THE PRINCE ALBERT II OF MONACO FOUNDATION’S ACTIVITIES IN ENERGY EFFICIENCY & RENEWABLE ENERGY
This document has been produced with the assistance of:

- Mrs Charlotte FRANZELLIN
  Stanford University
  Master of Science in Civil & Environmental Engineering Atmosphere / Energy

- Mr John BOGHOSIAN
  Harvard Business School
  MBA Student
ENERGY EFFICIENCY & RENEWABLE ENERGY

Energy Efficiency (EE) ...

... is a way of managing and restraining growth in energy consumption by delivering more services for the same energy input, or the same services for less energy input. — IEA

Renewable Energy (RE) ...

... is energy collected from resources that are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat. — Ellabban et al.

Whilst enormous progress has been made on improving living standards, the world’s population reached 7 billion and the demand for reliable energy sources continues to grow. In spite of the need for more resources, energy supply and energy use can have negative effects on the environment. Policy makers, business and civil society leaders must work together to achieve energy efficiency improvements as recommended by the UN Secretary-General’s Sustainable Energy for All initiative. Buildings consume more than a third (35%) of the world’s energy resources and account for 40 percent of greenhouse gas emissions. Improving building efficiency represents one of the most economically viable opportunities to reduce energy needs. Today, energy efficiency is moving up the political agenda across the globe, as legislators and the stakeholder community begin to realise the potential of energy efficiency to reduce carbon emissions, increase energy security, and create jobs. Energy markets, meanwhile, are integrating energy efficiency as a valuable resource alongside traditional energy sources.

Experts agree: efficiency is the way forward. The question is how to make efficiency accessible and interesting to a growing number of stakeholders, so that substantial energy, cost and carbon savings can be made available to markets and society.

The World Wildlife Fund estimates that humanity is currently using the resources of one-and-a-half planets, and that by 2050 it would be using the resources of three planets. Humanity cannot continue to grow the way it did in the 250 years since the first industrial revolution. The transition is currently “volatile” for a number of reasons, among them: the global economic crisis; developing countries’ energy-intensive growth; fossil fuel price-volatility; massive urbanisation; and the turbulence in energy prices.

The alarming increase in greenhouse gases emissions associated with the drain in time of fuel reserves make vital the investigation and the development of renewable energy systems. Today, countries over the world are expanding investments in renewable energy: in Germany, they already account for 30% of the energy mix; globally, this share stands at 20%. Today, the way to go for renewable energy generation is still formidable.
One of the Prince Albert II of Monaco Foundation’s (PA2F) main objectives is to limit climate change and promote renewable energy. To this aim, the Foundation acts on several fronts by promoting a low-energy, low-carbon economy and field projects as well as ground-breaking energy efficiency and renewable energy initiatives.

- **Emirates Energy Efficiency Summit**
  - Inaugural event in 2016

- **Villa Girasole Retrofit**
  - PA2F’s headquarters EE improvements and ISO certifications

- **Euro-Mediterranean Energy Efficiency Forum**
  - Flagship PA2F event in EE, 5th edition in 2015

- **PA2F EE&RE Projects**
  - 15+ initiatives implemented between 2007-2016

- **Collaborations**
  - PA2F as partner

- **Sponsorships**
  - PA2F as sponsor
THREE MAJOR THEMES THE “3 Is”

**INFORM**
Foster global and regional dialog among EE&RE experts

**INSPIRE**
Increase general public awareness about EE&RE & recent achievements

**IMPLEMENT**
Impact communities around the world through EE&RE initiatives

OBJECTIVES OF THE PA2F REPORT ON EE&RE

- **Synthesize**
  Distil the wide-ranging efforts and achievements of PA2F in EE&RE in one coherent vision

- **Share**
  Showcase PA2F’s “portfolio” of EE&RE activities with our partners and other interested stakeholders

- **Reflect**
  Define potential directions for PA2F to get involved within EE&RE
We know what we have to do to keep the rise in temperature below 2%: almost all the technologies we need are deployed; almost all the policies are in operation somewhere; and the money exists, adding up to around 1% of GDP. No more studies or analysis are necessary. Instead we need the right policies. And one of these policy main axes is energy.

At the turn of the decade, cash-strapped governments and firms across Europe and the Mediterranean Basin were looking for ways to leverage efficiency to realise cost and carbon savings while creating needed jobs. The European Union’s carbon reduction and efficiency policies, considered exemplary across the globe, drove greener standards and trends in a range of industries. Energy markets were transforming, integrating energy efficiency as a valuable resource alongside traditional energy sources. Finally, businesses were innovating to make efficiency work not only for the planet, but also for their clients and shareholders.

Against this backdrop in April 2010, the Prince Albert II of Monaco Foundation and Johnson Controls hosted the inaugural Euro-Mediterranean Energy Efficiency Forum (EEF) in Monaco.

The Forum’s long-term vision is to be Europe’s premier event promoting an energy efficiency ethic.

