



**TOGETHER**  
*for a sustainable future*

## OCCASION

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UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION

ENERGY AND CLIMATE CHANGE BRANCH

**UNIDO RENEWABLE ENERGY UNIT**

# What we do



# UNIDO

## Renewable Energy Project Portfolio

UNIDO has long recognized that environmental issues must be addressed in order to facilitate an inclusive sustainable industrial development in developing countries and economies in transition. The promotion of renewable energy markets and industry at a systemic level plays an integral role in addressing the challenges of energy poverty, energy security and climate change simultaneously. UNIDO strives to work towards this goal by focusing on promotion of renewable energy at a local level, with specific attention to the promotion of renewable energy in industrial applications for the benefit of people and enterprises.

Renewable energy sources provide an opportunity for developing countries and countries with economies in transition to embrace a low carbon pathway powered by innovative, smart and locally relevant energy solutions. Renewable energy has great potential to help countries become less dependent on energy imports, create jobs and mitigate climate change while contributing to prosperity. This brochure features examples of renewable energy projects rolled out with technical assistance from UNIDO.

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UNIDO is currently implementing more than 60 renewable energy projects in around 50 countries, with the following targets to be achieved in a 5-year period (2013-2018):

Number of people gaining access to energy: **>135,000<sup>1</sup>**

Renewable energy capacity installed: **~25 MW**

Renewable energy generated: **>125 GWh/year**

Million tons of CO<sub>2</sub>e emissions avoided: **>3 million tons direct<sup>2</sup>**

Number of enterprises benefiting from projects: **>600**

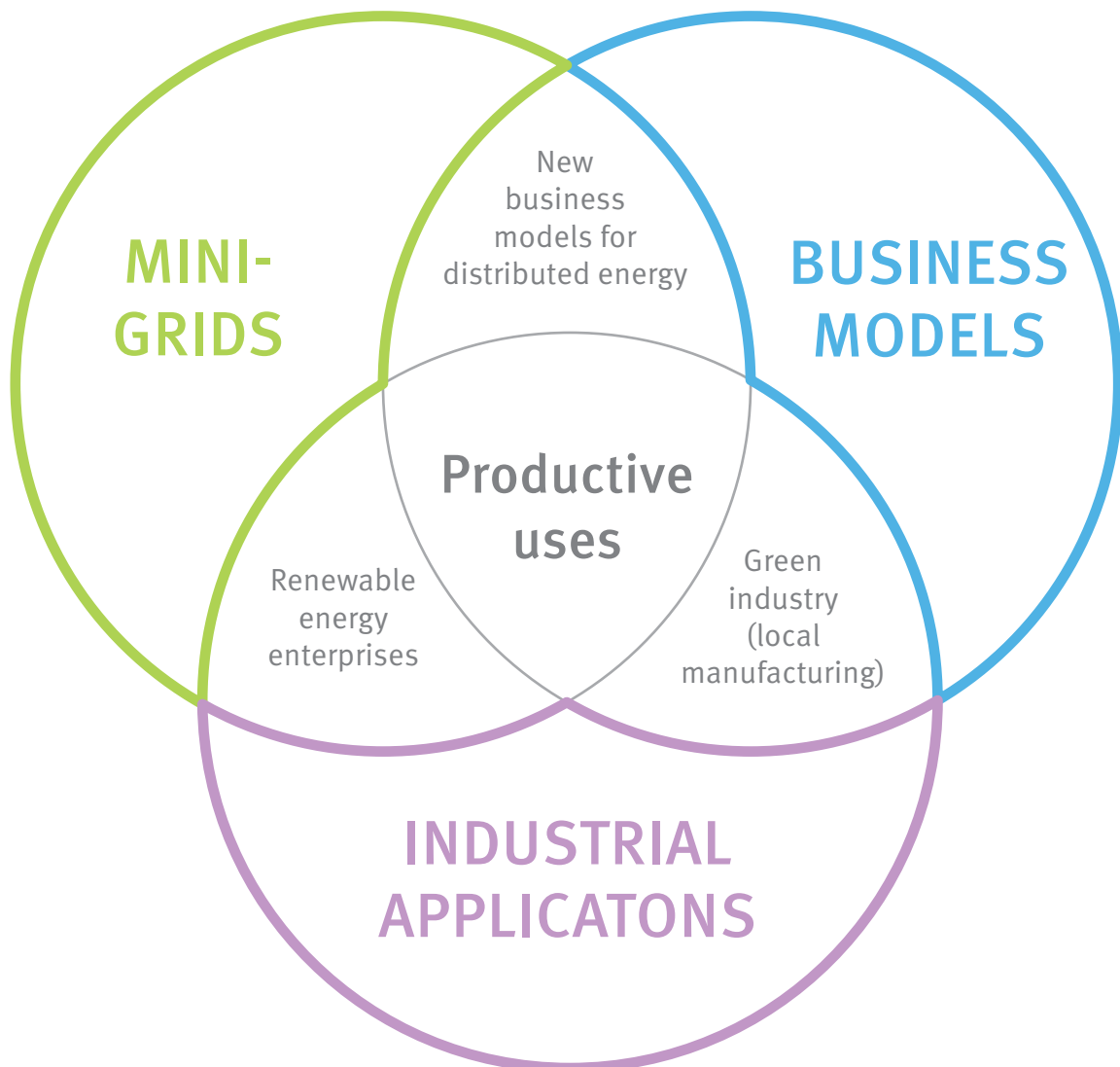
<sup>1</sup> Calculated on the basis of MWh/year generated as a result of projects divided by average electricity consumption per capita in a given country (based on 13 projects), using World Bank Statistics 2009.

