmental certification scheme, arguing that this would help drive improvement through practical energy transition and sustainable development initiatives and showcase what organisations in the Principality are doing on this front.

Decision-making support and financial incentives

Support and financial incentive schemes were frequently mentioned as a driver during the interviews, although views are split on this subject. The opinions fall into two camps:

Some participants say they lack the financial latitude to embark on ambitious initiatives and call on the Government to introduce technical and financial incentives, in line with existing electric mobility and renewables schemes.

Others take the view that there are already sufficient funds available in Monaco and that the Government should invest in other initiatives instead, arguing that fast-track, ambitious regulatory changes would force organisations to comply with the new rules and that the country’s commitment to the cause would win out over financial considerations.

The participants broadly concur on two other points. Firstly, they agree on the need to **fund innovative and/or large-scale schemes**, pointing to the fact that a constant stream of new products, processes and services would be needed to support the energy transition, and that efforts should focus on areas where



the greatest potential savings could be made. In these cases, the participants take the view that financial assistance could help facilitate decision-making and, in some instances, deliver a more acceptable return on investment.

Secondly, the interviewees request **decision-making support**, arguing that stakeholders often fail to act because they lack the necessary information and expertise. They call for help to carry out assessments and feasibility studies to promote more informed decision-making on practical initiatives.

The participants also say that financial assistance would represent formal Government **recognition** that an initiative is aligned with its energy transition strategy.

They also stress the need for better **communication** around existing support schemes, and say that these schemes need to be **clearer**.

More generally, they suggest introducing environmental criteria for **all Government assistance** schemes.

Initiatives proposed by the participants



Mobility

As well as mentioning the main drivers outlined above, the participants also propose a number of practical initiatives. These initiatives were categorised by theme then discussed in greater depth during the group workshop sessions.

A number of mobility measures are already in place. These include electric bicycles, grants for electric and hybrid vehicles, telecommuting, the CAM bus network and smartphone app, the Monaco Malin alternative mobility plan, preferential parking for eco-friendly vehicles, the Petit Rouleur subscription scheme, car-pooling, the traffic and road works information website, and the Mobeé car-sharing programme. The participants also suggest several new mobility initiatives to support the energy transition in Monaco:

Infrastructure

- Install more **charging points and electric bikes** to widen the scheme to more people living and working in Monaco.
- Develop **dedicated-lane public transport infrastructure** between the western and eastern parts of the Principality.
- Limit the number of fuel-powered vehicles entering the Principality by creating **park and ride facilities** outside Monaco, and provide connecting public transport services operated by CAM and/or other systems such as cable cars or express trains.
- Create more **cycle lanes** and roadside **bicycle parking facilities** to make cycling easier and encourage people to use bicycles.
- Install more **rapid charging points** for electric vehicles.
- Create a **reserved area** for public transport and low-emission vehicles.
- Install more **organised mooring points** in Monaco's territorial waters.

Service improvement

- Introduce **sea shuttle services** between coastal communes.
- Improve **SNCF train** service quality and frequency.

Incentive schemes

- Provide financial assistance to help people **buy electric bicycles**.
- Introduce strong incentives for commuters to set up **car-pools**.
- Create a **green pavilion** for the most environmentally friendly pleasure-boaters (waste, waste water, energy, etc.).

Information and awareness

- Carry out a national **awareness campaign** on sustainable mobility challenges, benefits and solutions.
- Introduce a **car sticker** scheme based on vehicle environmental performance.
- Conduct public awareness campaigns on the **health** benefits of walking and cycling.
- Publish information about air quality.
- Create and display a Charter of Good Conduct for vessels entering Monaco's ports.



Buildings

The largest body of proposals focuses on improving new and existing building quality and performance. The participants feel that Monaco's existing building stock falls short of the mark on environmental performance and innovation, with a few exceptions. Moreover, when asked where the greatest energy efficiency gains could be made, the interviewees put the construction sector at the top of the list.

The participants also identify several examples of existing best practice, including buildings connected to the Fontvieille heating and cooling network, private developers adopting the BREEAM, BDM and HQE schemes, blanket application of the HQE standards to public-sector developments, and the "green construction site" programme.