The Forum rests on the importance of establishing a dialogue amongst key stakeholders to debate and act on energy efficiency and climate change. Senior leaders and experts from government, non-governmental organisations, the private sector as well as academia reflected on how Europe can make energy savings a reality. The event has been held annually since 2010, with more than 100 attendees gathering in Monaco (or Belgium in 2013 at the Roundtable of the Institute for Building Efficiency) for two days of knowledge sharing and policy debate. Year after year, the Forum has remained at the cutting edge of the most pressing issues related to EE in the region.
FORUM: BACKGROUND AND OBJECTIVES

His Serene Highness Prince Albert II of Monaco has hosted five editions of the Forum to date. Keynote speakers over the years have included key proponents of energy efficiency in the region and the world, including:

· Christian Estrosi, French Minister of Industry and Mayor of Nice
· Eric Besson, French Minister of Industry, Energy and the Digital Economy
· Alain Hubert, polar explorer and Chairman of the International Polar Foundation
· Herman Van Rompuy, President of the European Council
· Christoph Frei, Secretary General of the World Energy Council
· Kandeh Yumkella, UN Special Representative for Sustainable Energy for All

The Forum invites and challenges all participants to ask themselves how to be smarter about efficiency. The real question is: “How can we make sure efficiency occupies at least the same value in our society as the raw energy we consume in excess every day?” and it is a challenge that lies at the heart of the climate and sustainability challenges facing our generation.

THE EEF TACKLES CUTTING EDGE TOPICS FOR THE EU AND THE MEDITERRANEAN

INFORM

Burning EE issues in EU & Mediterranean

EU announces 20-20-20 target: by 2020, 20% of the energy produced in the EU to come from renewable energy sources. EU leaders commit to a 20% indicative efficiency target.

EE “at the heart of discussions” at a meeting of the European Council in February. Europe’s new “Energy Efficiency Action Plan” is unveiled in March.

PA2F focus in concurrent EEF

“Setting the stage for EE”

By unwinding several key topics (including the debate around binding energy saving targets), the Forum helped move EE to the top of Europe’s political agenda.

“Getting Smarter about EE”

The Forum capitalised on the political momentum behind EE to ensure policies, business models, technologies, and manufacturing processes drive EE in an intelligent way.

“Picture the Opportunity”

The Forum focused on an integrative approach to the benefits of EE. Panels each highlighted how EE fits with broad prosperity (talking to people’s pockets while engaging hearts & minds).

New European Union EE Directive adopted in October.

THE EEF TACKLES CUTTING EDGE TOPICS FOR THE EU AND THE MEDITERRANEAN

Burning EE issues in EU & Mediterranean

Debate intensifies on the shape of the EU climate and energy targets for 2030 in the context of economic austerity measures, with a communiqué expected in December.

With EU recovery still underway, the EE debate continues to be timely. Given its geopolitical and technical environment, Europe finds itself on course to miss its 2020 targets.

Europe prepares for “the Road to Paris”, i.e. the policy landscape leading up to the UN-sponsored Climate Summit in December in Paris (COP21).

PA2F focus in concurrent EEF

“EE’s role in Economic Recovery”

Roundtable focused on how investment in EE can contribute to Europe’s sustainable recovery, while producing an opinion statement targeted at EU policy proceedings.

“Committing to Growth” Forum

 Renewed its focus on EE for economic recovery and growth, tackling the business case, the “co-benefits”, and practical issues around goal setting for Europe.

“Bringing Innovation to EE”

Forum explored how financial, social, and policy innovations can create a framework to accelerate improvements in energy efficiency and greater use of low carbon technologies.

At the initiative of the “Partnership for Progress on Energy Efficiency” between General Electric and the PA2F, in 2016 the Energy Efficiency Forum was for the first time extended beyond the region of Europe and the Mediterranean, to the Middle-East.

With partners such as the American University in Dubai and the Zayed International Foundation for the Environment, the Foundation co-organized the inaugural “Emirates Energy Efficiency Summit” in Dubai, following a year of continued global energy crises and renewed volatility in the crude oil market.

Building on the success of the EEF, the EEES will combine business and social interests with government action in order to elevate awareness and drive energy saving and climate change projects, programmes and initiatives.

Cutting straight to the heart of the Middle East’s energy efficiency challenges, the Summit brought together some of the industry’s most influential thinkers to tackle the biggest issues facing the region today.

Among the prestigious speakers that took to the stage were HE Ahmad Buti Al Muhairbi, Secretary General, Supreme Council of Energy; Dr. Meshgan Al Awar Secretary General Zayed International Prize for the Environment, Dubai and Mr Abdulla Alshahyari, Acting Director of the Conservation and Efficiency Department at the UAE Ministry of Energy. With high-level delegates spanning the worlds of business, government and the media, the event provided a thought-provoking platform for two-way dialogue – with numerous takeaways that will go on to deliver real action.

