

CLIMATE CHANGE TRUST FUND

Maldives



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Country Profile

- 1,190 islands.
- 198 Inhabited Islands.
- Total land area 300 km²
- Islands range b/w 0.2 – 5 km²
- Population approx. 350,000
- Economy - Tourism and Fishing
- No proven non renewable energy resources



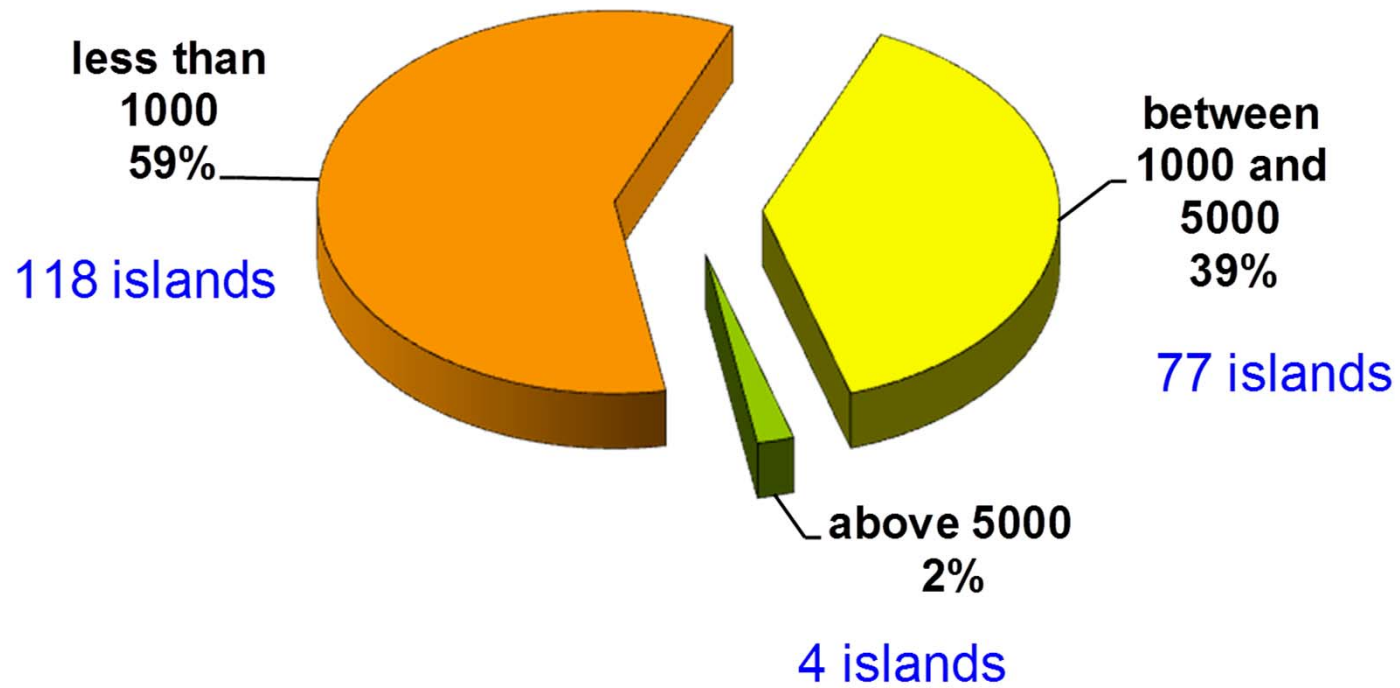
Tourism industry is now the mainstay of Maldivian economy





**About one third of the total population is in the Capital Island
Malé'.**

Population Distribution (excluding Male')



VULNERABILITY INDICATORS

- Highest elevation **1.5m** above sea level.
- **88** inhabited islands face perennial beach erosion.
- Wide dispersal of population across very small islands.
- Remoteness and inaccessibility of islands.
- Extremely high economic dependence on tourism.
- High import dependence.

Carbon Neutrality

- Showing the world that it is possible for a country to reach carbon neutrality is a demonstration of International leadership and a proof that low-carbon growth is possible.
- Imported fossil fuel generates more than 80 % of the Maldives' emissions. The country spends over 300M\$ per year importing fossil fuels – a figure equivalent to around 23 % of its GDP.