<sup>2</sup> Based on emissions over the lifetime of projects (typically between 10-20 years, depending on the technology used and the size of the project).

>135,000 | ~25 MW | >125 GWh/year | >3 million tons direct | >600

# We Work On

The Renewable Energy Unit's portfolio is based on three strategic areas of intervention:



Our focus on three areas of intervention ensures that projects are designed to achieve maximum benefits for people and industry, creating opportunities for renewable energy enterprises, new businesses through distributed energy, and a sustainable industry, with local manufacturing and servicing.

# Technology Focus

UNIDO technical assistance has catalyzed self-sustaining renewable energy projects that have provided access to energy for productive uses and demonstrated the industrial application of renewable energy technologies in a number of developing countries and countries with economies in transition. The energy technologies promoted by UNIDO include:

- » Small hydro power
- » Solar thermal and solar photovoltaic
- » Biomass/biogas heat and power generation
- » Sustainably produced biofuels
- » Wind energy

# Project Elements

UNIDO projects include the following elements:

## Human capacity-building

Training programmes enhance the human capacity to build, operate and maintain renewable energy systems.

## Local manufacturing capacity

Local manufacturing capacity is put in place by transferring technology and training production personnel. Special importance is given to South-South cooperation.

## Replication and scale-up

Based on successful demonstration projects, UNIDO interventions aim at promoting large-scale replication and transformation.

## Policy

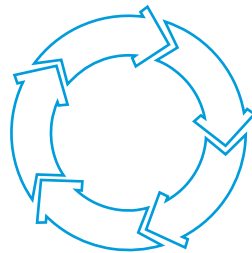
UNIDO aims at creating an enabling policy and market environment to increase renewable energy deployment.

## Demonstration

Demonstration projects show that renewable energy can be technically and economically feasible, efficient and reliable, and can stimulate economic growth.

## Institution-building

UNIDO catalyses the establishment of regional centres to build institutional capacity with a view to integrating renewable energy with the overall development policy.



# Project-strategic areas of intervention

1.

## MINI-GRIDS

### Focus on driving sustainable rural growth

Renewable energy is the best solution for areas that are isolated from national grids. UNIDO services help create the capacity to develop renewable energy projects in rural areas that match national development objectives. Small hydro power, solar thermal and photovoltaic, wind, biomass and biogas power schemes are already in operation.

2.

## INDUSTRIAL APPLICATIONS

### Empowering enterprises to use locally available energy sources

Promoting sustainable patterns of energy use, such as fuel-switching from fossil fuels to locally available renewable sources, increases industrial competitiveness and creates local jobs.

3.

## BUSINESS MODELS

### Promoting renewable energy production as a viable industry

Larger industrial companies already commonly generate their own energy, but now smaller-scale companies can also do so. Great potential exists for the creation of renewable energy entrepreneurs and independent power producers, and for the conversion of agricultural industry into rural energy enterprises. Renewable energy can be a source of sustainable income in less accessible areas.

4.

## CROSS-CUTTING: POLICY AND CAPACITY-BUILDING

UNIDO focuses on creating an enabling policy and market environment for increasing the take-up of renewable energy, and on developing the technical capacity and business skills capable of encouraging entrepreneurship.



# Tanzania: Kinko Micro-Hydro Scheme

## Background

Only about 14 per cent of Tanzanians have access to electricity from the national grid. The low level of electrification is one of the main challenges facing the energy sector and the Tanzanian economy as a whole.

## Objective

UNIDO is working to promote micro hydropower (MHP) in Tanzania because it has an important role to play in electrifying rural areas.



## Donors and Partners

The project is co-financed by the Global Environment Facility (GEF). UNIDO partnered with the Government of Tanzania and the non-governmental Tanzanian Traditional Energy Development and Environmental Organisation aimed at demonstrating the viability of community based micro-hydro technology and mini-grids.

## Results

- » The project resulted in the construction of a micro hydropower plant with a capacity of 10 kW in the village of Kinko in the Lushoto district of the Tanga region
- » The electricity network was built by a local company and generated local employment and income, as well as providing electricity to 80 households. It fostered productive activities in the community, including educational activities in a newly established community centre furnished with Internet connectivity, computers and a battery charging facility, and provided power to a nearby national park, which promoted tourism in the area
- » The project encourages a new business model of community-based ownership of energy services: it is owned by the community and managed by the village committee.