The proposals mentioned for the construction sector are as follows:

Regulation

- Adopt a new **thermal regulation** for buildings, tailored to the context in Monaco and covering both existing stock and new building.
- Require all building permission applications to include an **energy performance assessment**.
- Regulate **air conditioning** and **heating use**.
- Change existing regulations on **indoor and outdoor lighting for buildings**.
- **Allow over-development** of plots of land for green buildings or ambitious renovation projects.
- Force property management companies to submit a detailed energy performance report, at least once a year, at **annual general meetings**, outlining energy trends and areas for improvement, and involve tenants in these meetings.

Incentive schemes and funding

- Introduce financial assistance for **comprehensive energy audits**, to assess all aspects of building energy consumption (heating, cooling, electricity) and performance and to identify areas for improvement and opportunities to develop renewables.
- Provide financial assistance in the form of **combined work packages**.
- Introduce financial assistance to connect buildings to **district heating and cooling networks**.
- Create incentives to use the **total cost of ownership** model.
- Provide support for the use of **eco-materials**.
- Work with financial institutions to develop **special financial products** for energy renovation work on residential and tertiary-sector buildings.

Tools and training

- Create a platform detailing all **completed, ongoing and planned green projects** in Monaco, covering both new-build developments and renovation work in the public and private sectors.



- Create a **"building health record"** containing information about building methods, equipment, energy systems, water and energy consumption, and a history of maintenance and operation work.
- Create a **Monegasque environmental quality framework** for new-build and renovation projects, building on best practice from projects carried out to BREEAM and BDM standards.
- Introduce an **accreditation or certification scheme** for contractors and engineering firms.
- Create a **training programme** for building craftsmen and general contractors, to help boost their knowledge skills on thermal and environmental issues and improve their practices.
- Work with property management companies to draw up a set of **model specifications**, incorporating energy system targets and requirements.
- Create a **training programme** for building managers, covering fluid (water and energy) management and outlining potential practical initiatives targeting owners and occupants.

Information and awareness

- Create a **cross-industry information and discussion platform** for the entire construction sector (architects, building firms, property developers, building craftsmen, energy service operators and property management companies).
- Arrange **tours** of flagship sites in Monaco and abroad.
- Create a new **Monegasque agency** (similar to the French Environment and Energy Management Agency, ADEME) to work with members of the public and publish information about energy efficiency and renewables in Monaco.
- Appoint an **advisor for property managers**, to raise awareness and help them carry out energy initiatives. This advice service could be provided by a new Monegasque agency (like ADEME) or by the Mission for the Energy Transition.
- **Publicise heating network timetables and locations** so that property managers looking to switch to a new energy system can opt for the best solution.
- Install more **meters and sub-meters** for all types of energy consumption.
- Loan **thermal imaging cameras** to carry out building inspections, so that owners and occupants can see where heat is being lost.
- Carry out an **information and awareness campaign** on energy-efficient practices for all residents and owners.
- Identify **volunteer households** to test solutions, monitor results and share feedback, then use this information to carry out a broader awareness campaign in Monaco.

Government leadership

- Amend **public contract award criteria** to make more room for innovative alternatives on energy and environmental matters.
- Carry out a flagship project as part of the Portier Cove **land reclamation** programme.
- Build a **flagship positive-energy building** as a demonstrator, possibly designed by a leading architect with strong environmental credentials.
- Launch an **architecture competition** for a flagship renovation project.
- Introduce stricter **environmental performance inspections** for buildings.



The participants broadly agree that more could be done to reduce the amount of waste produced in Monaco and to improve waste sorting standards.

The interviewees identify several examples of best practice, including the installation of voluntary waste sorting and collection points throughout the Principality, energy recovery from waste and the district heating and cooling network in Fontvieille, the ban on plastic carrier bags, the “Petite boîte” scheme (boxes used by some restaurants to allow customers to take their unfinished meals home with them), and the “green site” programme. The majority of the waste-related proposals concern sorting and recycling.

Infrastructure

- Provide **waste compactors**.
- Install **more waste sorting bins** on the streets.
- Introduce **waste sorting containers in all buildings**.