- Highest elevation 1.5m above sea level



Most islands in Maldives are barely 1m above sea level. Under the predicted worst case sea level rise scenario, large areas of Maldives could be inundated.

- Highest elevation 1.5m above sea level



**Male' International
Airport**

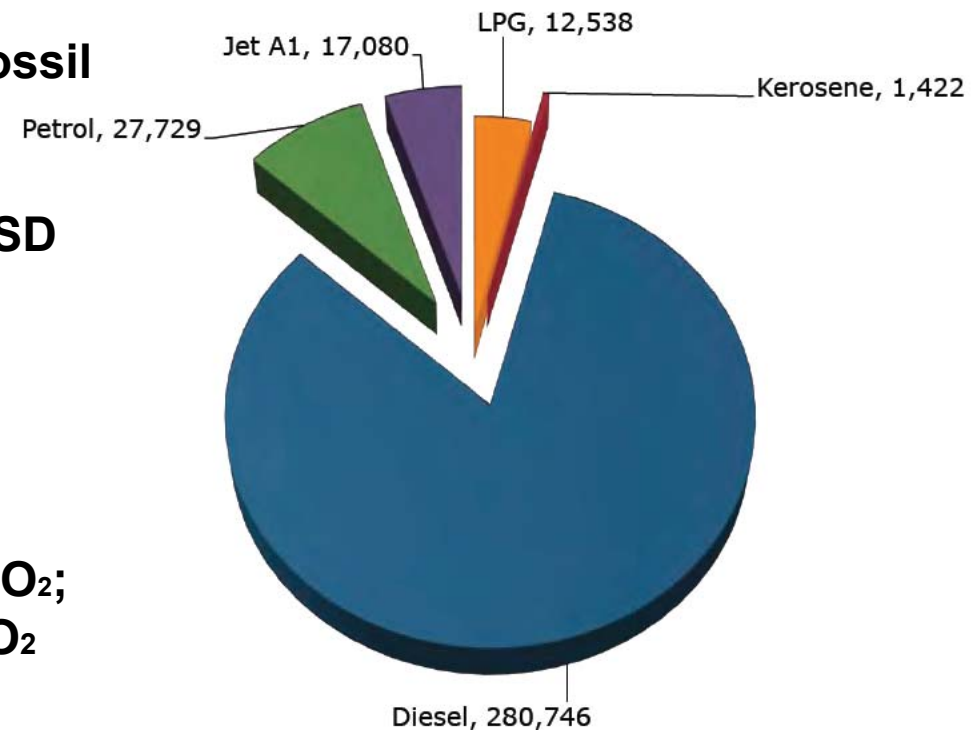
Energy Sector



Energy Sector Overview.

Why need a NAMA?

- ❑ National electricity installed capacity: **260MW** (annual growth **10%**)
- ❑ Entirely depends on imported fossil fuel
- ❑ Fuel import :~**21%** of GDP = USD 324 Million
 - Total primary energy consumption - **394,394 toe**
 - Total CO₂ emissions: **1.45 MtCO₂**;
energy contributes to **1.22 MtCO₂**
 - **314,818 toe** of diesel used;
 - **About 45%** for electricity
- ❑ Fuel price fluctuations... Therefore needs to Increase energy security