Sharing insights is an important step towards creating tangible and lasting change. This first event has been a real success towards achieving our energy efficiency goals. Our hope is that the EEES will create an annual space for motivated organizations and individuals to come together and debate issues – through which we can find true solutions to the energy challenges we face.

Erdem Soyal, Project Sales General Manager for GE Middle East, Africa & Turkey
The EV 20 initiative started by the Climate Group in 2010 and supported by the PA2F is designed to speed up and develop the use of electric vehicles. The scheme groups together governments, states, automotive industries, owners of car fleets, financiers, and players working to promote the use of electric vehicles. The purpose of this task force is to focus on efforts designed to accelerate the automotive market transformation by 2020 by encouraging the participants to share best practice in policy, finance, and EV fleet procurement. The countries involved include: Australia, Canada, China, Denmark, France, Germany, the United States, the United Kingdom, the Principality of Monaco, Israel, Scandinavia and Holland. One of the first summits was convened at Monaco’s Pavilion at the Shanghai World Expo 2010 to explore how the world’s biggest and smallest countries are hoping to turn the world’s fleet electric.

In partnership with the United Nations Foundation, the PA2F hosted a dinner-debate bringing together over 150 personalities including political leaders, heads of international institutions, and key players in the economic world. The evening, during which the announcement was made of the establishment of a public/private partnership aimed at increasing energy efficiency in buildings, formed part of the initiative conducted by the United Nations Secretary General, Ban Ki Moon, entitled «Sustainable Energy for All».

The PA2F partnered with IDDRI (Institute for Sustainable Development and International Relations) to improve legislation concerning offshore energy exploitation, as an attempt to homogenise safety and governance standards on a global scale. This initiative was launched after a series of catastrophic accidents occurred on offshore oil rigs, causing deaths and serious ecological consequences. A dozen experts in the sector were brought together in Paris in March 2012 to produce a report on the offshore oil industry globally, but also in specific regions such as the Arctic and West Africa. The report encompasses the technical, economic and legal overview of the industry and identifies the main shortfalls in the current regulation in order for those shortfalls to be addressed in the second phase of the project.
PA2F FOSTERS DIALOGUE NOT ONLY IN EE

INFORM

2015

Conference

“Mitigating methane emissions” for COP21

The Veolia Institute organised, in partnership with the Agence Française de Développement and the PA2F, an international conference on innovative solutions to reduce methane emissions. The conference was held on November 9, 2015 in Paris. This conference had the institutional support of the French government illustrated by the official «COP21» label. Participants exchanged scientific knowledge, explored Saovurceailab: PA I2Fe mitigation options in the major emitting sectors—agriculture, oil and gas and waste—and discussed economic and financial mechanisms that could facilitate the development of these solutions for meeting the climate challenge.

2016

Forum | Energy Security For The Future

This forum tackled for the first time in Europe a burning issue that is energy security. The popularization of alternative energy sources was the core focus of this first edition of the forum that was held in Monaco in June 2016. Via an open dialogue with key stakeholders and decision-makers, as well as leading experts and businessmen, this event aspires to introduce effective technology and smart ideas into everyday life and facilitate the transition from fossil fuels to renewable energy. It facilitates discussion and the re-framing of ideas and views on perspectives of power safety development in Europe. This event is considered the most ambitious European project on energy security today. With more than 200 participants, and politicians from both the EU and from countries not members of the EU, this event symbolically shows how willing these nations are to develop a common security strategy involving countries, organizations and the civil society to address energy concerns and the security challenges countries are facing today.

2017


The 2nd edition of the Energy Security for the future international conference provided an annual debate and networking platform to discuss all issues involved in creating a secure, clean, and reliable energy future in Europe. The conference brought together leading European policy makers, key energy market players, and well known analysts and experts as well as energy customers, to discuss strategies for supporting the development of a European energy market that is unified, reliable trading ground, promoting and intensifying the introduction of cleaner energy sources, and highlighting new investments in energy infrastructure, innovation, and much, much more. . .

In 2017, the British professional team Adam Smith Conferences became official partners of the Forum, transforming the event into a truly global conference.

The topic of the 2nd edition of this Forum was chosen as “Energy Security for the Future: new vision, strategy, innovation” and the format’s international status was strengthened by the participation of new countries, including China and the United States, which sent official government delegations. More than 250 people took part in the work of the 2017 Forum.
The “PlanetSolar” expedition is the first global tour made by a boat powered exclusively by solar energy. The MS Tûranor PlanetSolar left Monaco on September 27, 2010 and returned on May 4, 2012, after 585 days. Its purpose is to demonstrate the power and efficiency of solar energy and to create a new approach to solar mobility. With close to 537 square meters of photovoltaic modules, the catamaran is the largest solar boat ever built and has an average energy consumption equivalent to that of a scooter. The solar ship now belongs to the Race for Water Foundation, who uses it for scientific missions and demonstrations with the objective of fighting against plastic ocean pollution.