Service improvement and innovation

- Carry out an **audit** to pinpoint the barriers to more widespread selective sorting.
- Introduce **selective cardboard waste collection** for businesses outside Fontvieille, for recycling purposes.
- Amend **waste collection** procedures to better reflect the context in Monaco and take account of the Principality’s dense urban infrastructure and narrow streets.
- Identify **new waste recovery sectors** that could potentially be introduced in Monaco.
- **Help stakeholders** manage waste not collected and treated by SMA.
- Improve **waste management on anchored ships**.
- Introduce **short supply chains** and **cut waste at the source** (e.g. packaging).
- Encourage Monegasque stakeholders to **pool their waste management solutions** (e.g. introduce pooled sorting and recycling systems for the tourism, events and health sectors, or treat infectious clinical waste from the health sector in Monaco).

Incentive schemes

- **Help joint ownership associations** introduce waste sorting schemes, especially in older neighbourhoods.
- **Help retailers** identify and implement more effective waste recovery solutions.

Information and awareness

- Set up a **working group** for all businesses and organisations in Monaco that want to share feedback, develop joint initiatives, and suggest ways to improve waste service standards in the Principality.
- **Publish information** about the waste situation.
- Introduce a **national awareness programme and campaign** on waste reduction and recovery, targeting all members of the community.
- Establish a **programme to tackle food waste**.
- **Raise awareness among business visitors, tourists and event organisers**.
- **Improve communication about the future of the Fontvieille waste treatment and recovery unit** and the district heating and cooling network.



Energy supply

The participants cited a number of existing measures, including the EcoWatt scheme, EGEO and SMEG services, the Government's solar power assistance scheme, and business and industry environmental certification programmes. Stakeholders from across the spectrum – both within and outside the energy sector – came up with a wide range of solutions to help secure Monaco's energy supply and reduce energy demand.

Infrastructure, planning and innovation

- Develop a district heating and cooling network in **Larvotto**.
- Assess the **potential of thermal and electric renewable energy production** in Monaco's various neighbourhoods and take steps to promote (or impose) renewable use where appropriate.

- Develop a programme to help buildings abandon **heating oil** and switch to alternative sources.
- Develop **renewable electricity production outside** the Principality.
- Build a comprehensive strategy to address expected increases in energy consumption from **new information and communication technologies**. One of the main components of this strategy is to make **data centers and servers** more energy efficient, for example by pooling infrastructure and introducing heat recovery systems.
- Explore ways to meet the electricity demands of **large cruise ships**.
- Assess the long-term impact of **standard and rapid charging points** for electric vehicles, looking at both energy consumption and power supply capacities to support future development.
- Explore the potential of harnessing energy from **biomass, geothermal and hydrogen**.
- Encourage **energy service providers** to focus more on energy efficiency and renewable energy solutions.
- Encourage Monaco's health sector stakeholders to pool instrument sterilisation (a costly process that consumes large amounts of energy).



Incentive schemes

- Introduce **grants to connect** buildings to district heating and cooling networks.
- Establish a framework to allow third parties to **rent roof space** for solar energy production.
- Simplify the **grant application procedure** for solar power facilities.
- Introduce an **energy pricing structure** per consumer type to encourage greater energy efficiency, especially during periods of peak demand.
- Initiate and set up an **energy transition cluster** comprising stakeholders from the green economy (such as a business incubator), R&D, training and services.

Information and awareness

- Publish Monaco's energy and greenhouse gas emissions assessment.
- **Publish feedback** from stakeholders that have used energy performance contracts or operating contracts with incentive clauses.
- Produce a **map of energy use** in Monaco.
- Encourage **energy service providers to do more to educate their customers** about short, medium and long-term benefits, with general and comparative approaches to support decision-making.

Conclusion

To the Government's invitation to contribute to this Energy Transition White Paper, the response was positive and unanimous. The Mission for the Energy Transition team and myself are very grateful to everyone who helped produce this document. The discussions were extremely rich and many new ideas emerged in the process.

The broad consultation exercise helped foster a better understanding of the issues and identify the challenges ahead. As of now we have to focus our efforts on three major sectors that each account for approximately 30% of Monaco's greenhouse gas emissions – mobility, waste treatment, and building energy consumption.

To achieve our goals, we must be imaginative and creative and leave our preconceptions behind. We need to work towards becoming a more responsible society that uses less energy and harnesses renewables.