Possible Technologies

- Solar
- Wind
- Ocean
- Biomass
- Waste to Energy

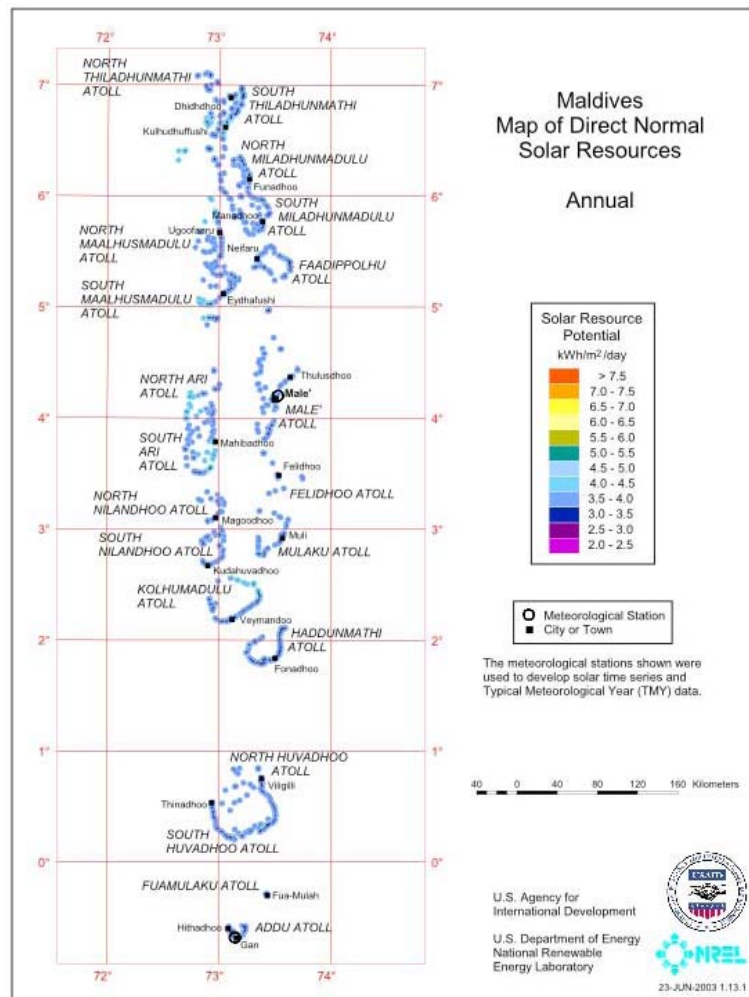


Potential RE Technologies for the Maldives

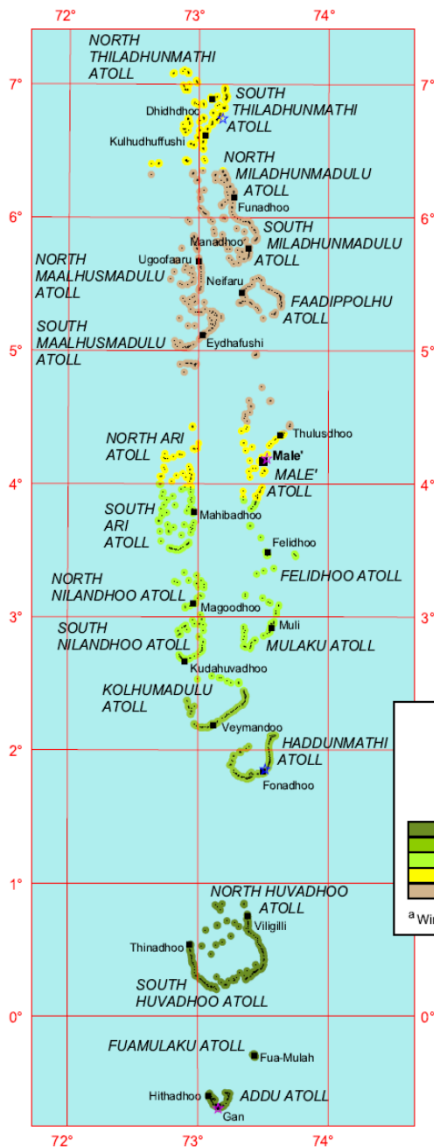
Solar Energy

- Good potential for Solar Energy as insolation levels are around 5kWh/m²/day.

- Two main Solar technologies can be employed- Solar PV and Solar Heating



Potential RE technologies for the Maldives



Maldives Wind Resource Map

This wind resource classification is specific for large scale and small scale applications.