# Cambodia: Photovoltaic and biogas

## Background

Cambodia has small isolated electricity grids that serve around 12 per cent of the total population. Besides these, around 1,500 battery-charging stations are operated by Rural Electricity Enterprises to recharge lead-acid batteries for off-grid areas, mainly operating diesel generators with high losses and high costs.

## Objective

The objective of the project is to harness renewable energy technologies and to improve living conditions in remote areas.



## Results

- » The project facilitated the formation of public-private partnerships (PPPs) to disseminate renewable energy technologies and demonstrate the viability of solar photovoltaic, solar drying and biomass gasification.
- » Photovoltaic battery-charging stations were installed in 6 remote villages, providing energy for 1,073 households, replacing diesel generators, cutting charging costs by two thirds and saving 32 tons of CO<sub>2</sub> emissions/year. A solar dryer technology was installed to improve dried fish production, replacing wood fuel heat, which boosted the capacity of local business to absorb technology transfer. The 150 kW rice husk gasifier replaced a diesel generator and connected an additional 300 households (700 people), reducing emissions by 900 tons of CO<sub>2</sub> per year.
- » The capacity building component ensured the training of staff from the Institute of Technology of Cambodia, Ministry of Industry, the University of Battambang and the private sector.

## Donors and Partners

Funded by the Government of Austria and implemented with the help of the Ministry of Industry, Mines and Energy and the Ministry of Rural Development of Cambodia.

# Pacific Islands: Enabling framework for renewable energy

## Background

Small Island Developing States (SIDS) efforts to reduce poverty and achieve greater economic growth are thwarted by a lack of access to modern energy services and a heavy reliance on imported fossil fuels. Their renewable energy potential is great, but financial and technical barriers have to be overcome.

## Objective

The project supports networking and capacity building for the promotion of renewable energy in industrial applications.



## Results

- » A solar-powered community centre at Solomon Island using solar photovoltaic power improved local living conditions for 15 communities, increasing employment and income opportunities by supporting productive activities such as sewing, food processing and food storage.
- » Local entrepreneurs were trained in these areas. The project is reducing about 460 kg of CO<sub>2</sub> emissions per year.
- » A Strategic Plan for the Community of Pacific Power Utilities was approved to guide decision-makers on priority areas of intervention.
- » Technically and economically viable investment opportunities were identified in the tourism and agro-food sectors, such as using waste from coconut processing in Samoa (the largest producer of coconut oil). A full technical feasibility study is to be carried out to demonstrate state-of-the-art technologies and trigger replication.

## Donors and Partners

The project is funded by the Government of Austria, together with the Secretariat of the Pacific Community and the Pacific Power Association as implementing partners.

# Zambia: Renewable energy mini-grids

## Background

Only 50 per cent of the country's urban and 3 per cent of the rural population is connected to Zambia's national grid. As a consequence, economic prosperity and social development are seriously hindered by the lack of access to energy.

## Objective

The goal of the project is to promote locally available renewable energy to facilitate rural electrification and demonstrate the technical and financial viability of mini-grids.



## Results

- » A 1 MW Small Hydro-Power Plant (SHP) was constructed and is fully operational, distributing electricity in the Shiwang'andu area and surrounding settlements to 25,000 people.
- » A solar mini-grid of 60 kW capacity in Mpanta benefits a cluster of fishing villages, around 617 households, schools, a rural health centre, shops, businesses and a church on the shores of Bangweulu Lake.
- » A biomass gasifier of 25 kW in Ndola has created an incentive to help improve the image of the use of biomass in Zambia for electricity production.
- » The project demonstrates the viability of new institutional and financial practices that enable private enterprises to become power producers and energy service providers, while enhancing employment opportunities.
- » A biomass gasifier of 1 MW, developed in collaboration with the Copper Belt Energy company. The commendation from the President of Zambia further raised its visibility of the project and highlighted the importance of RE for poverty alleviation.

## Donors and Partners

The project is funded by the GEF and ZESCO (Zambia's electricity utility) and implemented in partnership with the United Nations Environment Programme (UNEP), in collaboration with the Rural Electrification Authority (REA) of Zambia and the UNIDO International Centre on Small Hydro Power based in China.

# Cuba: Demonstration of renewable energy

## Background

A number of financial, institutional, technical, information and human resource-related barriers hamper the increased use of renewable energy sources in isolated areas in Cuba. On the Isla de la Juventud, Cuba's second largest island, diesel-based power and heat generation is used to provide energy.

## Objective

The main objective of the project is to promote renewable energy technologies for power generation and process heat in selected industries, by promoting new business models and financing instruments.



## Results

- » Cocodrillo biomass gasification power plant based on the southern part of the island has been in operation since 2010 and has been generating electricity for local community.
- » The project has supported the development of a forest management initiative to produce 30,000 tonnes of biomass per year in a sustainable way to supply biomass for the power plants and industry.
- » Thanks to co-financing from the Government of Cuba, hurricane-proof wind turbines were erected. The wind farm Los Canarreos is fully operational.
- » A large-scale biomass gasification plant is under construction in northern part of the island. The plant is designed on a modular basis of 0.5 MW component. Technology has been provided from India as a part of the South-South Cooperation exercise. Two biomass boilers are being installed in the meat processing industry to improve efficiency, financial viability and competitiveness of the company.
- » A fund has been established within Compañía Fiduciaria to finance renewable energy projects in Cuba and to set an incentive mechanism for local companies to invest into renewable energy sector.

