

ARUBA'S SUSTAINABLE FUTURE

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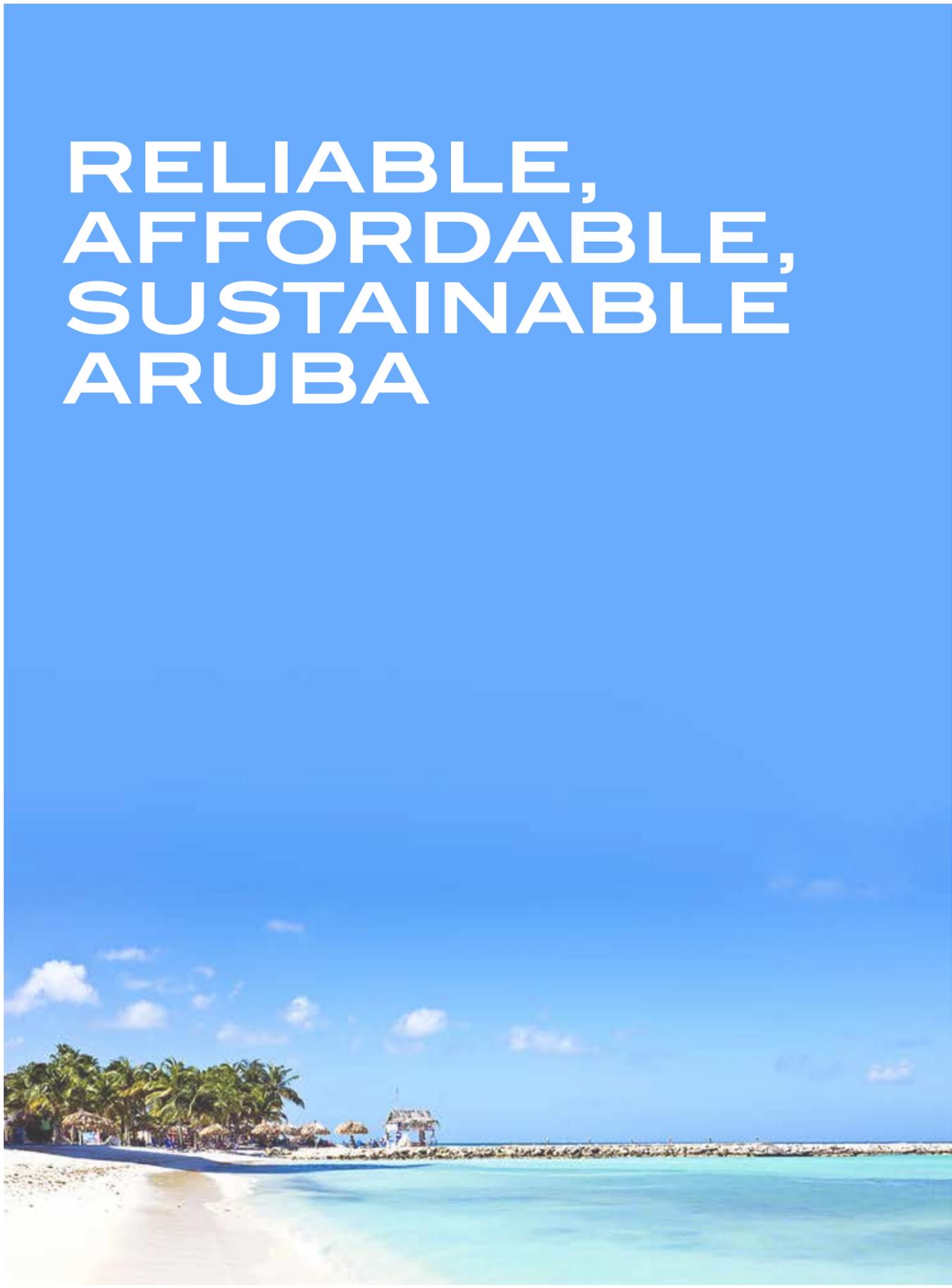
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RELIABLE, AFFORDABLE, SUSTAINABLE ARUBA



Aruba may be one of the smallest islands in the Caribbean, but nobody could accuse it of lacking ambition. Utilities Aruba, the private, state-owned company that manages the generation, distribution and transmission of its energy and water, plans to ensure the island has 100 percent sustainable power by 2020.

It's a lofty aim, especially when compared to the European Union's target for its members: ensuring 20 percent of total energy generation is renewable by the same date. But Utilities Aruba firmly believes that reaching for the sky is justified. "Some will say [2020] is too soon, but it doesn't really matter. A target has been set and achieving it is what matters," says Frank Hoevertsz, managing director of Utilities Aruba. "Kennedy said that in 10 years they would put a man on the moon. People laughed, but he made it in 10 years."

The company is made up of two working firms, WEB and Elmar. WEB generates electricity, which it sells to its sister company, and produces water through desalination of seawater before its distribution. Elmar owns the Aruban electricity distribution grid and distributes the power that it buys from WEB.

In 2009, the government introduced a new strategy for its utilities, prioritising the inevitable environmental concerns of a small island and also moving away from reliance on the fluctuations of the oil market. This approach was crystallised in the so-called RAS framework – "Renewable, Affordable, Sustainable" – and the 2020 sustainable energy target, announced at the Rio+20 conference in 2012, was its flagship policy aim.

Those leading the sustainability project say Aruba is the ideal place to implement it. Its location just off the coast of Venezuela means it is both out of the hurricane belt yet exposed to 2,500 hours of sun per year – more than enough to make solar energy a viable venture – as well as enough wind to keep turbines spinning. Aruba's climate also allows year-round testing of new energy technologies, but, as a report by the FIAS financial advisory group has pointed out, the island's merits go beyond bountiful sunshine: "Aruba is blessed with more than just a good climate. It has an able population, a tradition of good government, a stable and predictable business environment, and the excellent quality of life that these create."