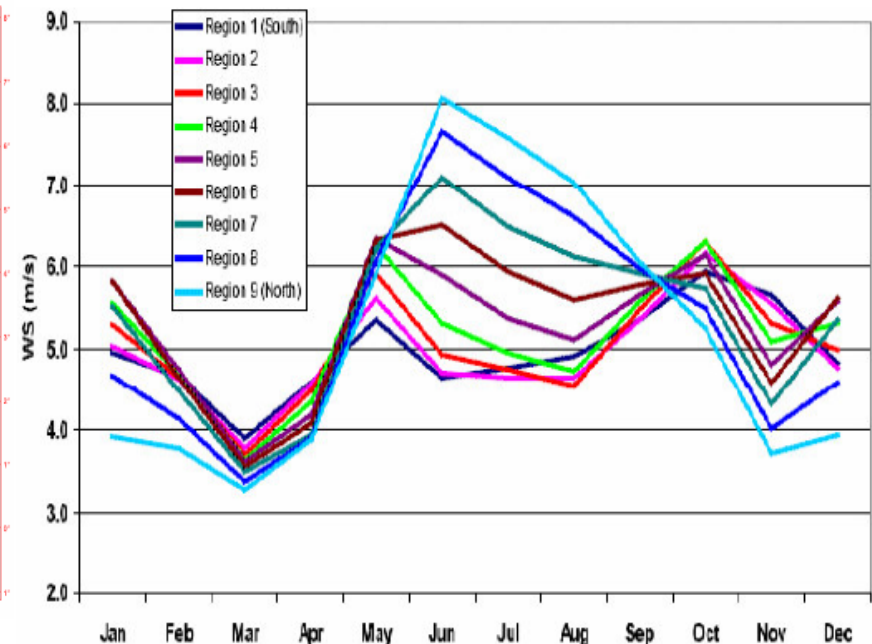
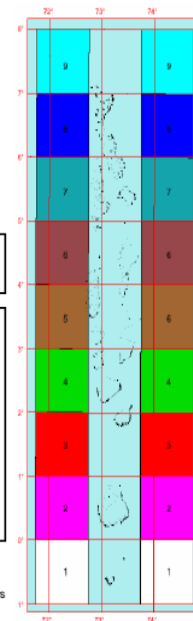
U.S. Agency for International Development

U.S. Department of Energy National Renewable Energy Laboratory



Wind Energy

- Northern and North Central regions have good potential for wind power
- Wind speed at 50m height varies from 3.5 to 8m/sec (NREL)



Different wind regimes for the Maldives

Potential RE technologies for Maldives

- **Ocean Energies**

- Ocean Thermal Energy Conversion (OTEC)

Deep sea water cooling project is planned by MWSC-HITACHI to provide energy required for cooling of INIA at Hulhule & Hulhumale.

- Wave energy

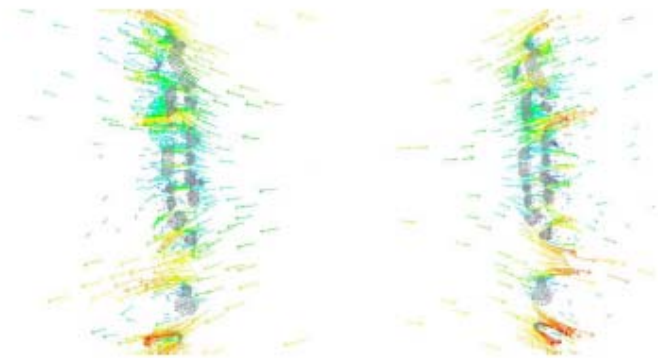
- Ocean Current

Further studies are required to identify the Ocean energy potential.

Marine Energy in the Maldives

*Pre-feasibility report on Scottish Support for
Maldives Marine Energy Implementation*

Final Report – part 1 of 2: Main Report



Centre for Understanding Sustainable Practice
Robert Gordon University, Aberdeen, Scotland

Aberdeen, July 2011



CUSP
Centre for Understanding Sustainable Practice

 **ROBERT GORDON
UNIVERSITY • ABERDEEN**

Potential RE technologies for Maldives

Waste to Energy

- In 2007, three potential locations were studied
 - Addu Atoll – 36.65 tons waste / day- 700kW of energy
 - Kuldufushi – 13.9 tons waste / day- 278kW of energy
 - Naifaru – 9.16 tons waste / day
- 180kW of energy
- Each 50ton waste generates 1MW of energy (electricity demand of 500 households)



Investment & GHG Emission Reduction Potential for RE installation in Maldives

Sr. No.	Particulars	Units saved/generated MWh	Diesel Saving in tons	Investment (Million USD/MW)	CO2 Reduction tCO2
1	1 MW Solar PV	1500	360	3.25 to 4.0	1296
2	1 MW Wind Power	2000	480	1.25 to 2.0	1728
3	1 MW Biomass Power	7000	1680	1.2 to 1.8	6048



New Innovation in Maldives

- E-Dhoni
- RE diesel hybrid for public transportation
- ~12 knots
- <http://www.renewableenergymaldives.com.mv/>



