FY2015 Feasibility Studies with the Aim of Developing a
Joint Crediting Mechanism

Feasibility Study for Project Development of Wind Energy System Introduction on Remote Islands in the Maldives

New Energy and Industrial Technology Development Organization (NEDO)

Komaihaltec Inc.

NEDO Feasibility Studies with the Aim of Developing a Joint Crediting Mechanism **Country: Maldives Sector: Renewable Energy**

Feasibility Study for Project Development of Wind Energy System Introduction on Remote Islands in the Maldives

Conducted by: Komaihaltec Inc.

This project aims to contribute to reduced diesel fuel consumption and greenhouse gas (GHG) emissions by introducing mid-size (300 kW) wind turbines with high-level specifications and a microgrid system to the islands of the Maldives, which depend on diesel generators for 99% of their energy.

Study Summary

This study examines the feasibility of a project to install Japanese 300 kW wind turbines and a microgrid system, which were created for Japanese islands, and will contribute to reduced diesel fuel dependency and GHG emissions. The scope of the study includes an examination of site conditions, such as wind resource assessment, basic system design, drafting of preliminary project plans, and Measurement, Reporting and Verification (MRV) development.

Study Items

① **Policies on renewable energy in the Maldives**
② **Examination of site conditions, including a wind resource assessment**
③ **System design and project planning**
④ **Funding planning**
⑤ **MRV development**

Counterpart/Site

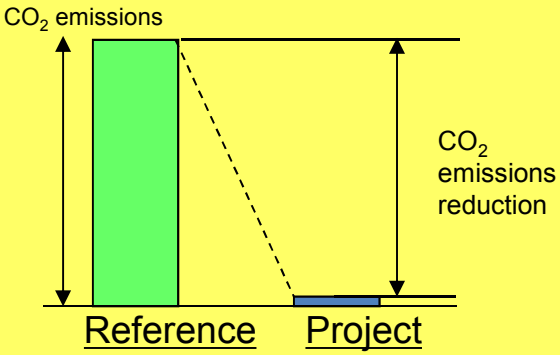
- **Counterpart: Ministry of Environment and Energy; STELCO; FENAKA; MWSC**
- **Site: Naifaru; Himmafushi**

GHG Emission Reduction/MRV

Reduction amount when installing three 300 kW wind turbines: Approx. 1,000 tons CO_2/year

Reference Emissions

Currently, the islands depend on diesel for 99% of power generation. Reference emissions are calculated based on continuous use of diesel fuel in a conservative manner, considering the government plan for expanding the power supply facility.



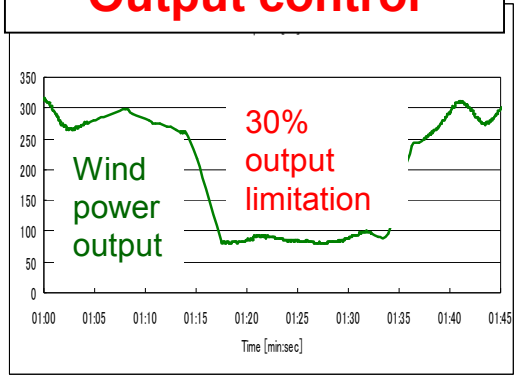
Project Emissions

By replacing part of the diesel power generation with wind power, current GHG emissions from diesel fuel consumption will be reduced. The reduction in GHG emissions will be calculated by multiplying the amount of electricity generated by wind power by the factor of diesel power generation GHG emissions.

Summary of Introduced Technology

Komaihaltec 300 kW wind turbine

Output control



This is a Japanese 300 kW wind turbine. Wind turbines of this capacity and size are not built by the world's major wind turbine manufacturers. Today, the common size of wind turbines in the market exceeds 1 MW and they are not suitable for the Maldives, where a number of small island grids exist. Wind turbines of 300 kW are practical in terms of size for installation on the islands of the Maldives. The Komaihaltec wind turbine is also easier to transport and install, and is equipped with the following features suitable for the islands:

(Issues of wind and diesel systems) Impact to the small grid system	(How Komaihaltec wind turbines rate against such issues) • Equipped with an AC-DC-AC convertor with an output fluctuation that is less than other systems • Introduce wind turbines with a microgrid system
Difficulty of transportation and construction	• Compact design • Erection can be carried out with 60 ton cranes
Typhoons	• Can withstand wind speeds of 70 m/s and major typhoons
Possible off-peak energy surplus	• Output control as low as 10% of the output rating, which allows battery size to be reduced
Diesel generators incapable of dealing with fluctuating wind turbine output	• **Control of energy increase of wind turbine output** To limit the increase of wind power to the extent the diesel generators can function properly • **Soft cut-out** To avoid a sudden power drop at the cut-out point for wind turbines by gradually reducing their power output