The Hydroptere promotes the use of renewable energies and more specifically wind energy. Nicknamed the “flying boat”, this sailing boat is able to fly over the water thanks to a set of submerged wings designed by Alain Thébault, a pioneer of “flying boats”. In addition to reaching the magical 50-knot speed barrier in 2009, making Hydroptere the fastest sailing boat in the world, Alain Thébault, the project designer and Jacques Vincent, the co-pilot, decided to set off for Hawaii from Los Angeles, after a crossing of more than 4102 km. Hydroptere became the first flying hydrofoil to cross an ocean.
Solar Impulse is not the first solar airplane, but it is the first to fly day and night only using energy stored in its batteries without a single drop of fuel. Bertrand Piccard and André Borschberg decided to push back the boundaries of the possible and take on a project deemed impossible by industry experts, to complete the first Round-The-World Solar to support concrete actions for sustainability and show that the world can be run on clean technologies. They had to rise up to the technical, human and operational challenges associated with this pioneering initiative.

The Prince Albert II of Monaco Foundation, along with the Government have supported this journey by hosting the mission control center (MCC) in the Rainier III Auditorium in Monaco for the entire duration of the world tour. The plane left Abu Dhabi on March 9th 2015 and returned on July 26th 2016, after travelling more than 42000km over a total of 21 days of flight and 17 legs. It became the first solar airplane to have crossed an ocean when it flew from Nagoya, Japan to Kalaeloa, Hawaii for 5 consecutive days and nights.

You may be ending your around the world flight today, but the journey to a more sustainable world is just beginning. The Solar Impulse team is helping to pilot us to that future.

UN Secretary-General Ban Ki-moon

By proving that the impossible is possible, in just a few years Solar Impulse has done more than any discourse on innovation. It is a pleasure to make an attempt, to advance and to excel together.

H.S.H. Prince Albert II of Monaco
Energy Observer is the first hydrogen vessel, aiming the energy autonomy, with zero greenhouse gas emissions or fine particles. This former race boat, an outstanding competitor has been fully transformed into a vessel of the future, powered by electric propulsion thanks to a mix of renewable energies and a hydrogen production system that produces carbon-free hydrogen on board using seawater.

Behind this project lies a vision of the future which consists in drawing the energy needed from nature, without damaging it, and without wasting it. To do so, the team of Energy Observer has taken on both a human and technological challenge: building the first self-sufficient energy vessel with zero greenhouse gas or fine particulate emissions that is powered by hydrogen and renewable energies, thanks to energy coupling.

Energy Observer is also an odyssey around the world on the search for innovative solutions for the environment. 6 years, 50 countries, and 101 stopovers, to go and meet people who are designing tomorrow's future, and to prove that a cleaner world is possible. More than a vessel, Energy Observer is a media platform providing positive and inspiring content in favor of innovative solutions.
PA2F entered, in 2014, a joint partnership with organisers of the FIA Formula E Championship who wanted to show their support for the environmental actions led by the Foundation and help raise funds for future projects. Formula E is the FIA’s global motorsport championship featuring fully-electric open-wheel cars racing around 10 of the world’s leading cities including London, Miami and Monaco. The debut of Formula E ushers in an innovative age where a race on the world stage has become the platform to showcase and promote sustainable technology for the environment. During each race weekend, Formula E is hosting activities to help raise funds to be distributed between each official charity (ONE DROP and PA2F), along with projects across the country and other schemes in the local area. A total of over $1 million (USD) were raised in the first season by all gala charity auctions hosted during each race weekend all around the world.

Formula E is a perfect illustration of what can be achieved in terms of clean mobility with electric vehicles. The move towards a low-carbon economy is one of the key challenges of this century on which global climate change and the level of adverse consequences for the planet’s population will greatly depend. The development of a series of spectacular and exciting races will certainly be a key factor for raising awareness of these crucial issues.
EVER MONACO has associated since its creation in 2006 the promotion of two fundamental pillars of sustainable development: energy and mobility. Developing the use of renewable energy at the same time as energy efficiency is the first focal area of the EVER event, the second being cleaner mobility characterized by the increasing use of electric and hybrid vehicles for personal transportation purposes. Traditionally, three major initiatives are organized each year in order to increase awareness:

- An exhibition ‘the sustainable village’
- Scientific conferences
- Roundtables gathering the stakeholders of the sector

For four years now, EVER has been associated with the Riviera Electric challenge: Cagnes for ever, a course of 160 km between Cagnes sur Mer and Monaco, using only electric vehicles. Moreover, the Metha Europe 2018 will take place during EVER 2018. This innovative project contest focused on the sustainable city is held by incubators from the "Ecoles de l'Institut Mines Télécom,” together with their partners, and in partnership with EVER Monaco 2018.