The Prince's Government will introduce incentive schemes and establish a regulatory framework to drive the behaviour change we need as we chart a course towards decarbonation. The legislative and regulatory provisions of the Environmental Code bill will form a key part of this policy.

One of the cornerstones of this new community-wide commitment could be the creation of a National Energy Transition Pact, signed by Monaco's institutions, authorities and private companies. Signatories to the pact would be able to share best practice, pool smart technology investment, carry out staff and user awareness campaigns, develop renewable energy production infrastructure, and evaluate progress.

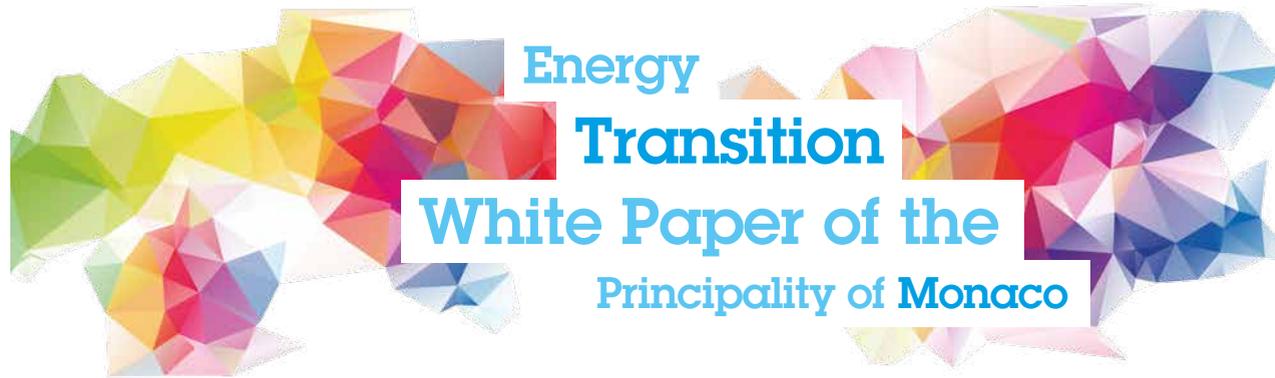
The Government intends to introduce or expand a number of initiatives in line with this new National Pact, including:

- Introducing a ban on oil-fired building heating systems.
- Issuing a call for tenders for start-ups with innovative energy transition solutions.
- Installing smart electricity meters – building on SMEG's existing work in this area – and making the data accessible to foster innovative new initiatives.
- Installing smart, energy-efficient lighting systems (low-consumption systems, LED bulbs, etc.) in all buildings and outdoor spaces across the public and private sectors.
- Running one-off awareness campaigns, such as the "car-free day".
- Introducing a ban on plastic bottles and cups in Government buildings, switching to glass jugs and cardboard cups and, eventually, banning the sale of plastic bottles in the Principality.
- Updating Monaco's energy regulations, to encompass both new-build and renovation projects.
- Publishing a solar map to give owners and property management companies information about the potential for installing solar panels on their roofs.
- Creating a new platform to provide comprehensive information about the energy transition, including regulations, grants and the timetable of Government action.
- Introducing a Government-backed financial assistance scheme for building energy audits.
- Exploring options to expand the Condamine seawater heat system and install a new system in Larvotto, bringing a new, competitive renewable energy source to these neighbourhoods.
- Setting in motion a thermal renovation programme for Government buildings.
- Launching a flagship positive-energy public building project.

The Government will implement its new energy transition policy gradually but irreversibly, to enable everyone to plan ahead for the changes and adapt accordingly.

With the impetus provided by His Serene Highness Prince Albert II, we can look ahead to the future with confidence. We know that if we work together, our country will be able to meet its greenhouse gas emissions reduction targets and chart a course to becoming a carbon-neutral society.