## Donors and Partners

The project is funded by the GEF and implemented in partnership with the UNEP and the Government of Cuba.

# Kyrgyzstan: Renewable energy supply to rural first aid stations

## Background

Kyrgyzstan's rural and remote areas suffer from a lack of reliable electricity supply, where losses account for up to 70 per cent of transmitted electricity. In other areas, the national grid has ceased to function and around 60 per cent of the population experience regular disruption of power supplies in these mountainous regions. This has a serious effect on hospitals and first aid stations, prohibiting the use of laboratories, vaccination and medicine refrigerators, and sterilization equipment. refrigerators, and sterilization equipment.

## Objective

The project aims to increase the supply of reliable energy to rural first aid stations in each province (a total of seven) by fitting them with mini-hydro units and solar energy panels, necessary for vital treatment of people.



## Results

- » The training on the usage and maintenance of solar photovoltaic and SHP equipment was conducted in cooperation with the Kyrgyz-Russian Slavic University.
- » Informational campaign on the use of renewable energy in local mass media and Internet.
- » Around 2640 local residents of 16 villages receive steady access to health services.
- » Local authorities in the Alchaluu village, Chui rayon of Chui oblast approached the joint programme with a request to install similar equipment in five other nearby villages.

## Donors and Partners

The project is a joint programme of the United Nations Development Programme (UNDP), the UNIDO, the United Nations Volunteers (UNV) and the World Health Organization (WHO).

# Nigeria: Waya dam hydro and local manufacture

## Background

Rural electrification is a national priority in Nigeria, and two projects are presented here to highlight two aspects of rapid take-up of renewable energy in rural areas: local renewable energy production and enhancing local manufacturing capabilities.

## Objective

The objective of this project was to demonstrate the feasibility of harnessing locally available renewable energy resources for rural and urban electrification, to promote productive activities aimed at improving living standards in a rural area and to foster the formation of local companies in manufacturing SHP equipment.



## Donors and Partners

The project is funded by the GEF, and implemented in partnership with the Energy Commission of Nigeria, the UNIDO Regional Centre for Small Hydropower in Abuja, the Upper Benue River Basin Development Authority, and the Bauchi State Government. For the local manufacturing project, the counterparts were the Nigerian National Agency for Science and Engineering Infrastructure and the Product Development Agency (PRODA).

## Results

- » An existing irrigation dam was converted for MHP use, through the installation of a 150 kW system with estimated annual output of 1,080,000 kWh, supplying over 336 rural households (2,250 people) with electricity.
- » The project powers several productive activities: fish farming, grain milling, micro businesses such as tailoring, and a local pharmacy.
- » Following the success of the local manufacturing project, the government has plans to establish a Micro Hydropower Equipment Development Institute.

# Benin and Nigeria: Biomass gasification

## Background

Benin and Nigeria have abundant biomass resources, where better use of biomass could cut CO<sub>2</sub> emissions by replacing diesel generation, reduce dependence on imported energy, and generate employment. Bio-energy is ideal for rural areas.

## Objective

The main objective of the project is to demonstrate the use of biomass gasification to generate electricity, through South-South cooperation with the UNIDO Centre for South-South Industrial Cooperation (UCSSIC) in India.



## Results

- » The project provided training to young farmers and development workers at an integrated farming training centre. A 25 kW biomass gasifier and generators at the Songhai Center in Benin and in the Ngbo Business Area in Nigeria were installed. The demonstration plant is up and running and gasifies waste wood and agricultural residues. The output from the gasifier runs a gas engine generating set, and the waste heat from the engine is used to dry the biomass fuel.
- » Training was provided for technical and managerial staff at the Indian Institute of Science where the plant was designed, and for local staff in operation and maintenance of the plant.
- » Electricity is supplied partly to a food processing plant at the Songhai Centre in Nigeria and the government is developing a small agro-processing cluster around the gasifier.

## Donors and Partners

The project is co-funded UCSSIC in India and the Ebony State government of Nigeria, and partnered by UCSSIC.



# The Gambia: **Demonstration of wind energy technology**

## Background

The uptake of renewable energy in the Gambia has faced several barriers, and there is an urgent need to create a market environment conducive to investments in renewable energy. In addition, considering the increasing energy needs of the country, there is an urgency to demonstrate the technical feasibility and commercial viability of renewable energy in the country through pilot plants.

## Objective

The primary objective of the project is to demonstrate the technical feasibility and commercial viability of renewable energy based projects, including mini-grids. This demonstration will create best practice examples in the country for further dissemination. Furthermore, an investment strategy and the need to strengthen national policies and the regulatory framework constitute a main objective of the project.