EXHIBITION
THE “SUSTAINABLE VILLAGE”

Intended as a forum for discussion and professional meetings, the "sustainable village” area showcases ecological vehicles and renewable energy companies giving the public the opportunity to see promising RE technologies and try the latest products of the automotive industry in terms of electric vehicles.

SCIENTIFIC CONFERENCES

Researchers, academics and industrialists, involved in R&D projects are brought together for discussions on related topics. On the ecological vehicles side, propulsion systems and power supplies have been discussed over time while emergent renewables, wind and solar energy systems, smart grids, and efficient energy management in buildings are of interest in the first focal area.

ROUNDTABLES

These free-to-the-public events bring together various stakeholders including industrialists, engineers, researchers, local authorities and professionals. Each round table session, based on one main theme, addresses crucial and vital high-level issues and facilitates the exchange between public and private spheres.
PA2F AND ITS PARTNERS RECOGNIZE EXCELLENCE

**Energy efficiency innovators awards | 2012, 2014**

This initiative was launched by the Euro-Mediterranean Energy Efficiency Forum (EEF) in 2012 as a way to reinforce the core message that policy and decision makers should act on energy efficiency, often referred to as the low hanging fruit. In order to recognize best contributions in this field, the Energy Efficiency Innovator Awards initiative was started in 2012. This was then repeated in 2014 awards to help recognize and communicate smart actions towards energy efficiency in Europe and the Mediterranean basin. The 14 ex EEF’s board chose the winners of the four categories. These were then presented at the 2012 and 2014 editions of the EEF.

- **Communication Award**
  - Ms. Fiona Harvey
  - Mr. Arthur Nelsen

  Rewards the media/an organization for a particularly motivating communications campaign or other actions taken on EE.

- **Finance Award**
  - SUSI Energy Efficiency Fund

  Rewards a particular financial institution/organization that has developed and put in place effective EE financing vehicles/tools.

- **Business Model Award**
  - City of Berlin

  Rewards individuals/organizations that have groundbreaking ways of reaching more customers on EE.

- **Projects Award**
  - Ms. Yamina Saheb
  - Dutch Postcode Lottery

  Rewards individuals/organizations that have implemented remarkable EE projects at local, regional or global levels.

By improving individual energy performance, each of us is acting for the planet, whilst continuously maintaining our comforts and safeguarding our future. We should not forget that this creates economic momentum, which for once, does not recklessly consume our natural resources, but preserves the environment.

H.S.H. Prince Albert II of Monaco
3 IMPLEMENT
PA2F SUPPORTS EE&RE PROJECTS

KEY FACTS

The Foundation supports initiatives of public and private organizations, in the fields of research and studies, technological innovation and socially-aware practices. It concentrates its efforts on three main domains of action in three main geographical zones: the Mediterranean basin, the Polar regions and the least developed countries (as defined by the United Nations official list), such as the countries in Sahelian Africa. One of the three focuses of the foundation is on limiting the effects of climate change and promoting renewable energies, also the focus of this report.

22 EE&RE projects supported by PA2F since 2007

Invested on average in EE&RE projects each year

11% OF PA2F PROJECTS IN EE&RE... ... 22 PROJECTS OVER 2007-2017

Focus areas within EE&RE

Continents spanned

200 000€
PROJECTS TIMELINE

Nature of the project
- Solar
- Wind
- Biofuels
- EE / LED / Lighting
- Biomass / Agriculture

Implement

- Waste-to-energy from biogas in Pirita Arenas
- Planting lignocellulosic crops in Champagne-Ardenne/Franc, regions
- Introducing solar cookers built in local schools to populations in Morocco
- Production of an alternative fuel to charcoal in Kigali, Rwanda
- Sahel-Grenier: non-polluting and autonomous facilities for the cold storage of perishable goods
- Energy efficiency improvements in the Vile Girasole, headquarters of the Prince Albert II of Monaco Foundation
- BOREALE project: Electrification project using solar and wind energy in Madagascar
- Structuring a regional market for energy efficient wood cookers in Lower Guinea
- Marketing domestic fuel based on charcoal residues in Kigali, Rwanda
- Small Hybrid Energy in Guinea
- Renewable solutions for basic public services in Nabeul, Tunisia
- A territory devoted to excellence, which aims at 100% autarky in sustainable energy in Prats-de-Mollo, France
- Promoting the production of biocel from Jatropha Curcas in Kenya
- Pilot programme for the sustainable management of biomass in Morocco
- Eco-schools in Morocco
- Provide affordable solar lighting and electricity to communities in Laos through solar lantern rental systems
- Climate and Energy in West Africa (CEWA)
- Community light centers lit up by LED and photovoltaic technology
- Lighting the clear revolution: speeding up placing LEDs on the market in a number of countries
- Introducing Biochar in the Cyaza Region, Rwanda
- SCALE- up improved Cookstove Access toward better Life and Environment in Myanmar
- Solar energy for the household needs of households in Logo

PROJECTS GEOGRAPHICAL DISTRIBUTION

ON 4 CONTINENTS!