Barriers for promotion of RE

- Limited policies, laws, regulations etc.
- High initial investment cost.
- Lack of necessary funds (depends on foreign aids only).
- Capacity constraints (Human resource, Institutions etc.).
- Inadequate information on potential RE sources in the Maldives.
- Enabling environment for investors, service providers and consumers.
- Market mechanisms

Climate Change Trust Fund

MALDIVES

Climate Change Trust Fund (CCTF)

- CCTF fund was initiated in December 2009 and is due to close in March 2015
- CCTF donor grant contributions to date are US\$9.5million by European Union (EU) and Australian Agency for International Development (AusAID). The World Bank is the managing trustee of CCTF
- CCTF is implemented by MEE, through a Project Management Unit
- MOFT is the recipient Agency of CCTF
- The Project Management Unit comprises a Project Director (Permanent Secretary , MEE), Project Manager, Technical Coordinators, Environment and Social Safe Guards Coordinator, Procurement and Financial Management Officers and Assistants
- PMU is supported by staff at island levels
- Partnering Institutions include, EPA, MRC, MOFA, MoTAC, Fenaka and Local Councils, Selected Tourist Resorts and Dive Centers

Development Objectives

- Support the development and implementation of climate change strategy and action plan.
- Strengthen knowledge and leadership in GOM to deal with CC issues domestically and internationally
- Improve capacity, regulatory and governance frameworks to integrate climate risk management into sector strategies and plans.
- Build adaptive capacity and climate resilience in key sectors through tangible pilot projects.
- Increase energy access through renewable energy generation, distribution and efficiency in the public and private sectors through low carbon renewable energy options.
- Improve institutional and management capacities in the public and private sectors to deal with adaptation and mitigation interventions that will bring both developmental and climate change benefits.

Principles Guiding current CCTF Projects

Resilient

- **Enhancing resilience of communities and ecosystems**
- **Water Security, Energy security and low carbon development**
- **Solid Waste Management**