## Results

- » Six demonstration plants were constructed with a total capacity of 1.5 MW, generating 1,250 MWh of renewable energy/year. The total reduction of greenhouse gas emissions is estimated at 31,000 tons of CO<sub>2</sub> over the period 2012-2032.
- » 60 companies, 20 renewable and 40 stakeholders were trained and made aware of opportunities in renewable energy.
- » An Electricity Master Plan and a renewable energy law were developed, including a Standard Power Purchase Agreement which has since been adopted and enforced.

## Donors and Partners

The GEF, the European Union (EU), Q-Cell, and GAMWIND co-financed the project.

# Kenya: Biogas plant at abattoir

## Background

Dagoretti is a suburb of Nairobi well known for its slaughterhouses, which were almost shut down in 2009, due to slaughterhouse waste polluting the Nairobi River. Moreover, apart from the waste pollution they create, frequent power cuts have forced the abattoirs to use diesel generators.

## Objective

The objective of the project was to demonstrate the use of slaughterhouse waste in biogas production.



## Results

- » A 15 kW biogas plant was installed at the Nyongara slaughterhouse, with a high performance temperature controlled digester (using solar heating), replacing the diesel generator, and recovering waste heat to replace wood and charcoal for hot water to clean the abattoir.
- » The project has cut CO<sub>2</sub> emissions by 108 tons per year. Economic benefits include reducing the cost of energy from US\$ 0.20 to US\$ 0.09 per kW. In addition, the process yields organic fertiliser as a by-product, bringing additional income to the abattoir.
- » The Government of Kenya and the abattoir owners are planning to apply the lessons learned to replicate the project in other slaughterhouses around the country.
- » A new project to scale up this model is under implementation.

## Donors and Partners

The GEF co-funded the project, which established a public-private partnership between the abattoir, the UNIDO, the UNEP, the Kenyan Ministries of Environment and Industrialization and the Kenya Industrial Research and Development Institute (KIRDI).

# Nigeria: Enabling policy framework for renewable energy

## Background

An energy supply-demand gap of about 12,000 MW exists in Nigeria, where rural electrification is a national priority. For this, the Government wants to establish an appropriate policy and regulatory framework and contribute to the development of a conducive market environment for increased private sector investment programmes.

## Objective

The main objective of the project is to demonstrate biomass based mini-grids as viable options for augmenting the rural electrification programme in Nigeria, considering that biomass based power has a huge potential for scaling up in the country.



## Results

- » The project contributed to the development of a new regulatory policy and institutional framework for setting up mini-grids; as well as capacity-building and public awareness-raising activities. The removal of technical, policy and capacity barriers contributes to the uptake of renewable energy and the increased access to modern forms of energy.
- » The project has also successfully demonstrated a 5 MW biomass power plant that has enhanced the trust of rural communities in such technologies, and will enable the government to scale up and replicate best practices across the country.

## Donors and Partners

The GEF and the Nigerian Federal Ministry of Environment, Housing and Urban Development financed the project, whereas a substantial amount of co-financing came from the private sector.

# Mozambique: Adaptation to Climate Change

## Background

The District of Chicualacuala in Mozambique faces many challenges in adapting to climate change.

## Objective

The objective of this programme was to assist the Chicualacuala District to become more resilient to climate change and adopt alternative livelihood options as sources of income.



## Results

- » UNIDO installed renewable energy systems for water supply, irrigation and electricity supply in seven communities, and provided tailored training on various issues including improved charcoal production and general operation and maintenance of the renewable energy systems installed.
- » Four photovoltaic solar water pump systems installed with cumulative capacity of 5280 Wp supplying safer drinking water for 2,000 inhabitants
- » Solar photovoltaic power system installed in Eduardo Mondlane with 4800 Wp capacity for a community radio transmission station with tele-centre, benefitting 14,000 inhabitants
- » Two photovoltaic solar water pump systems installed in Ndombe and Mapai for productive uses with cumulative capacity of 1920 Wp benefitting 1,800 inhabitants
- » A biogas digester system of 10 kW generator capacity for electricity generation installed in Mepuzi.

## Donors and Partners

The programme was funded by the MDG Achievement Fund of Spain, stemming from a UN-wide response to help the region adapt to climate change. The Food and Agriculture Organization (FAO), UNDO, UNEP, UN-HABITAT, United Nations World Food Programme (WFP) and UNIDO implemented the project; The role of UNIDO was to design and install renewable energy systems for productive uses, as well as capacity building of communities.

# ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE)



## Background

Due to a severe energy crisis, the Economic Community for West African States, (ECOWAS) with support from UNIDO, created the ECOWAS Centre for Renewable Energy and Energy Efficiency ([www.ecreee.org](http://www.ecreee.org)) in 2010.

## Objective

The Centre fosters favourable framework conditions for regional renewable energy and energy efficiency markets by supporting policy development, capacity building, and knowledge management.



## Donors and Partners

The project is co-funded by ECOWAS, the Austrian Development Agency (ADA), the Spanish Agency for International Cooperation (AECID), the United States Agency for International Development (USAID), the European Union and the GEF. Implementation partners also include the International Renewable Energy Agency (IRENA), the UNDP, and the UNEP.

