IRENA QUARTERLY
April 2015

FINANCING PROJECTS FOR TRANSFORMATION

Photo: Energy Unit, Ministry of National Security / Mount Soufriere, St Vincent

Fuel prices in St. Vincent and the Grenadines are among the highest in the world.

These small Caribbean islands are highly dependent on imported diesel fuel, the pricing of which tends to be volatile and inflated. Moving to a sustainable energy path that uses indigenous, stable and affordable energy resources would help communities in the small island developing state grow and prosper.

However, indigenous geothermal sources can boost the power supply and help lower energy costs. But as promising as underground heat may be, it requires high upfront costs, and drilling entails heavy investment risks. This puts such schemes beyond the reach of St. Vincent and the Grenadines.

Indigenous geothermal sources can boost power supplies, helping to lower energy costs

Fortunately, finance for a 15 megawatt (MW) geothermal power project near Mount Soufriere on the island of Saint Vincent, has become available thanks to a loan facility that seeks to promote renewable energy worldwide. The International Renewable Energy Agency (IRENA) and the UAE-based Abu Dhabi Fund for Development (ADFD), have collaborated to offer a concessional loan facility worth USD 350 million over seven years for renewable energy projects in developing countries. Already, 11 projects have been selected for USD 98 million of concessional finance to cover up to 50% of their costs. The rest must come from other lenders, including other national, regional and international development institutions. The concessional loans of USD 15 million will be provided to the St Vincent and the Grenadines geothermal project from ADFD at a 2% interest rate with a 20 year loan period including a 5-year grace period.

Other projects being supported through the facility include a small hydropower plant in Argentina that will provide power, as well as pumping irrigation and clean drinking water to inhabitants of Nahueve. A solar plant in Cuba, which will provide energy

stability, help the environment and create jobs, to a small-scale 5 MW geothermal project in Ardebil, Iran that is receiving a loan of six million dollars. The local population of 150,000 people will benefit from electricity, as well as thermal energy that will provide local heating, support greenhouse agriculture and fish farming.

The aim of the 10-15 MW geothermal energy power plant for St. Vincent and the Grenadines is to be connected to the energy grid, thereby providing a consistent power source for the entire country and influencing the deployment of additional geothermal projects in the Caribbean.

The project looks set to transform the island country of 104,000 people. Three quarters of all energy would be provided by renewables, in line with national climate, energy and economic development objectives. This would move the country from fuel-import dependency to a sustainable self-reliant energy path. The ground-breaking project could also spur further geothermal developments around the Caribbean.

"We will slash our USD 27 million import bill, drastically reduce our carbon footprint, and enhance our energy independence and security." said H.E. Camillo Gonsalves, Minister of Foreign Affairs, Foreign Trade, Commerce and Information Technology. "Most importantly the project will ensure a roughly 25% reduction in electricity bills for end-consumers below current prices, which has wide ranging impacts on national efforts on poverty reduction."

The project will receive 50% of its finances through the IRENA and ADFD project loan facility; 30% will be financed through equity from the partnerships between the Government and the private consortium.

Projects selected for financing in the first and second cycle represent a combined total capacity of 56 MW and will bring reliable and sustainable power to 580,000 people that are currently lacking access to modern energy services. The IRENA-ADFD project facility has completed two cycles, providing concessional loans with USD 98 million to date.

Second-cycle projects receive USD 57 million in loans

Country	Project and Technology	Loan	Benefits
Argentina	4 MW hydropower	USD 15 million	• Energy and pumping water for irrigation and drinking
Cuba	10 MW solar PV	USD 15 million	• Energy stability, creating jobs
Iran	5 MW geothermal energy	USD 6 million	• Energy for heating and agriculture
Mauritania	1 MW hybrid system (wind, solar, hydro)	USD 6 million	• Energy for small rural communities
St. Vincent and the Grenadines	10-15 MW geothermal energy	USD 15 million	• Supporting consistent energy provision for the country

The third cycle is being implemented, with interest rates of only 1%-2% available on concessional loans extending up to 20 years, including a 5-year grace period. These improved ADFD lending terms applied retroactively will support an even broader range of renewable energy projects.

Please see the website at **www.irena.org/adfd** for further details.


Photo: Shutterstock / Solar panels

Africa: Planning for Renewables

Africa has vast reserves of renewable energy that could be used to produce clean sustainable electric power. These include hydro, solar power, wind, biomass and geothermal sources. But tapping into the continent's renewable energy potential requires long-term planning and modelling to find the right mix of technologies in each country and region, and public policies to promote renewables and lower deployment costs. For the growing number of African states producing natural gas, renewable energy development could free up the hydrocarbons for export, thereby adding to state revenues instead of consumption by power plants.