"Aruba is gaining knowledge and expertise on various technologies from several partners and each step brings us closer to 100 percent sustainable production of water and electricity," says Mike

de Meza, minister of economic affairs, communication, energy and environment and deputy prime minister of Aruba. That expertise is being developed in solar energy for large and small installations, grid stabilisation and solar penetration, as well as wind energy technologies. Meanwhile, Utilities Aruba is looking at other renewable energy options to ensure stability of output should there be a shortage of wind or sun. These include ocean thermal energy conversion, a technology driven by the difference in temperatures of ocean water, and geothermal power. Energy storage technology is another key area of research. In addition, the government and Utilities Aruba are also focusing on construction and the need to hone practices and technologies with a view to increasing the efficiency of buildings, as well as water consumption and recycling.

OJ Boekhoudt, general manager of WEB, insists that the aim of keeping costs down must remain at the forefront of the project. "The magic isn't producing power with alternative techniques, that's the easy part," he says. "We need to produce it affordably, at or below the price our customer has been paying."

Robert Henriquez, general manager of Elmar, adds that "the challenges ahead also include creating a skilled workforce, and employees need to have relevant and up-to-date skills to respond to market changes".

While Utilities Aruba oversees the massive shift towards renewable energy, it is replacing heavy fuel oil with natural gas as a transitional fuel, to be transported to the island in a liquid state as LNG. Meanwhile, it is also attempting to make major energy savings on the demand side, especially in cooling. Tax incentives and reduced import duties on efficient equipment seek to help in this area, as will planned energy audits of government buildings.

"[We] cannot look at neighbouring islands and learn from their experience, because no island has gone so far with its efforts," says Utilities Aruba's Hoevertsz. "We will be leading many other islands, but these are exciting times, as well as challenging times. Dealing with the challenges requires a lot of studies, investment and financing."



Interview

MIKE DE MEZA

Minister of economic affairs, communication, energy and environment and deputy prime minister of Aruba

Mike de Meza outlines what the Aruban government is doing to transform the island into a focal point for knowledge, technology and services for both the Americas and Europe, and explained Aruba's progress toward full sustainability by 2020.

What role can Utilities Aruba play in the establishment of the island as a centre of excellence for the export of knowledge to countries and territories in the region?

During the Rio+20 Conference in June 2012, the government of Aruba announced its goal to provide the island by 2020 with 100 percent sustainable energy. Utilities Aruba is playing a key role in this transition towards the use of alternative energy sources and its participation is elemental to reach Aruba's 2020 sustainability goals. The company has acted as a conduit for the government's strategy and helped facilitate the adoption of sustainable technologies and efficiency measures with innovative business models at the national utility services companies of Aruba.

What are Aruba's key strengths as an emerging knowledge hub?

Aruba is the ideal location for generating sustainable energy. The combination of 2,500 annual hours of solar energy and 5,000 annual hours of wind energy on the island is unique. Thus the climate of Aruba offers the perfect conditions for year-round testing of new technologies. There is a great opportunity to develop cooperation with research institutes and for universities to use the facilities in Aruba for research and development in the winter months, combining this with the touristic attractions of Aruba.

In addition, our location is easy to reach from the Americas and Europe, and the multicultural flavour of the island and our population's ability to speak several languages is key to overcoming communication and business barriers.

What is the ministry doing to channel investment into Aruba's growing knowledge economy?

The Eman administration is focussed on growing Aruba's sustainable energy sources. It has done so not only because the reliance on fossil energy increases expenses for both households and businesses, but because this transition also provides possibilities for new economic activity, and fits into the broad vision of sustainability – a path em-



“The government’s strategy calls for Aruba to grow into a gateway in the industries of knowledge, technology and services to and from Latin America, whereby the local green energy sector will serve as a catalyst.”

barked upon since 2010.

To foster these economic activities, our ministry has established two additional economic zones. Combining their physical location in combination with a package of customised stimuli, Aruba's economic zones will attract local and international businesses.

What smart projects are underway, or are being planned?

Aruba is working together with TNO and other key stakeholders on a project called the Smart Community, where 20 houses are being constructed. This will be a large experimenting ground for existing and emerging technologies.

The solar park at the airport will be the largest in the Caribbean, and the second wind park, Urirama, will almost double the wind energy capacity of Aruba and will further deliver on the reduction of foreign oil imports and electricity price stability.

A waste-to-energy plant will be constructed, which will supply biogas to the electricity production plant therefore reducing the dependence on fossil fuel as a source.

How will the transfer of know-how and technology contribute to Aruba becoming 100 percent sustainable for the production of water and electricity by 2020?

Aruba is gaining knowledge and expertise on various technologies from several partners, and each step brings us closer to 100 percent sustainable production of water and electricity. So far, the introduction of the wind parks, the solar plants, the distributed solar installations in homes and buildings, the improvement of efficiency for electricity generation, air conditioning, illumination and water production are all key factors for us to reach our goals.

What can you tell us about partnerships such as ‘Smart Growth Pathways’, the joint project between the government of Aruba and the Carbon War Room?

Important partners such as TNO, GasUnie, Anthony Veder, the Carbon War Room, New America Foundation, Harvard University, along with pioneers in sustainability such as Carbon War Room's Richard Branson and Wubbo Ockels, are working with Aruba in a spirit of cooperation, harmony, and prosperity to embrace sustainable development and to reach the next 50 percent of our goals. It will take a concerted effort to develop storage facilities at the utility service companies, smart grids to stabilise the energy supply and demand-side management.

How is Aruba's government engaging the private sector in its sustainability initiatives?

The government of Aruba not only engages the private sector in its initiatives, but it also showcases them in regional events such as the Green Aruba Conference, 'Europe Meets the Americas' and other platforms where opportunities exist for local companies to network with foreign companies. Fiscal incentives in the form of reduced import duties for solar panel systems, electric cars, inverter air conditioners and LEDs have also been in place for the last few years. Furthermore, the three economic zones provide fiscal incentives and regulatory stimulation for the private sector.

What would you identify as the key areas of research and development in Aruba, and where do you see the opportunities?