With a main focus on the clean electrification of the least developed countries

Nature of the project:
- Solar
- Wind
- Biofuels
- EE/LED/Lighting
- Biomass/Agriculture
All projects are focused on renewable energy, energy efficiency and biofuel production for local consumption. Selected for the purpose of this report are five projects representative of the Foundation’s commitment to innovative field projects. The selection was based on the PA2F’s involvement in the project.
EE&RE PROJECTS

1 ENERGY EFFICIENCY

SMALL HYBRID ENERGY, GUINEA, 2017: The PEHGUI project aims to improve living conditions for Guinea’s rural populations through sustainable access to electricity supplies. This is effected through the establishment of a mini-network powered by a hybrid power station of approximately 50kW using solar and fossil-fuel energy. The final part of the exercise is the connection of power supplies to households and social and community infrastructures. The electricity supplies are managed by a local provider, trained and selected so as to optimise operation whilst complying with the rules put in place by the Agence Guinéenne d’Electrification Rurale.

2 SOLAR ENERGY

TOWN OF NABEUL: RENEWABLE SOLUTIONS, 2017: The town of Nabeul has limited access to energy, and consequently its public services (town lighting, water treatment) work only sporadically. To remedy the detrimental effects on the environment and public safety, the ICU has installed two photovoltaic power stations to make up for the shortfall in energy. The use of solar power demonstrates the Town of Nabeul’s commitment to renewable energy. To reskill the local workforce, training in the management of photovoltaic systems is offered. The town administrators are trained to formulate and implement regional policies on sustainable energy. The long-term objective is to develop this project on a national scale, notably through awareness campaigns amongst the workforces of other towns in Tunisia and the neighbouring populations.

3 WIND ENERGY

BOREALE PROJECT: ELECTRIFICATION USING RENEWABLE ENERGY IN MADAGASCAR, 2012-2016: Access to electricity in rural areas of Madagascar is very low, only reaching 7% in 2009 and the few existing installations are generally powered by fossil-fuel generators, that not only pollute the environment but are also excessively expensive for the households using them. Despite an energy policy to promote the use of renewable energies, little action has been undertaken by the government for the implementation of affordable green energy. The BOREALE project consisted of providing power to 8 rural communities, or approximately 20,000 people, in the Anosy and Androy regions of Madagascar by using a combination of solar and wind energy. This project helped improve the quality of basic social services, in addition to developing local economic activities.
4 BIOFUEL

AN ALTERNATIVE FUEL TO CHARCOAL IN KIGALI, RWANDA 2009-2015 : This innovative approach to reusing solid domestic waste to produce a fuel used for cooking purposes not only tackles the issue of waste accumulating in uncontrolled dumps, having severe health and environmental consequences but also the issue of deforestation, by avoiding the destruction of 265ha of forest a year. It also has the social benefit of giving work to women, and a role to play within their community. This project was divided into two phases, the first being the development of a pilot production unit for this biofuel created from charcoal dust in Kigali (2009-2011), and the second being the marketing of this highly efficient biofuel, cheaper than charcoal.

5 BIOMASS/AGRICULTURE

SCALE UP IMPROVED COOKSTOVE ACCESS TOWARD BETTER LIFE AND ENVIRONMENT, MYANMAR, 2017 : In Burma, 80% of the energy used in preparing food comes from wood charcoal. A study by GERES has shown that kitchen equipment used for cooking is often of mediocre quality because customers have access neither to proper information about what they are buying, nor to better quality alternatives. The aim is therefore to introduce, in response to the success experienced in Cambodia with a similar exercise, as many ICSs (Improved Cook Stoves, that use only 30% of the fuel normally required) as possible. The project is split into two phases spread over three years. The improved stoves are initially introduced into homes, with training for manufacturers and also for users. An awareness campaign is then developed in order to create national demand.

FOCUS

SOLAR ENERGY FOR DOMESTIC USE, TOGO, 2017: In Togo, more than 80% of the energy needs of rural and suburban households required for cooking food are met by using wood charcoal. The environmental consequences are major: deforestation, greenhouse gas emission, etc. But the social repercussions are just as significant: the women go long distances and spend a long time looking for wood, or have to buy it at very high prices. In order to limit or stop wood consumption, this project aims to introduce and encourage the use of solar ovens, cookstoves and dryers in households in the Savannah region. Initially, training is offered to 50 artisans of the Groupement Inter Professionnel des Artisans du Togo (GIPATO / Savannah region) who will then be able to manufacture solar ovens, cookstoves and dryers from local materials (iron, plywood, kapok, glass...) to meet household energy (cooking) needs. The next stage is to make women and young girls aware of the advantages of these new materials so that they adopt new methods of cooking and processing food.
The Prince Albert II of Monaco Foundation has also developed a reduction and voluntary offset programme entitled “Monaco Carbon Offsetting” (MCO2) as part of its actions against climate change. This scheme, created in 2008, was designed for individuals and companies wishing to voluntarily offset their greenhouse gas emissions and is available on the Foundation’s website. In addition to only offering certified carbon credits from projects presenting all UNFCCC (United Nations Framework Convention on Climate Change) guarantees, it also emphasizes the need to carry out eco-efficient measures prior to any offsetting.