Renewables currently comprise 17% of Africa's total electricity-generation mix. A recent report from IRENA, combining the results of five regional studies in Africa, found that between 240 gigawatts (GW) and 460 GW of new generation capacity is needed by 2030. Renewables could comprise anywhere from 22% to 60% of that total, depending on policy support, costs, and the development of major projects, such as hydropower facilities at Grand Inga, on the Congo River in the Democratic Republic of Congo.

As African countries are largely connected by land, regional power pooling has proven effective at reducing power shortages. Therefore five regional power pools have been created that cover the continent's mainland.

IRENA's studies envisioning future power-generation scenarios in regional groupings based on those pools, estimate demand and supply under certain variables: the extent of policy support for renewables; the level of regional trade in electricity; and with or without certain large-scale projects with potential continental impact. These scenarios were developed using System Planning Test (SPLAT) modelling tools, and the results were shared with African leaders ahead of IRENA's fifth Assembly in January. IRENA will support African countries in using these modelling tools on their own to further refine their future energy scenarios.

In Central Africa, the models suggest that generation capacity needs to rise from the current 5.6 GW to 36 GW by 2030 in order to meet demand. A large proportion of that increase could come from Grand Inga, which could contribute 4.8 GW of new capacity by 2023 and up to 40 GW in the years to follow, potentially emerging as a significant source of electricity for West and Southern Africa.

In West Africa, where current capacity of 10 GW should rise to 60 GW by 2030 in order to meet demand, more than half of the capacity could come from renewables, led by hydropower from within the region and from Grand Inga.

In Southern Africa, imports from Grand Inga would be a major element in the expected 110 GW of new capacity, of which almost 80% could come from renewables. However, without policy support to lower the costs of renewable power installations, this contribution could drop to about 55%.

In East Africa, where wind and geothermal resources are plentiful, exports to other countries, in particular Egypt, could help further reduce reliance on fossil fuels for electricity generation in the future.

The gas-rich countries of North Africa, which are also rich in solar potential, could benefit enormously by freeing up natural gas either for export or sale in domestic markets. The analysis showed that these countries could collectively increase state revenue by USD 15 billion annually if renewables supplanted natural gas in power generation.

The findings from the Africa Power Sector: Planning and Prospects for Renewable Energy (synthesis report) are available on the IRENA website:

www.irena.org/publications


Photo: Masdar

IRENA Moves into New Headquarters

In March 2015, IRENA relocated from its temporary headquarters in downtown Abu Dhabi, to its new global headquarters complex in Masdar City, the clean tech hub on the outskirts of the UAE capital. The 32,000 square-metre complex is made up of three interconnected buildings, which work together to conserve energy and water and create shared space.

The opening of IRENA's permanent offices is also a milestone in the clean energy movement, symbolising maturity for renewable energy, as well as at the agency. While world leaders have grasped the need to replace fossil fuels with renewables, technology costs are falling to competitive levels, and renewable energy investment and deployment are accelerating.

The IRENA Headquarters and other buildings in Masdar City look ahead to a cleaner energy future for the UAE — a major oil producer and exporter that also enjoys rich solar energy potential. The new building enables IRENA to lead by example, by operating one of the most sustainable of any international organisation worldwide.

Building facts:

• The building received Four Pearls, the highest possible rating from Estidama – a UAE-certification system measuring energy, water and carbon efficiency. This is the first Four Pearl building in the UAE.

• Thanks to passive design and smart energy-management systems, the complex uses 42% less energy than global energy-efficiency standards and 64% less energy than typical buildings in Abu Dhabi.

• The complex demands roughly 50% less water than typical buildings in Abu Dhabi.

• The windows deflect 90% of direct solar radiation. Permanent shades installed outside maximise the light entering, while minimising the heating effect.

• A 1,000 m^2 solar photovoltaic rooftop system produces the equivalent of 305,000 kWh of electricity annually. A solar water heater system produces the equivalent of 85,000 kWh of heat per year, for total solar power and heat generation of 390,000 kWh annually, supplying 75% of hot water demand. This self-generation meets more than 10% of the complex's total energy demand. The rest comes from Masdar City, which is self-sufficient in terms of power generation.

• Thanks to an efficient building envelope, the IRENA headquarters is twice as airtight as required by Estidama, reducing overall energy use.

• The air conditioning system recovers 75% of the energy released in exhaust air, using this to cool incoming fresh air.

• Electrical power is harvested from regenerative drives on the building's elevators.

• Building construction made use of Abu Dhabi's green-supply chain, using low-carbon, locally-sourced, sustainable materials, including recycled steel, and recycled-content aluminium and cement.

The building will be officially inaugurated at a launch reception in June 2015.