The opportunities range from solar energy for large and small installations, grid stabilisation and solar penetration in different levels of transmission and distribution, to wind energy and cooling technologies. Other key areas include in construction, where further research is needed on best practices and technologies to make buildings more efficient. Water consumption and recycling, and electric mobility and grid interaction are further areas for development.

What is your vision for Aruba in the future?

Aruba will emerge as an international leader in the large-scale implementation of sustainable measures. Other countries, especially island nations, will look to Aruba for guidance and contacts to replicate the same kind of developments.

“Achieving a high percentage of sustainability will reflect not only on the island’s energy sector of the island but also on all the other sectors.”

“Aruba is the ideal location for generating sustainable energy. The combination of 2,500 annual hours of solar energy and 5,000 annual hours of wind energy on the island is unique.”





Dr. Edward Cheung
CENTER FOR INNOVATION

GREEN IS COOL

Aruba, under the visionary leadership of its prime minister, Mike Eman, has set itself the ambitious goal of 100 percent fuel independence by 2020. To meet this goal, there are many aspects to tackle, and without acceptance, commitment and participation from Arubans, it will be hard to achieve.



Writer
Juliet Carvalhal

Spurring change

In January 2013, the Bureau of Innovation, along with the first Dutch astronaut, Dr Wubbo Ockels and partners from the private sector, formed a public-private partnership to catalyse change and tackle Aruba's future today. From this partnership, the Green'S'Cool programme was developed as a way to involve Aruba's secondary school students in Aruba's vision for 2020. Green'S'Cool's fun, creative approach has led to astounding innovation among the students as they work to turn their schools green: at the programme's grand finale in June 2013, one school even combined several of the programme's topics to create a circular economy on its property.

Building partnerships

Last year, at Green Aruba IV, Green'S'Cool launched its Growums pilot project in an elementary school. Together with the Excel Academy in Washington, the schools collaborated and learnt from each other about growing their own vegetables and herbs. The lesson here is that if children grow their own healthy food, they will eat their own healthy food. The first pizza cook-out, using school-grown tomatoes and basil, was held in March 2014.

In April 2014, 2,700 students attended the Green Education Symposium (GES) III, hosted by the National Library of Aruba and co-facilitated by Bureau of Innovation. The theme was sustainable food supplies. With 99 percent of Aruba's food being imported from overseas, it is



The Green'S'Cool programme was developed as a way to involve Aruba's secondary school students in Aruba's vision for 2020

vital to involve the country's teens in the goal of reaching a 20 percent sustainable food supply, organically locally grown on Aruban soil.

and start changing their surroundings.

Taking the message global

In the last few months, Green'S'Cool has grown and crossed borders to the United States and various countries within Europe as Green'S'Cool Friends. Its unique hands-on approach, its PPP structure and its key message is very exciting. For Aruba, there is no longer a question mark over the path to sustainability. Through Green'S'Cool, and its myriad other initiatives, the island has created a multi-faceted, hands-on approach involving the community, the private sector, non-governmental institutions and the government, all working together towards the common goal of sustainability by 2020.

Spreading the word

In another hands-on approach, the Green'S'Cool movement has appointed Aruba's first Green'S'Cool Change Agent. At the GES III, star student Hanna Arends enthusiastically participated in the Green'S'Cool workshop and inspired attendees with ideas for greening their own neighbourhood. She was selected to go into neighbourhoods to approach and recruit more students and citizens, getting them involved in educating their own communities

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SMART COMMUNITY ARUBA

As Aruba pushes ahead with its full sustainability project, it is not only focusing on industry and businesses. Smart Community Aruba is a 20-unit planned residential complex that will encapsulate the spirit of innovation that the island hopes will drive it towards a 100-percent green future.



Writer
Carlos Tapias

Utilities Aruba describes the project as a living lab, where sustainable ideas can find a practical application while their viability is assessed. In February 2014, several parties involved in the enterprise signed an agreement confirming their contribution. As well as representatives of the government of Aruba, Utilities Aruba, WEB N.V., ELMAR N.V., national telecommunications company SE-TAR and the public housing agency FCCA were also present, as was the independent Dutch research and development institute TNO, which has been operating in Aruba since 2011. Through real-life testing and demonstration, Smart Community Aruba will involve its residents in moving applied sustainable technologies from concepts to practical application. The key objective is knowledge development relating to scalable technology solutions and business models to help make Aruba's transition to sustain-

able energy a reality.

Land has already been cleared for this living lab in Kibaima, in the centre of the island, and the project is scheduled to be completed by the spring of 2015.

Experimenting on supply and demand

The main objectives of the planned neighbourhood include gaining valuable experience in the integration of renewable energy into the smart grid, where the island's 5,000 hours of wind and 2,000 hours of sun per year will be an enormous asset. Smart Community Aruba will also see the evaluation of sustainable construction techniques and efficiency measures, as well as research into improving water and waste management techniques. A large part of the project will focus on the demand side, with the eco-neighbourhood also aiming to generate important data about con-

sumer behaviour.

Once knowledge and experience is gained from this Smart Community project, Utilities Aruba will be introducing these results into the more than 40,000 other homes on the island.

Aruba hopes that this kind of project will have not just environmental repercussions but also substantial economic ones, fomenting a knowledge-based economy and taking the emphasis off Aruba's relatively large tourism industry.

With the island's very particular geographic and climatic features forming the context for this real-life experiment, those involved hope that it will be an attractive prospect for private investors who wish to test sustainability-related products, and Aruba is an ideal setting for showcasing their solutions. "However, it is also a challenging test environment due to the harsh climatic conditions including high speed winds, high UV

factor and salt corrosion. A successful performance on Aruba will therefore be a real seal of quality and future selling point," says Carlos Tapias, financial analyst of Utilities Aruba N.V. and member of the committee of Smart Community Aruba.

There is also scope for private investors to take part in the scheme by sponsoring experiments, showcasing their own technology or testing and certifying technology. Partnerships can be developed on a project basis.