In 2012, PA2F has partnered with SMEG to broaden the scope of this initiative. SMEG now offers its customers the possibility to offset the entirety of their emissions linked to their natural gas consumption.

**HOW DOES IT WORK?**

Any individual can trade all or part of its greenhouse gas emissions with an equivalent amount of “carbon credits” bought from a third-party. These “carbon credits” allow for the financing of carbon sequestration or greenhouse gas reduction projects guaranteed by the UNFCCC. The individual can choose from various projects which to support.

The PA2F has contributed to the financing of 8 different renewable energy projects around the world by offsetting its own carbon emissions since MCO2 was implemented. As part of the selection process, careful consideration is given to the social and environmental impacts of the projects (e.g. For landfills, leachate production must be controlled and waste pickers must be included in the plan).

- **Methane gas recovery** from landfills in Argentina, Brazil and Chile
- **5MW and 4.5MW hydroelectric power plants** in Himachal Pradesh, India
- **4.5 MW Hydroelectric power plant** in Fugon, China
- **30 MW and 49.5 MW Wind farms** in Duchang and Ongniud Qi, China

**75,000**

Tonnes of CO2e offset by PA2F since 2008
AN ENERGY RETROFIT ON A « BELLE ÉPOQUE » VILLA, THE VILLA GIRASOLE IN MONACO

The Prince Albert II of Monaco Foundation has also developed a reduction and voluntary offset programme entitled "Monaco Carbon Offsetting" (MCO2) as part of its actions against climate change. This scheme, created in 2008, was designed for individuals and companies wishing to voluntarily offset their greenhouse gas emissions and is available on the Foundation’s website. In addition to only offering certified carbon credits from projects presenting all UNFCCC (United Nations Framework Convention on Climate Change) guarantees, it also emphasizes the need to carry out eco-efficient measures prior to any offsetting.

1. Heat pump replacement  
   ▶ 15% reduction in electricity consumption
2. Windows replacement  
   ▶ Further 24% reduction in electricity consumption
3. Solar photovoltaic panels operational: 60 sqm, 36 panels  
   Building Management System (BMS) installed with sub-meters General low-voltage panel upgraded

4. General low-voltage panel upgraded
5. Main door automatized - Avoid losses (e.g. door left open with AC on)
6. Replacement of the remaining windows and the offices’ stained-glass windows
7. Roof insulation retrofit  
   ▶ Further 15% reduction in electricity consumption
8. Central staircase’s stained-glass windows retrofit  
   General study regarding fan coil replacement
9. Fan coil replacement with regulator system

Yearly electricity consumption & production

-58,79%  
Electricity consumed (2017 vs. 2005)
The 36 solar PV panels were installed in 2010 and were fully operational in 2011. The panels were installed facing different directions: South, East, and West. By including the East and West orientation, the low winter sun late in the afternoons and early in the morning could be harnessed. The electricity produced is first self-consumed by the villa. Any extra production is fed back into the grid. On average kWh/year have been reinjected since 2012 on the SMEG distribution system. This occurs the weekend, when the villa is unoccupied the load is minimal.

The heat pump was replaced in 2005 to improve the efficiency of the building and achieve savings. A 15% reduction in energy consumption resulted from this upgrade. The heat pump still accounts for most of the building’s consumption, up to 67% in summer and winter. The fan coil replacement works planned for 2018 aim at further improving the efficiency of the ventilation system. The regulation system will also help control the ventilation system energy consumption and hence achieve a load reduction for the villa. In February 2017, The Prince Albert II Foundation was certified ISO 50001: Energy Management.
4
FUTURE DIRECTIONS
SYSTEM CHARACTERISTICS

INFORM

-Reinventing the Energy forum
Combine EE and RE into one forum, a hybrid version of the EEF and the EVER forum with an exhibition area divided in two (EE & RE) with startups showcasing their latest innovation in the field. The sole focus of the EVER forum will be on ecologic vehicles, which is the sector mostly represented today in the forum, so as to avoid diverting all the public attention that could go to renewable energy innovation to the trendy automobiles showcased as part of the exhibition.

-Follow the EEES model with additional countries
Partner with organizations in the least developed countries for initiatives similar to the EEES (e.g. China, India, African countries...). This will raise the local population’s awareness of the burning need for their countries to leapfrog coal and go straight to clean energy.

IMPLEMENT

-New /underserved geographies for EE&RE projects
Keep the focus on least developed countries but targeting underserved areas of the globe (e.g. India, South-East Asian or South American countries).