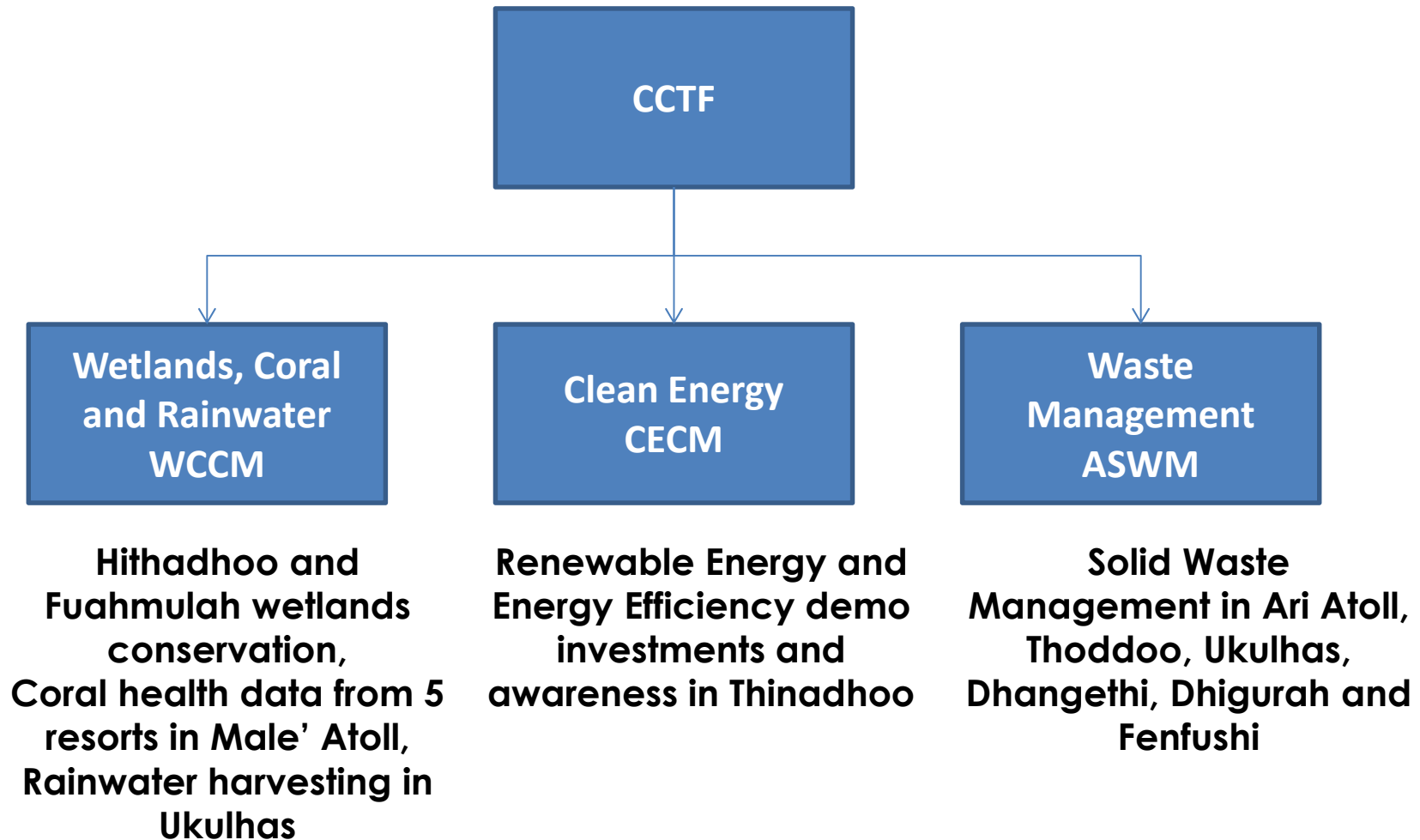
Integrated

- **Capacity strengthening**
- **Strengthening local governance, private and public sectors**
- **Promoting multi-sectoral approaches**

Sustainable

- **Sustainable management of climate vulnerable goods and services**
- **Is participatory, transparent and accountable processes**
- **Enhancing and using available science and local knowledge**

CURRENT PROJECTS UNDER CCTF



CURRENT PROJECTS UNDER CCTF

All Projects have a closing date September 30th , 2014

- 1. Ari Atoll Solid Waste Management Pilot (AASWM) US\$ 1.25 m, (Start date December 23rd 2012)**
- 2. Wetlands Conservation and Coral Reef Monitoring for Adaptation to Climate Change (WCCM) US\$ 3.83 million (Start Date April 25th 2012)**
 - I. Wetland Conservation & Ecotourism US\$1.7 m
 - II. Rain Water Harvesting US\$0.6 m
 - III. Coral Reef Monitoring US\$1.03 m
- 3. Clean Energy for Climate Mitigation (CECM) (Start Date April 25th 2012)**
 - I. Solar PV systems
 - II. Energy Conservation and Efficiency Improvement**
 - III. Technical assistance

Expected Outcomes of current CCTF Projects



2 Islands with ecosystem based adaptation to secure wetlands and ecotourism opportunities



1 Island with Solar Energy Security option and Energy Efficiency Measures implemented



5 House reefs gets monitored long term



1 Island with Safe Rain water harvesting



5 Islands with integrated Solid Waste management

Clean Energy for Climate Change Mitigation



Clean Energy for Climate Change Mitigation



Energy / Carbon Neutrality (CECM) Investments in renewable energy and energy efficiency, GDh. Thinadhoo.

- Technology Assessment and Power Systems Planning
- Grid Connected Solar PV Systems – 200kW Roof mounted, Grid connected system on 2 school buildings.
- Energy Conservation and Efficiency Improvement – Energy audits, demo EE upgrades and advocacy.
- Capacity building for MEE and Utilities staff

Clean Energy for Climate Change Mitigation

- **Diesel installed capacity:** 600kW, 720kW, 1000kW
- **Electricity demand :** 5000MWh/yr
- **PV installed capacity:** 300 kWp
- **PV electricity generation:** 500MWh/yr
- **CO2 offset:** 300ton/yr
- Potential to increase solar PV capacity
- Cost effective with storage

Challenges and Issues in Implementation

Significant progress has been made in all three projects. However, there are still challenges to be addressed:

- Time taken for procurement has been longer than envisaged. This could include procedures involving communications and approval from the tender board, internal evaluation of proposals, insufficient responses from bidders etc.
- Limited availability of local technical expertise
- Meeting the expectations of communities and local councils on time
- Technical coordinators are spread thin due to shared duties
- Need to integrate and sustain project activities with recurrent government delivery mechanisms

THANK YOU