A regional springboard of sustainability

A series of concrete experiments focusing on both supply- and demand-side sustainability have been planned for Smart Community Aruba. The obvious areas of solar and wind power performance and reliability are among them, but so too are power storage solutions that seek to boost energy grid

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stability as well as building designs, retrofitting strategies and electric transportation. The areas of water and waste management will also see various innovative tests, such as decentralised water purification, water production through waste-

water treatment and biogas production. With only 20 homes, Smart Community Aruba will be relatively small, but Utilities Aruba, the government and the other stakeholders hope its successes can be exported elsewhere on a larger scale. While Aruba is contemplating becoming a springboard for technology between Europe and the Americas, it is also seeking to push the boundaries of sustainable innovation, and the expectations is that many will look to this small island for inspiration.

As Tapias, points out, sustainability isn't just in energy production: "It is everything around you, and it is a lifestyle. We choose to become 100 percent sustainable, a long process for sure, but by taking one step at the time, and what we gain is our contribution to planet Earth. Aruba is becoming a reference point for the rest of the region, and hopefully to the world."

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Interview

DR FRANK HOEVERTSZ

Managing director of Utilities Aruba

Dr Frank Hoevertsz, as managing director of Utilities Aruba, is leading the charge to transform Aruba into a hotspot for sustainability and renewable energy, and hopes to inspire other countries around the world with the same enthusiasm. He explains the challenges, both technical and social, of increasing sustainability and talked about what Aruba can offer to the rest of the world as a hub for green development.



“With our vision and strategy we could demonstrate the world that something had to be done with this growing global footprint problem.”

What are Utilities Aruba's main objectives?

Utilities Aruba is a private state-owned company with two working companies, WEB and Elmar. WEB, besides producing both power and water, also takes care of the distribution of water, while Elmar is the owner of the power transmission and distribution grid. Five years ago a new vision was introduced by government, which was adapted by all the utility companies. A cleaner environment and a more sustainable way of living became the objectives for the production of both power and water. Utilising heavy fuel oil in our power generation is unsustainable both due to its high level of CO2 emission and to its many uncertainties in supply and demand, as well as volatile prices.

The new vision brought the challenging strategy of becoming independent from fossil fuel, by introducing more renewable energy. Even more complicated is keeping tariffs affordable.

How feasible is Aruba's strategy to become 100 percent sustainable by 2020?

We know that by Aruba becoming 100 percent sustainable tomorrow morning won't a difference on the global scale in terms of carbon footprints. But we can pass the enthusiasm of our activities and experiences to the rest of the world, becoming the forerunner and a pioneer.

Our mission is to reach 100 percent sustainability by 2020. Some will say that is too soon, but it doesn't really matter; a target has been set and achieving it what matters. Kennedy said that in ten years they would put a man on the moon. People laughed, but he made it in ten years. But if he had made it in 12 years, it wouldn't have made any difference. It's about the vision, creating targets, and the bigger picture. Whether or not we make it by 2020, the most important achievement would be convincing the rest of the world.

How are you putting your strategy into place?

On the supply side, we have three pillars. One is reaching a higher degree of efficiency in our actual conventional energy and water production. Secondly we are trying to replace the heavy fuel oil

with natural gas as a transitional fuel, transported to the island in liquid form. The third pillar is increasing the penetration of renewable energy in our grid.

On the demand side, there is one big adage: “The greenest energy of all is the energy you don't use”. The idea therefore is to retrofit the island and change electric appliances for more efficient ones. In Aruba, 50 percent of the energy demand comes from cooling. This is basically a low-hanging fruit. If we can reach more efficiency in cooling then we will have a big gain in energy savings. There are no subsidies being provided, however we are providing fiscal incentives and recently we introduced lower import duties on efficient equipment, especially refrigeration and air conditioning. Soon an extensive replacement of all existing streetlights to more efficient LED fixtures will start, as well as energy audits for efficiency purpose in government building and schools.

“We will be leading many other islands, but these are exciting times, as well as challenging times.”

How important is creating awareness among Arubans of energy sustainability?

Awareness and consciousness is another part of our challenge. To change a light bulb to a LED is easy, but when it comes to changing people's behaviour, there is need for a broader approach.

Other than wind and solar energy, what other renewable energy resources are you exploring?

Currently in Aruba we have a growing portion of intermittent renewables in our energy mix. What if we reach 100 percent and then we have three or four days of no wind? What if these days are also rainy days with limited sun? We need to have a renewable energy source for our base load that is not intermittent. One possibility could be ocean thermal energy conversion. This technology uses the difference in sea temperatures to generate energy. There is a company working on this new technology and obtaining good results with a pilot project, but with limited capacity and thus it is not really shelf-ready yet. A second possibility could be geothermal, but we have not determined yet the feasibility of this in Aruba.

What does Utilities Aruba think about this potential that Aruba has to set the pace for the rest of the Caribbean and become a hub for green technology?

Many Caribbean islands know of our efforts and success in our energy efficiency projects, which has seen us reduce our heavy fuel oil consumption in the last couple of years from 6,300 to 3,800 barrels per day, despite growing energy demand. This sets the pace for other Caribbean islands.

What sort of collaboration can we anticipate between the UK and Aruba in renewable energy?

We need strategic alliances to get enough support. We have an alliance with Richard Branson's Carbon War Room, which is an organisation that has declared war against carbon emission. Both Branson and the CEO of Carbon War Room, Jose Maria Figueres (the former president of Costa Rica) are strong believers in Aruba's potential. We are also inviting other UK partners to join our Smart Community Aruba effort.

What are you expecting for 2014?

On the energy mix side, we are practically done with the second wind farm, and it's ready for deployment, and becoming operational late 2015. A 3.6MW solar park is under construction at the airport and will become the largest Caribbean solar energy source. Other smaller projects, like a waste to energy project which will produce biofuel, are also underway.

On the storage side, we are now going to start a pilot with underwater compressed air. We will use the excess unused or curtailed wind energy to drive an air pump and store this volume of compressed air in underwater storage tanks. It's basically a large underwater balloon, and whenever energy is needed, a valve will be opened to let the air flow in the opposite direction, which drives a generator to produce the required energy. Studies are also ongoing for pumped hydro and ice storage, which in combination with flywheel technology should solve the instability of wind and solar energy supply.

“We would like our initiative to become an inspiration for others, and where action meets ideology.”

What would you like to achieve during your time in your role?

As managing director of Utilities Aruba and as guardian of the vision of our shareholder, the first accomplishment will be to structure and execute all the projects, technically

and also financially, so that Aruba's energy production is more reliable, affordable and sustainable. Furthermore the aim is to achieve the necessary attention and urgency from the demand side, to convince more people to follow our mission and persuade them to be more conscious of their energy consumption. A cleaner environment will lead to a more sustainable earth. We would like our initiative to become an inspiration for others, and where action meets ideology.

Sustainability does not know a finish line; it only knows higher levels. It's like innovation; you're never done innovating, it's an ongoing process. Our neighbouring islands are getting in touch with us to assist them into moving to a cleaner fossil fuel. Aruba is becoming a reference point for the rest of the region, and hopefully for the world.





Aruba boasts one of the world's best locations for wind power, with 5,000 hours of wind per year

EMBRACING THE WINDS OF CHANGE

With a new wind farm about to go live and the implementation of innovative energy storage solutions, Aruba is well on the way to meeting its sustainability targets, becoming a world leader in wind power generation along the way.

With an actual capacity of 30MW, Aruba's current wind power production represents about 15 percent of its total consumption, which places it fourth globally and still some way behind Denmark, the current global leader, which produces 26 percent of its power from wind. But today, with a second wind farm about to be deployed, Aruba is set to double its wind energy output, placing it firmly in first place.

"We are practically done with the second wind farm at Urirama," says Frank Hovertsz, managing director of Utilities Aruba, who adds that it is expected to become operational in late 2015. This second wind farm will have a capacity of 26.4MW, but due to its

longer blades will be more efficient than the island's current wind farm, Vader Piet, and will ultimately be able to produce more energy. Dutch venture capitalists Bright Capital Partners are arranging the financing for the project, which has been overseen by wind developer Vader Piet Beheer, while the wind turbines are coming from Danish firm Vestas.

Aruba boasts one of the world's best locations for wind power, with 5,000 hours of wind per year, and to make the most of this resource, the two wind farms will be as spread out as much as is possible on a tiny island. Vader Piet is located on Aruba's northeast corner, while Urirama will be located to the northwest.

An unreliable resource

Increasing wind generation capacity brings challenges, especially in terms of reliability of power production. While in Europe or the USA energy supply reliability is guaranteed by the many different forms of production, on an island like Aruba it is a completely different scenario. With just one power plant, the country is totally dependent on backup capacity in the absence of wind production. This challenge arises not only when wind levels are lower, as is the case during the Aruban autumn, but also when sudden wind speed fluctuations occur. This intermittency factor of wind energy can result in sudden drops of up to 50 percent of wind production.

In Aruba, actual load demand varies between 130MW during peak hours to a low point of 70MW during the early morning. So far, the island has been able to manage sudden power fluctuations from the existing wind farm, but with Urirama becoming operational, a sudden drop in wind power could easily result in a drop in production of as much as 25MW, with conventional power being needed to absorb this drop. The slow ramp-up time of the heavy fuel oil-powered turbines also means that there may be some delay before this back-up supply fills the gap.

Storing energy

Storage is the only solution to resolve these issues, but, with the exception of battery solutions, adequate storage technology isn't yet available. Even new, proven, long-life battery technology doesn't

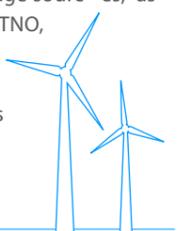
meet Aruba's unique needs. In determining the right storage source for the island, reaction time was key, and therefore flywheel technology was chosen as the best short-term solution, while for the longer term, Aruba has opted for an as yet unproven method: underwater compressed air storage.

By early 2015, both of these solutions will be operational, which not only lays the ground for the effective deployment of the Urirama wind farm but also enables the country to reduce wind energy curtailment – when wind farm output is reduced due to insufficient demand – to below 2 percent.

At this point, and combining all of Aruba's efforts in other renewable solutions, the country's sustainable energy production will have risen to over 40 percent, another step closer to its ultimate goal of 100 percent.

A sustainable vision

Utilities Aruba, together with WEB, Elmar and all the other energy stakeholders, believes in its sustainable vision and is determined to execute it. With plans afoot for a third or even fourth wind farm, more megawatts of solar energy, more biofuel, and other technologies in combination with other storage sources, as well as support from The Carbon War Room and TNO, Aruba believes that implementing its mission is achievable. What is more, Aruba hopes it can set an example for its neighbouring islands in sustainability.





Interview

OJ BOEKHOUDT

General manager of WEB Aruba

With no natural source of freshwater and scarce rainfall, Aruba's water needs are harder to meet than most. Producing electricity for the island's population, which is swelled by the huge influx of tourists each year, is also a tough job. But WEB Aruba, the island's water and electricity production company, is rising to the challenge. OJ Boekhoudt, whose experience in the oil, gas and energy business spans the globe, leads the company. He outlines his approach and talks about WEB Aruba's initiatives to drive the island towards its sustainability goals.

What are your goals for water supply and power production in Aruba, and where do you see the challenges?

My main goal in power generation and production is to stay ahead of the ever-increasing cost of conventional fossil fuels, particularly petroleum derivatives. At the same time I strive to meet the demand for high-quality water and reliable power at the best price possible.

The greatest challenge on the road ahead is the volatility of the energy industry and rapid price changes in heavy fuel oil. Since we cannot predict the future with respect to heavy fuel oil, we need to stay ahead of the pack and ahead of energy development. The cheapest fuel is the fuel you don't need, meaning we need to reduce our barrel consumption.

What are you doing to create positive change in Aruba's energy and water sectors?

We want to enable economic development by stimulating business creation; in the end this also stabilises our own wellbeing within the economic framework. At the same time we are focusing on educating the upcoming generation

on the topic of energy and water due to the increasing cost of energy and the scarcity of water. With all this in mind we see ourselves not as a key player but in a supporting role, contributing to the development of energy and water policies and legislature.