Photo: IRENA

Model IRENA Simulates Council for New Generation

The agency set up to promote renewable energy worldwide conducted the first-ever Model IRENA debates in its host city of Abu Dhabi in April 2015. Model IRENA is a simulation exercise, mimicking the workings of IRENA's 21 member Council, one of the organisation's governing bodies. In its inaugural year, Model IRENA gathered more than fifty active, committed UAE youth leaders from New York University Abu Dhabi, Sorbonne University, Masdar Institute, Khalifa University, and the Petroleum Institute.

Paulius Urbonas, a student from New York University, representing Poland at Model IRENA, said:

"I have gained new insights into sustainability and renewable energy. Model IRENA is more about content and less about procedure. It has been hard to work in large groups and produce something together."

Model IRENA aimed to offer participants:

• Insights into the operations of an intergovernmental organisation;

• A better understanding of the agendas of different IRENA member countries around the international energy transition;

• Training in critical thinking, research and debating on the most up-to-date topics in the renewable energy field;

• Direct access to the Agency's renewable energy experts and opportunities to engage with the diplomatic community in the UAE;

• Perspectives in developing and advancing professional aspirations in an international setting.

Student Jeren Garryeva from Sorbonne University, representing the Republic of Korea said:

"It gives a clear picture of how the sustainable energy debate works at an international level. This has been a great experience."

The event featured a full-day debating session, preceded by four days of training, mentoring workshops, social activities, and an opening event featuring IRENA's senior staff and Agency stakeholders.

Next year, IRENA plans to extend the Model IRENA programme internationally.

For more information visit the **Model IRENA** page

MODEL IRENA
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Briquettes: Lightening the Biomass Load

Despite impressive growth in some economies, South Asia's population is still poor by global standards. Much of this poverty can broadly be attributed to limited availability, affordability and accessibility to energy and water resources.

Bioenergy resources, however, are plentiful throughout the region, and in countries like India, and Pakistan, can be exploited safely and sustainably.

Biomass briquettes or pellets offer a more efficient energy conversion process

Firewood, a form of biomass, has been collected and used for cooking and heating for millennia. Agricultural residues are another source of biomass, but their low fuel density limits their use and leaves extensive waste to be burned. Unfortunately, such traditional biomass use contributes to health problems, such as tuberculosis, puts the burden of firewood collection on women and children and adds pressure to forests. In India, for example, cotton residues that could be used as an energy resource are piled, and the resulting burning leads to environmental pollution as well as severe health problems. The alternative even in poverty-stricken communities, is natural gas or kerosene, primarily imported and expensive.

India has roughly 18% of the world population, 3% of global energy and 1% of water resources, according to World Bank data. Economic growth is limited by low literacy rates, chronic unemployment, weak political and economic systems, heavy debt burdens, vulnerability to natural disasters; and in some cases conflict and instability.

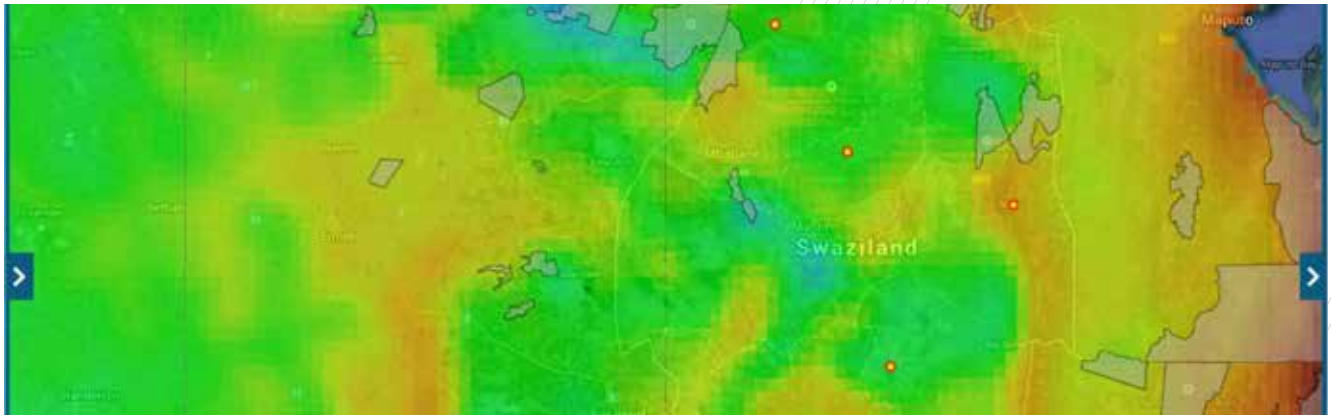
The challenge is to derive innovative business solutions that merge the objectives of business profitability with social development and change. Access to affordable and reliable biomass resources can fuel economic growth, create substantial employment opportunities, improve living standards and alleviate poverty.