## Results

- » ECREEE Secretariat and a network of National Focal Institutions in 15 ECOWAS countries was established
- » Policies and Targets were adopted by the ECOWAS Ministers
- » More than 750 key market enablers on various aspects of sustainable energy were trained (e.g. financing, policy, technical)
- » ECOWAS RETScreen Clean Project Analysis Train the Trainers Network was established and 14 national workshops were organized.
- » Technology conferences with more than 2.000 participants from the region were organized.
- » ECOWAS Observatory for Renewable Energy and Energy Efficiency ([www.ecowrex.org](http://www.ecowrex.org)) created with GIS maps on resources and investment possibilities in 15 ECOWAS countries
- » ECOWAS Renewable Energy Facility (EREF) was established and 41 rural projects of over EUR 3 million are under execution.

# Latin America: Renewable Energy Observatory

## Background

The concept of the Observatory for Renewable Energy in Latin America and the Caribbean stems from an agreement of Ministers of Energy to harness the potential of renewable energy technologies to meet the region's growing energy needs and increase energy security.

## Objective

The aim is to increase information sharing and knowledge generation and to strengthen renewable energy markets at the local, national and regional levels. The Observatory engages public institutions, private entities and civil society organizations to build a strong portfolio of projects and programmes oriented to promote productive uses and investments in renewable energy technologies.



## Results

- » The Observatory is currently operating in 12 countries of the LAC region: Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Mexico, Nicaragua, Paraguay, Peru and Uruguay.
- » Creation of a Renewable Energy Portal and Renewable Energy Knowledge Platform, as well as a geo-referenced Information System for Renewable Energy, with interactive maps ([www.renenergyobservatory.org](http://www.renenergyobservatory.org)).
- » Enhanced South-South cooperation: Establishment of solid links between key actors in the participating countries in order to develop joint initiatives.

## Donors and Partners

**Donors:** The Spanish Agency for International Development Cooperation (AECID) and the Italian Ministry of Environment, Land and Sea.

**Partners:** LAC Ministries and Secretaries of Energy; Academia and Universities (e.g. National Autonomous University of Mexico, UNAM, Polytechnic University Nicaragua, UPOLI), key private companies in the energy sector (e.g. Eletrobras, Brazil); and regional/global organizations (e.g. Iberoamerican General Secretariat, SEGIB; Latin American Energy Organization, OLADE, Inter-American Development Bank, IDB).

# Global: Biofuels screening toolkit

## Background

Donors and policy makers in developed and developing countries need to be provided with clear and unbiased data and recommendations on biofuels. To do so, all important aspects and implications of biofuel production, including GHG emissions, other environmental impacts, together with the social and economic issues have to be studied in order to arrive at an informed decision-making about the sustainability of biofuels.

## Objective

The project aims to identify and assess sustainable systems for the production of liquid biofuels within developing countries, and enable up-front feasibility assessments of biofuels projects.



## Results

- » UNIDO contributed to the drafting of a Biofuels Screening Toolkit. The Toolkit is a practical tool, which includes a GHG calculator, and is based on a traffic light system for screening biofuels projects on the following sustainability indicators: greenhouse gas savings, biodiversity, land productivity, soil and water protection, economic cost benefit and life cycle cost calculations, food security, labour conditions, land tenure and gender considerations.
- » An International Conference was held in March 2013 to disseminate the project results to GEF and developing country representatives.
- » The Toolkit will be tested on UNIDO's projects, following which a practical guidance document for project developers and recommendations for policy-makers will be published.

## Donors and Partners

The project was co-funded by the GEF and implemented jointly by UNEP, UNIDO, and FAO.

# Armenia: Biogas systems for rural and remote communities

## Background

Over quarter of the population lives below the official poverty line. Income inequality and lack of opportunities are high, particularly for refugees, internally displaced persons, women and other vulnerable groups.

## Objective

The project supports the empowerment of poor and vulnerable rural households by encouraging their participation in economic life, with a special focus on women and youth. The objective is to create a microcredit facility to support local businesses and facilitate access to modern and clean energy services through the construction of pilot biogas plants, and training activities for the local population in the operation and maintenance of these energy systems.



## Results

- » Following an assessment of business interests and training needs, 103 persons were trained in entrepreneurial skills, including a 35 per cent participation of women.
- » A Community based biogas plant of 15 kWe capacity and two household biogas plants of 3 kWth are being installed in a rural and remote area, while the establishment of an SME-support fund is ongoing.

## Donors and Partners

The project was funded by the Government of Japan through the United Nations Trust Fund for Human Security (UNTFHS). Implementing partners were the United Nations High Commissioner for Refugees (UNHCR), United Nations Development Programme (UNDP), United Nations Population Fund (UNFPA).



# Eastern Africa: Capacity building on sustainable energy

## Background

In Eastern Africa, more than 80 per cent of the population does not have access to modern energy services. Major barriers to scaling-up of sustainable energy in Eastern Africa include lack of financing and insufficient national capacity.

## Objective

The project aims to strengthen national technical, regulatory and commercial capacities in the areas of sustainable energy, climate change policy and related finance mechanisms. It focuses on understanding global trends and the transition towards low-carbon development, through sharing of best practices for Eastern Africa.



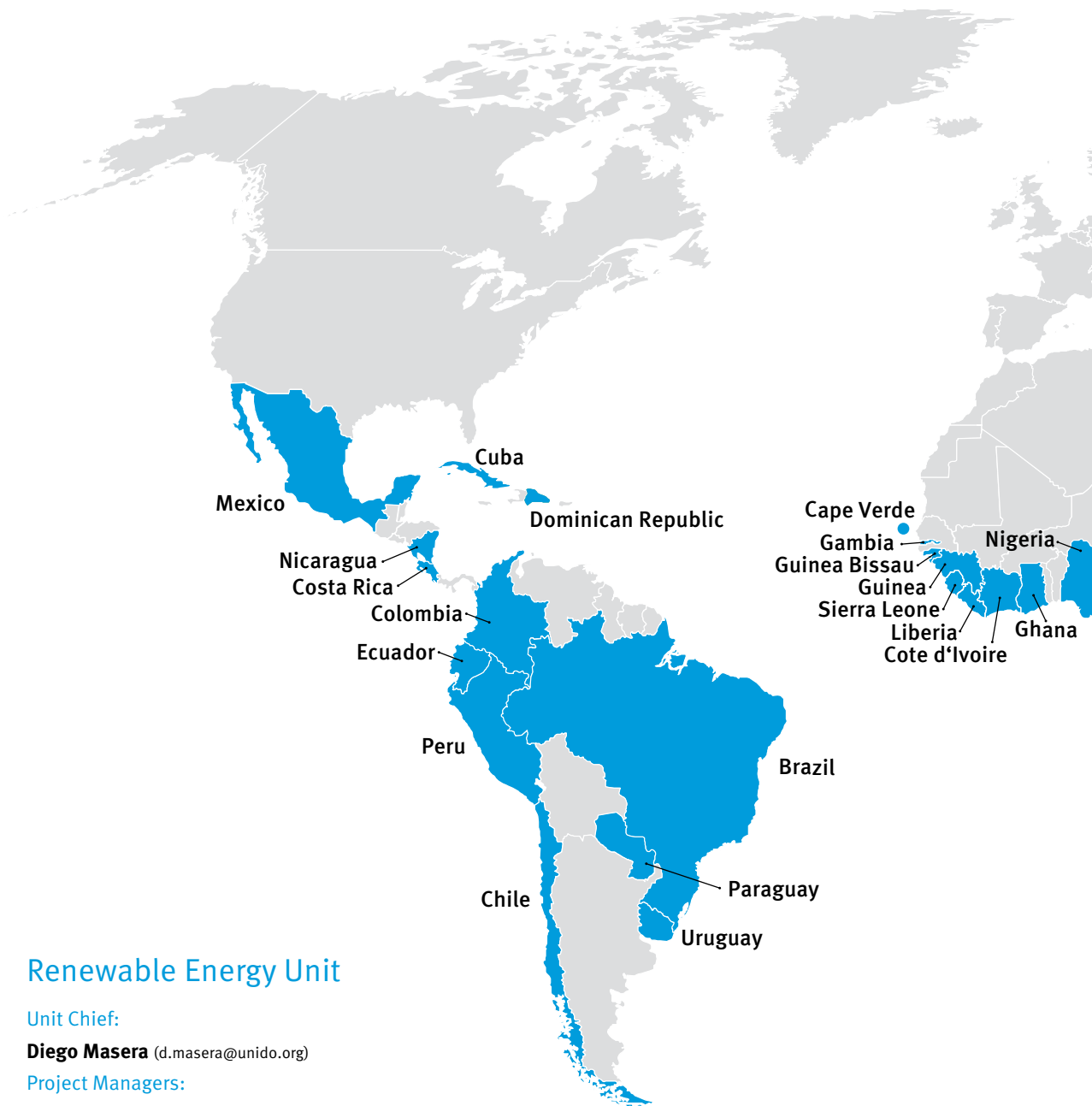
## Results

- » Two technical workshops were conducted: one in Ethiopia (in collaboration with the African Climate Policy Centre - ACPC) and one in Tanzania with participation of over 70 representatives from more than 35 institutions in 4 countries from the public and private sectors, as well as international organizations and NGOs, including the African Development Bank, UNDP and World Vision.
- » Following the workshops, a joint e-learning course was conducted in collaboration with the UNIDO Institute for Capacity Building which provided a forum for further discussion and learning.
- » A study on the potential of Nationally Appropriate Mitigation Actions (NAMAs) in Eastern Africa was commissioned to assess the institutional capacity for NAMA development in Ethiopia and Tanzania and to identify sectors most suited to NAMAs.