How is WEB Aruba contributing to help Aruba achieve the ambitious energy goals for 2020?

As the major power supplier for the island, our contribution is significant. Our first step is to reduce our fuel consumption by operating more efficiently. The second step is gradually introducing cleaner and more sustainable power generation processes. The approach is to operate efficiently, introduce green technologies and store the energy that you can't feed into the grid for future use. With this in mind I think our contribution to the goal of 2020 is crucial to achieving the final goal.

What do you consider to be the main challenges of maintaining a reliable, stable, and sustainable island grid network when incorporating renewable energy?

“We can't yet say if all our projects will be 100 percent successful, but at least we will learn how not to do things. The main focus is moving forward, not staying in the same position.”

The magic isn't producing power with alternative techniques, that's the easy part. We need to produce it affordably, at or below the price our customer has been paying. That is the tough part, because typically alternative power generation processes are not the cheapest ones. We are trying to counterbalance the cost by introducing a mix of different technologies.

How is WEB Aruba tackling the issue of energy efficiency?

From the producing side we are trying to produce power and water as efficiently as possible. We are producing as many megawatts as possible, with as few barrels as possible, by combining conventional and sustainable processes.

At the same time we are focusing on the demand side of the energy usage equation; our country needs to be educated about using power responsibly.

What projects and partnerships is the company involved in?

One collaboration we are excited about is Aruba's second wind park, which will be located at Urima, expanding our wind generation capability. This project is in an advanced stage of development, approaching the financing stages, but not yet in execution.

Another interesting project is our biogas project which will produce synthetic gas. Our partner in this project will produce gas out of domestic waste and organic waste from commercial and residential properties which will then be used as fuel to generate power.

Waste to oil is another project we have which will process used oil, from engines, motors and fuel tanks on land as well as from ships and refineries, to produce fuel. This fuel can, once treated, be used to drive our boilers and turbines. The benefit of these projects is twofold; we rid the island of organic waste and waste oil, which would otherwise be in landfills, while reducing our need to purchase traditional fuel oil.

Another partnership we have is in energy storage systems. We are developing an underwater pressurised air system with the company Hydrostor. This system is a one of a kind installation, which once implemented will be the first in the world. Another development that goes hand in hand with our energy storage system is our flywheel project. This technology enables us to take advantage of almost all the wind energy currently being curtailed, thereby further reducing consumption of fuel oil.

Lastly, we are developing an ice storage pilot program; this stored ice will be used to cool large buildings. We plan to use our headquarters as a model and later expand the use of this technology to help us shift power production from day to night.

How would you like to see Aruba develop as an example for international energy practices?

We see Aruba as a leading island in the region. Our combination of isolation and small population create a challenge. Most islands do not have the natural resources to generate power, meaning we need to take advantage of what nature gives us; the wind and the sun.

What does the future hold for WEB Aruba?

Our future holds much work dedicated to changing our future, in a structured manner, putting planning our future first and letting the day to day work follow. We believe in our vision and we are determined to execute it. As Thomas Edison so brilliantly said: "Vision without execution is hallucination," and we do not believe in hallucination. We can't yet say if all our projects will be 100 percent successful, but at least we will learn how not to do things. The main focus is moving forward, not staying in the same position.

“The greatest challenge on the road ahead is the volatility of the energy industry and rapid price changes in heavy fuel oil. Since we cannot predict the future with respect to heavy fuel oil, we need to stay ahead of the pack and ahead of energy development.”

“We're going to make our best attempt to at least approach the ambitious goal the island wants to reach by 2020. We may not attain it, but at least we will be well on our way.”



WATER TO BE PROUD OF

As a small, semi-arid island with practically no surface water and little groundwater, providing its population of 110,000 plus the more than 800,000 tourists who visit annually with enough water is a major challenge for Aruba. Today, after almost 80 years' experience in desalination technology, the island has managed to ensure sufficient water availability, boosting its economic development.



It wasn't always thus. The first population of Aruba, nomadic Arawak Indians, stayed only for a short period of time at places where enough water could be found. Later, the island's growing population would collect rainwater in dry riverbeds and pump groundwater out of wells, using a variety of methods to purify the water they collected, from limestone jars to calabashes.

In the early 1930s, WEB Aruba first used seawater desalination to provide water for the then population of 17,000. These first installed evaporators had a capacity of 200 cubic metres per day. From 1932 to 1958, ten more of these evaporators were installed. In 1958, the beginning of combined power and water production was initiated and five evaporators with a capacity of 2,000 cubic metres per day started running. These evaporators stayed in production for 25 years and were only demolished in 1983.

A period of growth

The island's expertise in the sector grew rapidly, and by 1959 Aruba was the world's largest producer of desalinated seawater, although it has since been overtaken by the Gulf States. In 1965, multi-stage flash (MSF) desalination technology, which distils seawater by flashing a portion of the water into steam in multiple stages, was introduced at WEB

Aruba with the installation of a 3,000 cubic metre per day evaporator. In the 1970s, the island's desalination production capacity was extended with two evaporators with a nominal capacity of 6,000 metric tons per day, which ran until 1985. Due to rapid economic growth between 1990 and 1998, WEB Aruba was forced to further increase production capacity with five new MSF evaporators.

Today, desalination remains the island's only means of providing water, and especially for the tourism industry, the most important economical pillar of Aruba, the 100 percent operational and delivery assurance of high-quality drinking water is of the utmost importance.

After decades of desalination activities, Aruba has gained enormous experience, and has now opted to phase out MSF technology and move toward seawater reverse osmosis (SWRO). One such plant is already in operation since 2008, with the second in operation since 2013 due to come online at full capacity by the end of 2014.

The distributed drinking water in Aruba is of the highest chemical and bacteriological quality, with constant checks performed by the WEB Aruba as well as the laboratory of the Aruban government's health department.



Writer
Dr Ir Filomeno
A Marchena
Advisor Sustainable Water Technology and Innovation

Innovating desalination

Due to the high cost of producing desalinated water, Aruba needs to ensure that there are minimal losses. Through a strict water control programme, the country has cut leakage down to a bare minimum, and water theft is practically non-existent. The current non-revenue water percentage – measured by the difference between billed water and produced water – in Aruba is between 2.6 and 4.1 percent, as compared to as high as 60 percent in the rest of the region.

Keen to remain at the forefront of advances in desalination technology, Aruba is working hard on the development and application of innovative, and most importantly environmentally-friendly, practices, as well as continuously seeking to improve the efficiency of current technology.

Nowadays, as a result of its ingenuity, Aruba, once dubbed "useless island" by the Spanish conquistadores due to its lack of resources, can say that its water is among the best in the world, both in quality and taste.

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CUTTING EMISSIONS AND COOLING ENERGY COSTS

On 4th February 2014, the Aruban government and Utilities Aruba unveiled a new cooling system at the main office building of WEB, the country's electricity generator and water producer. The new installation harnesses cutting-edge technology to help deliver on the vision of a greener, lower-cost energy future for Aruba. A partnership between thermal energy storage company CALMAC, air-conditioning supplier Trane and mechanical contractors Pro-Tec, the ice storage system uses stored ice to cool buildings, replacing traditional air-conditioning technology.



A cooler island

While the island's renewable energy initiatives, such as solar and wind power, are obvious areas of focus as it pursues its goal of becoming 100 percent green, Utilities Aruba believes that temperature management will also be crucial in cutting emissions and energy costs. "In Aruba, 50 percent of the energy demand comes from cooling," says Frank Hoevertsz, managing director of Utilities Aruba. "This is basically a low-hanging fruit. If we can reach more efficiency in cooling then we will have a big gain in energy savings." According to CALMAC, those savings could be as high as 40 percent over the 20-30 year life span of the cooling system. Johnston County Schools in North Carolina, which has already installed the technology, has estimated that it will save US\$28-US\$35 million across its 19 schools over the next four decades.

From day to night

Aruba may not see the sweltering heat of many other Caribbean islands, but at 27C-32C its average temperature is consistently high through-

out the year. That may be pleasant for the island's thousands of tourists, but for those working in office environments cool air is a necessity rather than a luxury, while it also makes sleeping much more comfortable.

The main concept behind the new cooling system is to "recharge" by producing ice at night, when electricity is cheaper and the load on the grid lighter. During the following day, that charged-up cooling power is used to keep buildings at the right temperature. The apparatus itself is easier to install than traditional cooling technology, while its relatively simple design, involving few moving parts, makes it relatively low-maintenance – an attraction for companies seeking to cut down on costs and paperwork. This is particularly advantageous to larger enterprises, as OJ Boekhoudt, general manager of WEB, points out.

The technology also means that the production plant can optimise wind energy production, because any excess of wind energy during the night won't have to be curtailed, while "peak shaving" – when the demand for electricity exceeds the available power generation capacity – will decrease during the day.

The main concept behind the new cooling system is to "recharge" by producing ice at night, when electricity is cheaper and the load on the grid lighter.

"This project will apply mostly to our larger and industrial clients," says Boekhoudt. "We plan to use our headquarters as a model and later expand the use of this technology to help us shift power production from day to night."

Small is cool

CALMAC says that any enterprise that meets two of the following requirements can install the system: having a building over 100 tonnes, having a cooling system that uses chilled water or having enough time during a 24-hour period to produce the ice needed.

The company also asserts that the ice storage system improves on traditional coolers in terms of size management. Most conventional designs, it estimates, require 20 percent more capacity

to accommodate larger-than-anticipated cooling loads or possible equipment failures. However, that extra space is rarely, if ever, used, cutting into the system's efficiency. The ice storage design is able to meet those safety margin requirements with stored ice but without needing extra space. A smaller system, CALMAC says, can still offer the same cooling capacity.

Some major enterprises already believe that ice storage is the future of cooling technology, including The Durst Organization, the New York real estate firm which prides itself on prioritising sustainability and innovation. "Beyond the cost-saving aspect, we selected this technology because it reduces peak electrical load on the grid. This lowers the need for building new power plants," says Jody Durst, the company's co-president.

Utilities Aruba believes that temperature management will be crucial in cutting emissions and energy costs

"We plan to use our headquarters as a model and later expand the use of this technology to help us shift power production from day to night."

OJ Boekhoudt, general manager of WEB Aruba



Interview

ROBERT HENRIQUEZ

General manager of NV ELMAR



NV ELMAR is the sole provider of electricity in Aruba. It was established in 1950 as a privately-owned company, and the government of Aruba became its majority shareholder in the early 1990s. Today, through innovation and awareness-raising, NV ELMAR is making a massive contribution to Aruba's goal of 100 percent sustainability by 2020. General manager Robert Henriquez discusses the company's initiatives.

“The role for ELMAR is to both educate and inspire our customers to make decisions that lead to the goals of 2020.”

What does sustainable living mean for you and for Aruba?

The value of sustainable living is not only measured in wealth. More important is the wellbeing of the community in general. On the professional side, sustainable living also includes generating and distributing power in a reliable way whilst maintaining its affordability for the community. On the personal side, sustainable living is a combined effort making use of our resources, including our human resources. The goal is that the next generation's future is equal to or better than ours.

What are your current priorities for the alternative energy sector?

Being ultimately responsible for the distribution grid our priority is to maintain high standards of stability and reliability of the grid as well as financial stability for the company. We also adopted the term 'RAS', which besides being a well-known Aruban family name, stands for reliability, affordability and sustainability, with affordability being the key factor.

How do you see your role, and that of NV ELMAR, in achieving the sustainable energy goals for 2020? What do you see as the main challenges in achieving those goals?

Achieving our sustainable energy goals will also include demand-side manage-

ment. Almost 50 percent of our energy consumption comes from the use of air conditioning for cooling and in that regard many efficiency gains can be obtained with the proper information. We want people to understand and eventually be part of these solutions, and therefore we need to educate them with awareness programs. The role for ELMAR is to both educate and inspire our customers to make decisions that lead to the goals of 2020. Passion is a key in reaching these goals. Solutions for technical challenges most of the time only require investments, but creating solutions through building people's consciousness is harder and takes a little longer.