One business which checks all these boxes is biomass briquettes or pellets, offering an efficient conversion process, enabling existing biomass resources to be used for modern residential, commercial and industrial heating requirements. The technology enables ordinary biomass to be converted into a standard product with defined specifications and performance criteria. This represents a saving of up to 30% compared to regular fuel costs in India, so that demand for briquettes is rising.

Historically, the transportation of low-density biomass has constrained its use, for example, a 20-tonne truck can carry only 2 tonnes of biomass. This problem can be averted by directly employing and enabling farm labourers to transport biomass to a central plant,

In India, clean energy companies, employing more than 10,000 labourers, have been able to substantially decrease their transportation costs for biomass through labour-intensive methods that are ingenious and efficient transportation methods employed by farm labourers. The manufactured briquettes are supplied to consumers, complemented with the provision of reliable briquette stoves rated at 30%-35% efficiency. By comparison, the efficiency of firewood stoves is in the range of 8%-12% and natural gas stoves around 40%. Biomass briquettes are now supplementing coal in industrial boilers and power plants, and the business model is already being replicated in other parts of the developing world.

For more information on biomass see the IRENA-ETSAP technology brief, ***Biomass for Heat and Power***



Spatial Planning for Solar and Wind Power: IRENA's Global Atlas

As a country moves towards a sustainable energy future, it needs to identify the renewable resources available for development.

The cost of performing large-scale, long-lasting measurement campaigns over entire countries can be a barrier.

High-level zoning approaches lack the details needed for final investment decisions, but can significantly reduce the cost of preliminary analysis when a country first sets out to establish a renewable energy market. International donors, in turn, are enabled to assist countries that choose such a direction, avoiding the need for multi-million-dollar measurement campaigns at the outset.

IRENA's Global Atlas for Renewable Energy, with help from the Berlin-based Renewables Academy AG (RENAC), added a new feature: a spatial planning module for renewables.

Starting with the evaluation of wind speeds and solar irradiation, users calculate the specific power density (MW/km^2/a) and the expected annual specific energy production (GWh/km^2/a) in areas of interest using country-specific maps.

Atlas applications let users determine the actual, realisable potential of wind and solar PV, based on the theoretical potential revealed by resource assessments.

Limiting factors can include grid infrastructure, space and flexibility in the power sector.

For more information:
IRENA Community, *Global Atlas Training Workshop*

Global Atlas Training on Planning the Renewable Energy Transition Using Solar and Wind Maps

Practice Planning

The spatial planning module was tried out in Tanzania and Egypt in January 2015 and Peru in February 2015, with 35 government representatives from 25 IRENA member countries receiving training in techniques to derive policy-relevant information from the Global Atlas for Renewable Energy.

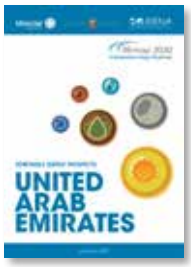
The two-days of non-technical training with the Global Atlas highlighted the best practices for using maps of solar and wind resource availability, to develop policies, propose tariff structures, initiate tendering processes and stimulate public awareness of renewable energy potential.

The first day of the seminar reviewed the essentials of wind and solar photovoltaic (PV) system technology, along with introducing the Global Atlas online software.

The second day dealt with policy strategies to develop renewable energy projects in different countries and jurisdictions.

The programme was supported by Germany, the Flemish Government and the Brussels-Capital Region.

Recent publications



Renewable Energy Prospects: United Arab Emirates

Renewable energy has become economically attractive in the oil-rich United Arab Emirates (UAE). This report is a joint effort of IRENA, the UAE-based Masdar Institute, and the UAE Ministry of Foreign Affairs' Directorate of Energy and Climate Change. The analysis is part of REmap 2030, IRENA's roadmap for doubling the share of renewables in the global energy mix.

IRENA/IEA-ETSAP Technology Briefs

The continuing series of briefs provides technical background, analyses the potential and barriers for market growth, and offers insights for policy makers on key renewable energy technologies. The latest briefs cover hydropower as a cost-effective power source and biomass applications for both heat and power.

Off-grid renewable energy systems: Status and methodological issues

This working paper provides an overview of current data sources for off-grid renewable energy systems. It suggests methodological improvements to help categorise such systems, evaluate and aggregate data and measure progress in deployment. The paper is a contribution to the Global Tracking Framework of the Sustainable Energy for All (SE4ALL) initiative.

Djibouti: Renewables Readiness Assessment

The Republic of Djibouti faces challenges associated with the generation, distribution, and use of electricity, being dependent on imported fossil fuels and power. The report aims to highlight the significant geothermal, wind and solar energy resources and the ways forward to bring higher quality energy services to populations across the country. *To be released in May*

www.irena.org/publications

About IRENA

The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future, and serves as the principal platform for international cooperation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity.