TONGA *briefing* note | June 2013

# SPC/GIZ Coping with Climate Change in the Pacific Island Region

## *Wind power in Tonga*

*'Wind turbines in Tonga are economically feasible, as they save costs through reduced diesel fuel consumption for electricity generation'*

*50 m tall wind monitoring mast at Lapaha, photo: Kevin Palmer-Wilson, GIZ*

Dependence on fossil fuel imports poses a great challenge for Pacific Island countries. The high price of oil on the world market has lead to soaring electricity costs and is affecting every aspect of the economy and private households. In Tonga for example, the price per kilowatt hour of electric energy was 0.85 Pa'anga (TOP) in 2012, which is equivalent to 0.49 United States Dollars (USD). Since 96% of electricity produced on the main island (Tongatapu) is generated using diesel fuel, the fuel component makes up half of this tariff.

### An opportunity for renewable energy

Unlike many industrialised nations around the world, Tonga can reduce its electricity cost significantly by implementing renewable energy technologies. In a first step, this goal has been achieved by fully commissioning the 1.32 megawatt Maama Mai solar farm in August 2012, which has already reduced the electricity tariff. Within the country's long-term energy strategy

*Project facts CCCPIR*

**Funding sources:** Federal Republic of Germany through the Federal Ministry for Economic Cooperation and Development (BMZ)

**Regional partners:** SPC, SPREP, USP, MSG, SPTO and PPA

**Countries:** Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu

**Duration:** January 2009–December 2015

SPC Secretariat of the Pacific Community

giz

german cooperation
DEUTSCHE ZUSAMMENARBEIT


*Some of the participants at the presentation of the pre-feasibility study, photo: GIZ*

known as the Tonga Energy Road Map (TERM), wind power generation was identified to be potentially feasible. For this purpose, the Energy Division of the Ministry of Environment, Climate Change and Natural Resources (MECC) in Tonga has an ongoing wind resource monitoring campaign, which started data collection in July 2010. Wind speed and wind direction are measured at heights of up to 50 m above ground level to meet international standards for wind power forecasting.

## Wind energy pre-feasibility study

In a recently completed pre-feasibility study conducted by the SPC-GIZ Coping with Climate Change in the Pacific Island Region (CCCPIR) programme, wind resource data from July 2010 to May 2012 were analysed to predict the long-term wind resource available on the eastern side of Tongatapu. The pre-feasibility study used the newly acquired data to generate a wind resource map of the entire island. Based on this map, a 1.1 MW wind farm consisting of four 275 kilowatt wind turbine generators was proposed. Using specialised software packages, the annual energy production of the wind farm was forecast and the resulting fuel savings were estimated at around 5% of Tongatapu's annual demand.

## Economic feasibility of wind energy

A budgetary proposal from a wind turbine manufacturer was used to predict the economic feasibility of the project. Based on the expenses saved through reduced diesel fuel consumption, the study showed that the wind farm has a double digit internal rate of return and a break-even point would be reached in approximately six years of operation.

## Greater energy security for Tonga

Apart from the financial benefits, renewable energy technologies hold advantages on a broader scale. Energy security can be increased, as the nation will be less vulnerable to unpredictable oil price shocks. However, the pre-visibility study does not fail to point out the negative impacts that the construction of a wind farm may have. The potential disruption to the environment must be accounted for in order to make an informed decision to benefit the Tongan people as a whole.

## Putting the study into practice

The study was presented and handed to MECC, Tonga Power Limited (TPL), TERM Implementation Unit (TERM-IU) and other stakeholders. While the results will serve as a benchmark for future development of wind power, collaboration between the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ – German Agency for International Cooperation), the Secretariat of the Pacific Community (SPC), MECC, TPL and TERM-IU will continue in order to put the theoretical findings into practice.

GIZ is a federally-owned enterprise that supports the German government in the field of international development cooperation. For more than 30 years, GIZ has been cooperating with Pacific Island partners in strengthening the capacity of people and institutions to improve the lives of communities for this generation and generations to come. GIZ is an implementing agency providing support through technical cooperation to balance economic, social and ecological interests through multi-stakeholder dialogue, participation and collaboration.

*Data logger for recording wind measurements at the bottom of the Lapaha wind monitoring mast, photo: Kevin Palmer-Wilson, GIZ*

# CONTACT

*SPC/GIZ Coping with Climate Change in the Pacific Island Region (CCCPIR)*

***Ofa Sefana***
*Acting Energy Planner, Energy Programme*
*Ministry of Environment, Climate Change and Natural Resources*
*ofasefana@yahoo.com*

***Katerina Syngellakis***
*SPC-GIZ Adviser on Sustainable Energy Management*
*Katerina.syngellakis@giz.de*

*GIZ is a federally-owned enterprise that supports the German government in the field of international development cooperation. For more than 30 years, GIZ has been cooperating with Pacific Island partners in strengthening the capacity of people and institutions to improve the lives of communities for this generation and generations to come. GIZ is an implementing agency providing support through technical cooperation to balance economic, social and ecological interests through multi-stakeholder dialogue, participation and collaboration.*

SPC Secretariat of the Pacific Community

giz

german cooperation
DEUTSCHE ZUSAMMENARBEIT