-Support events in the principality only powered by renewable energy
Partner with the government to organize renewably-powered outdoor events such as concerts (e.g DC Solar business model)

-Continue to set the example with the PA2F Headquarters
Continuous improvement on the compliance with the ISO management system standards (e.g ISO 500001:2011) to eventually achieve carbon neutrality by 2050.

INSPIRE

-Foster more local innovation in two steps
1. Seek local innovative companies, initiatives or R&D efforts to support.
2. Consider awarding EE&RE scholarships for students to become experts in the field provided they help the foundation in their efforts over summer and/or after their studies.

-Intensify the awareness raising effort on EE/RE topics locally
More specifically targeting the young population in a similar way to what is being done with biodiversity. Some ideas include an art exhibition on the “beauty” of RE (e.g. artistic pictures of wind & solar farms) as an attempt to overcome the NIMBY syndrome or starting educational programs in schools – “energy week” with workshops and talks and/or a contest between classes in schools where the class that emits less CO2 in a specific month wins an award.

-Incorporate EE&RE awards to annual PA2F awards
Beyond climate change, similar to the EEF awards but on a yearly basis

POTENTIAL ROUNDTABLE DISCUSSION TOPICS ON RE, EE & EV:
- Cybersecurity risk of increased EE connectedness given “smart” devices
- Future of RE without subsidies
- Future of nuclear in France and the impact on carbon intensity of the electricity in Monaco if Nuclear is phased out
- How to integrate the electric fleet to the grid and use it as grid storage?
- Marine energy potential for Monaco (SBM Offshore)
- Water-Energy nexus
PA2F MISSION AND KEY SECTORS OF ACTIVITY

The Prince Albert II of Monaco Foundation was created by H.S.H. the Sovereign Prince in 2006 and is dedicated to the protection of the environment and the promotion of sustainable development on a global scale. In achieving its objectives, the Foundation strives to promote sustainable development, taking into consideration all existing social and economic challenges and operating in a context of growth. The Prince Albert II of Monaco Foundation is active on an international level and is committed to raising awareness about the impact of human activity on the environment among governments and populations. The Prince Albert II of Monaco Foundation aims to reconcile environmental protection with progress, placing human wellbeing at the centre of all issues related to the environment.

3 MAIN OBJECTIVES

- To limit the effects of climate change and promote renewable energies.
- To safeguard biodiversity.
- To manage our water resources in a sustainable way and combat desertification.

3 PRIORITY GEOGRAPHICAL AREAS

- The Mediterranean basin
- The Polar regions
- Least Developed Countries (defined by the official list of the United Nations)

PROJECTS ARE SELECTED BY A DEMANDING GOVERNANCE

A VISIONNARY AND ENGAGED BOARD OF DIRECTORS A PRESTIGIOUS SCIENTIFIC AND TECHNICAL COMMITTEE

16 members define the Foundation strategy and control its 13 multidisciplinary world-known experts gather as a think-activities under the presidency of H.S.H. Prince Albert II of tank and define the strategy for each intervention domain of the Monaco Foundation.

I decided to set up a Foundation whose purpose is to protect environment and to encourage sustainable development. (...) By definition, this is a common global challenge that requires urgent and concrete action, considering three major environmental stakes: climate change, biodiversity and water.

H.S.H. Prince Albert II of Monaco
“The issue is: can growth be inclusive? Can we have prosperity for all and still maintain this planet? Question for you here? Can we have a world where the rest of us are very comfortable, raw materials coming from south and then these billions of people without energy. That’s unacceptable.”

Kandeh Yumkella

“The challenge and opportunity is to take energy efficiency that has always made sense for some and make it make sense for everybody”

Steve Howard

“What do we have in common? Looking for solutions is what we have in common”

Bertrand Piccard about FPA2

“The problem with our society is that, despite all the grand talk about sustainable development, we are a long way from making use of the clean technologies that are already available to us. Those solutions bring opportunities to create jobs, make profit, sustain the growth of the industry, and at the same time protect the environment.”

Bertrand Piccard

“The strong commitment over time of the Prince Albert II of Monaco’s Foundation – in pilot initiatives as well as in bigger projects – offers the protagonists involved on the ground an impressive innovation and action capacity to contribute to advancing progress in sustainable development to protect the planet and its inhabitants. The scientific expertise, the high standards and the reputation of the Foundation provide a strong guarantee to the actions implemented by the GERES. They represent an additional value to the financial support provided by the Foundation to renewable energy solutions we implement to combat poverty and protect the environment from climate change. ”

Mathieu Ruillet, Executive director, Group for the Environment, Renewable Energy and Solidarity
PA2F efforts in EE&RE not possible without our partners

INFORM

- Johnson Controls
- The Climate Group
- AUD

IMPLEMENT

- Philips
- Sunlabob
- ITERe

INSPIRE

- Solar Impulse
- Formula E
- IDDRI
- EVER Monaco
- anemoos