Madame Marie-Pierre Gramaglia,
Minister for Public Works,
the Environment and Urban Development



Energy Transition White Paper of the Principality of Monaco



the Participants

Institutions	Building	Economy, businesses and companies	Energy and urban services	Tourism, events and leisure	Health	Associations
<ul style="list-style-type: none"> ◆ Palais Princier ◆ Conseil National ◆ Mairie de Monaco ◆ Archevêché ◆ Direction des Services Judiciaires ◆ Conseil Economique et Social ◆ Fondation Prince Albert II 	<ul style="list-style-type: none"> ◆ AGEPRIM ◆ Cabinet Vivalda ◆ Cabinet Wolzok ◆ Chambre Immobilière Monégasque ◆ Chambre Patronale du Bâtiment ◆ ENGECO ◆ FPMC ◆ Gramaglia Immobilier ◆ Groupe Caroli ◆ Groupement des Entrepreneurs Monégasques du Bâtiment ◆ Groupe Pastor ◆ J.B. Pastor & Fils ◆ Michel Pastor Group ◆ Ordre des Architectes ◆ SATRI 	<ul style="list-style-type: none"> ◆ Association Monégasque des Activités Financières ◆ Carrefour Monaco ◆ Chambre Monégasque de l'Assurance ◆ Chambre Monégasque du Shipping ◆ Fédération des Entreprises Monégasques ◆ Groupement d'Etude des Industries de Transformation ◆ Groupement d'Intérêt Economique des Industries de Monaco ◆ Jeune Chambre Economique de Monaco ◆ Monaco Economic Board ◆ Monaco Telecom ◆ SBM Offshore ◆ Syndicat Patronal Monégasque des Transformateurs de Matières Plastiques ◆ Union des Commerçants et Artisans de Monaco 	<ul style="list-style-type: none"> ◆ Chambre des Energies Renouvelables et de l'Ecologie de Monaco ◆ COMETH SOMOCLIM ◆ C2S ◆ Société Monégasque d'Assainissement ◆ Société Monégasque des Eaux ◆ Société Monégasque de l'Electricité et du Gaz ◆ SOGET 	<ul style="list-style-type: none"> ◆ Automobile Club de Monaco ◆ Association des Industries Hôtelières Monégasques ◆ Fairmont Monte-Carlo ◆ Grimaldi Forum ◆ Jumping International de Monaco ◆ Monaco Yacht Show ◆ Musée Océanographique ◆ Novotel Monte-Carlo ◆ Société des Bains de Mer ◆ Société d'Exploitation des Ports de Monaco ◆ Yacht Club de Monaco 	<ul style="list-style-type: none"> ◆ Centre Cardio-Thoracique ◆ Centre Hospitalier Princesse Grace ◆ Centre Scientifique de Monaco ◆ Institut Monégasque de Médecine du Sport 	<ul style="list-style-type: none"> ◆ Ecopolis ◆ MC2D

Mission for the Energy Transition

The Energy Transition White Paper approach was spearheaded by the Mission for the Energy Transition, with support from consulting firm eQuiNeo and in particular its director, Sébastien Denis.



The Mission for the Energy Transition was created to implement Monaco's energy transition roadmap. Part of the Ministry of Public Works, the Environment and Urban Development, it is responsible for initiating and promoting renewable energy and energy efficiency initiatives in the Principality, working in tandem with other Government departments. The Mission for the Energy Transition's specific skills cover energy, sustainable development solutions and funding.

The Energy Transition objectives

- Rally the entire Monegasque community behind the energy transition project.
- Cut direct greenhouse gas emissions in line with Monaco's international commitments.
- Ensure the decarbonation of imported energy.
- Promote energy sobriety across all sectors of Monaco's economy.
- Increase local renewable energy production.

The Energy Transition values

- Solidarity:** Engaging in teamwork based on dialogue and partnership with all stakeholders.
- Innovation:** Constantly seeking new technologies and new ways of doing things.
- Performance:** Focusing on results and meeting targets.

The Energy Transition means to succeed

- Funding initiatives via the National Green Fund.
- Raising awareness among economic stakeholders and citizens.
- Delivering energy efficiency training.
- Providing grants to support renewable energy and energy efficiency projects.
- Amending building energy regulations.

The National Green Fund

The National Green Fund was set up in early 2016 using funds from the Government budget surplus and the electricity consumption contribution. The purpose of the fund is to give Monaco the financial resources to engage in long-term initiatives and make its energy transition a success.



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Mission for the Energy Transition

18, Allée Lazare Sauvaigo
98000 Monaco
Tel. : (+377) 98 98 47 59
transition-energetique@gouv.mc
www.gouv.mc



Gouvernement Princier
PRINCIPAUTÉ DE MONACO