With numerous projects implemented already, such as the first solar park project for Aruba, deployment of prepaid metering and LED street lighting, what other initiatives are currently being planned for the island?

The first solar park project in front of the airport is underway and we expect the project to be completed by the end of 2014. The LED street lighting project will soon start and we expect to have completed the instalment of 12,000 fixtures within the next three years. Pre-paid meters were also introduced some time ago and their introduction will continue as we introduce our latest initiative, the smart meter project. Smart grid and smart metering will be the focus for further penetration of renewables to the grid while also engaging more in demand-side management.

How will a smart grid help Aruba become more sustainable?

Nowadays, when a customer turns on the air conditioning, the power supplier has to meet this demand at whatever production cost. The key principle of a smart grid would be the possibility of having some control of the demand of consumers. This will allow the power supplier to operate its power production more efficiently, gaining on production costs, and ultimately also increasing reliability. The strategy for success will be making the customer aware of the advantages and therefore a strong and continuous marketing campaign is imperative.

How do you see the future of domestic energy solutions?

Up until 2012, the Aruban people only knew about power coming from the utility companies. Convincing them they could switch to their own power supply and at the same time sell the surplus to ELMAR has not been easy. They were a little reluctant and hesitant. We are now close to 1 MW installed capacity of solar and we expect this to increase, although cost is still a barrier to residential solar. Hopefully either this cost will drop considerably or solar panels will become more efficient. We are seeing a steady increase in applications for solar installations as well as requests for quotations, and ELMAR will keep promoting and selling solar solutions.

NV ELMAR was responsible for the installation of prepaid meters for electricity supplies in Aruba. What is the ideology behind the initiative and how will its impact and efficiency be measured?

By moving towards a more service-oriented business model, we expanded our services, giving our customers a choice. A prepaid meter is a choice for customers who want to have better control over their consumption and billing. Prepaid meters were part of the sustainability awareness programme, and what started as a pilot became very popular among consumers. Research clearly shows that the clients accepted this new service, and even more importantly they became conscious of their consumption. This consciousness is really how the efficiency on the demand side will be measured.

How successful has the introduction of electric and hybrid vehicles in Aruba

been? Are there plans for further transport-related sustainable initiatives on the island?

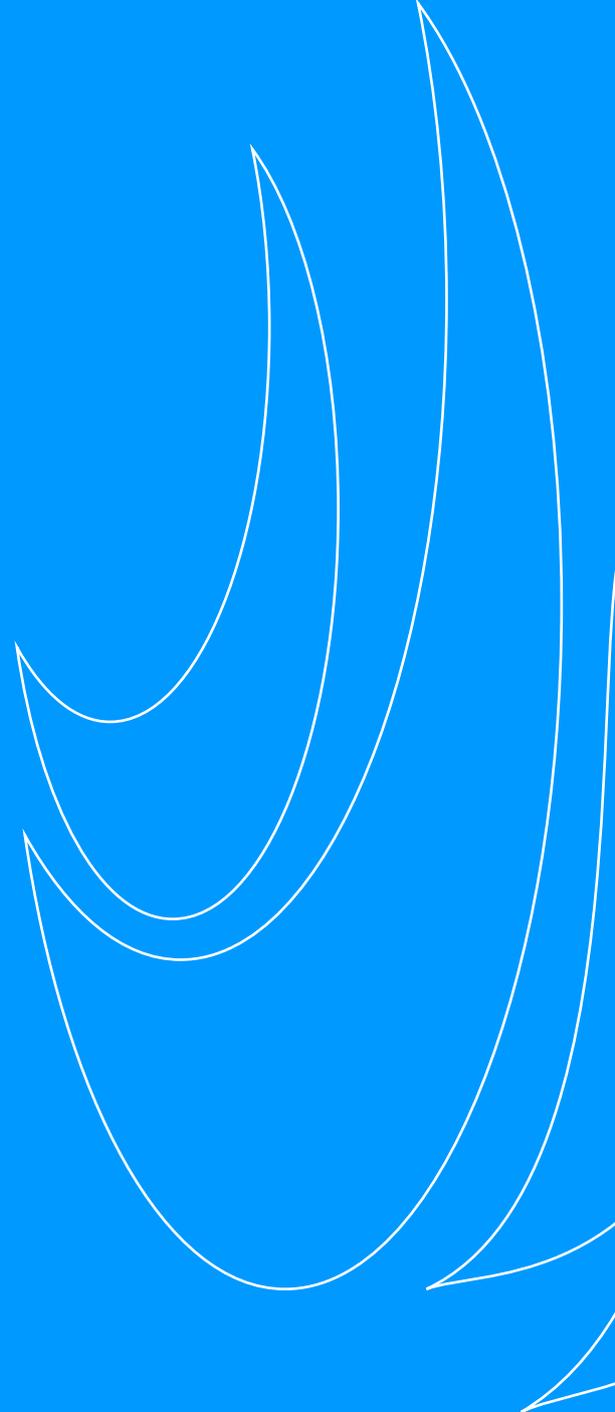
Our electricity demand after midnight is very low and with the high percentage of wind power availability during these hours it became obvious that more load in this period was needed. And what better way to charge your electric car during this period, while your car is in the garage? Furthermore, having all these batteries connected to the grid also creates a power storage source. The introduction of electric vehicles is part of the total scope of our power production and distribution plan, but it is still in a very early stage. Our public transportation company has invested in an electric bus, while both WEB and ELMAR have their own electric cars being tested. Hybrid vehicles have been a little more successful. ELMAR has created some electrical charging systems in order to promote this initiative.

What would you consider to be your proudest achievements to date for sustainable living in Aruba and what is your vision for the future of the island's energy landscape?

It is a team effort and we as a team find that executing alternative energy solutions is one of our proudest achievements. Serving our clients and offering alternative products and services is also something we are proud of. Our vision is to provide excellent service and create sustainable value for our customers, employees, community and other stakeholders.

“The value of sustainable living is not only measured in wealth. More important is the wellbeing of the community in general.”





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