## Donors and Partners

Funded by the Korea Energy Management Corporation (KEMCO) and implemented by UNIDO

# UNIDO Renewable Energy Portfolio



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Wind



Solar



Hydro



Biomass



# UNIDO Global Renewable Energy Portfolio: Some Examples

## AFRICA

<b>Cameroon</b>	Promoting integrated biomass and small hydro solutions for productive uses in Cameroon
<b>Cape Verde</b>	Promoting market based development of small to medium scale renewable energy systems
<b>Chad</b>	Promoting renewable energy based mini-grids for rural electrification and productive uses in Chad
<b>Côte d'Ivoire</b>	Promoting renewable energy based mini-grids for rural electrification and productive uses in Côte d'Ivoire
<b>EASTERN AFRICA</b>	Establishment and first operational phase of the East African Center for Renewable Energy and Energy Efficiency (EACREEE)
<b>ECOWAS</b>	ECREEE-ECOWAS Regional RE and EE Centre
<b>Egypt</b>	Promoting low-carbon technologies for cooling and heating applications
<b>Ethiopia and Tanzania</b>	UNIDO-KEMCO Africa sustainable energy and climate change capacity building project
<b>Gambia</b>	Promoting renewable energy based mini-grids for rural electrification and productive uses in The Gambia
<b>Ghana</b>	Supporting green industrial development in Ghana: Biogas technology and business for sustainable growth
<b>Guinea</b>	Promoting development of multi-purpose mini-hydro power systems
<b>Guinea Bissau</b>	Creation of an enabling environment for small to medium scale renewable energy investments
<b>Kenya</b>	Sustainable conversion of waste to clean energy for GHG emission reduction
<b>Kenya</b>	Enhancing Clean Lighting Industry Project
<b>Liberia</b>	Installation of multi purpose mini-hydro infrastructure (for energy and irrigation)
<b>Liberia</b>	Rehabilitation of training centers in vulnerable communities in Liberia
<b>Madagascar</b>	Increased energy access for productive use through small hydropower development in rural areas
<b>Mozambique</b>	Joint programme of environmental mainstreaming and adaptation to climate change in Mozambique
<b>Nigeria</b>	Mini-grids based on renewable energy (small-hydro and biomass) sources to augment rural electrification
<b>Nigeria</b>	Scaling up small hydro power (SHP) in Nigeria
<b>SOUTHERN AFRICA</b>	Establishing SADC RE and EE Centre
<b>Sierra Leone</b>	Mini grids based on small hydro power for productive uses in Sierra Leone
<b>Sudan</b>	Promoting market based development of solar PV mini grids for productive uses in rural areas
<b>Tanzania</b>	Promotion of waste-to-energy applications in agro-industries
<b>Tanzania</b>	Mini-grids based on small hydropower sources to augment rural electrification
<b>Uganda</b>	Establishment of a pilot Renewable Energy Powered Business Information Centre (REBIC) in Northern Uganda
<b>Zambia</b>	Renewable energy-based electricity generation for isolated mini-grids in Zambia
<b>Zambia</b>	Upscale small hydropower mini-grid in Zambia

## AMERICA

<b>Chile</b>	Promoting the development of biogas energy amongst select small- and medium-sized agro-industries
<b>Cuba</b>	Generation and delivery of renewable energy-based modern energy services on Isla de la Juventud, Cuba
<b>Dominican Republic</b>	Stimulating industrial competitiveness through biomass-based, grid-connected electricity generation
<b>Regional</b>	Observatory for renewable energy in Latin America and the Caribbean: Towards centres of excellence in renewable energy in LAC
<b>Uruguay</b>	Towards a green economy in Uruguay: stimulating sustainable production practices and low-emission technologies in prioritized sectors

## ASIA AND THE PACIFIC

<b>Armenia</b>	Sustainable livelihood for socially vulnerable refugees, internally displaced and local families - energy component
<b>Bangladesh</b>	Solar micro-utility enterprises for promoting rural energy and productive uses in Bangladesh
<b>Cambodia</b>	Biogas based rural electricity enterprises development in Cambodia
<b>Cambodia</b>	Access to clean energy for productive uses in Cambodia
<b>India</b>	Low-head micro hydropower technology for enhancing access to energy and promoting productive uses in rural areas
<b>India</b>	Promoting business models for increasing penetration and scaling-up of solar energy
<b>India</b>	Organic waste streams for industrial applications in India
<b>Kyrgyzstan</b>	Renewable energy supply to rural first aid stations
<b>Pacific Island States</b>	Renewable energy development for electricity generation and productive uses in selected Pacific Island States
<b>Pakistan</b>	Promoting sustainable energy production and use from biomass in Pakistan
<b>Pakistan</b>	Sustainable energy initiative for industries
<b>Thailand</b>	Overcoming policy, market and technological barriers to support technological and South-South technology transfer: the pilot case of ethanol production from cassava
<b>Thailand</b>	Promoting small biomass power plants in rural Thailand for sustainable renewable energy management and community involvement

## EUROPE

<b>Albania</b>	Bio-energy for productive use in the SMEs in the olive oil sector
<b>Ukraine</b>	Market development for sustainable production and use of liquid biofuels

## GLOBAL

<b>Global</b>	Establishing sustainable liquid biofuels production worldwide (with UNEP and FAO)
<b>Global</b>	World SHP Development Report 2013 and Knowledge Platform

ENERGY AND CLIMATE CHANGE BRANCH

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