



Ministry of Tourism and
Environment



Utility Regulatory
Authority

Training Report

Training on Energy Statistics and Energy Balance

Consultancy Services to Conduct Energy Supply and
Demand Study 2018 – 2022

30th January 2025

CBIT Maldives

Capacity Building for Improved Transparency
of Climate Change Mitigation and Adaptation
Actions in the Maldives



global
environment
facility
INVESTING IN OUR PLANET





**Ministry of Tourism and
Environment**



**Utility Regulatory
Authority**

Report on Energy Statistics and Energy Balance Training

Consultancy Services to Conduct Energy Supply and Demand Study 2018 – 2022

CBIT MALDIVES

*Capacity Strengthening for Improved Transparency of
Climate Change Mitigation and Adaptation Actions in
the Maldives Project*





Ministry of Tourism and Environment

Capacity Strengthening for Improved
Transparency of Climate Change
Mitigation and Adaptation Actions in
the Maldives Project (CBIT Maldives)



This document has been financed by the Global Environment Facility (GEF), through Capacity Strengthening for Improved Transparency of Climate Change Mitigation and Adaptation Actions in the Maldives Project (CBIT Maldives), executed by the Ministry of Tourism and Environment (MoTE) with implementation support from UN Environment.

February 2025

Consultant:

Sri Lanka Energy Managers Association
(SLEMA)



in Association with
Epoch Associates Pvt. Ltd.



Contents

Executive Summary.....	4
1. Introduction.....	5
2. Objectives of the Training.....	6
3. Presentations.....	6
3.1 Fundamentals of Energy Statistics	6
3.2 Hands on Practical Exercise	7
3.3 Quantifying Climate Impacts of Energy Systems	8
3.4 Data Collection and Validation	9
4. Main Discussions	11
Annex 1: Presentation on Fundamentals of Energy Statistics.....	13
Annex 2: Hands on Practical Exercise.....	14
Annex 3: Presentation on Quantifying Climate Impacts of Energy Systems	15
Annex 4: Presentation on Data Collection and Validation	16
Annex 5: Training Participant List.....	17
Annex 6: Photographs.....	18
Annex 7: Agenda	19

Executive Summary

As part a consultancy project to conduct an energy demand and supply study for the Maldives from 2018-2022, the training was held on 30th January 2025. The main objectives include.

1. Enhance stakeholder capacity in energy statistics and energy balance preparation.
2. Improve data collection methodologies and tools.
3. Ensure alignment with the Enhanced Transparency Framework (ETF) under the Paris Agreement.

The training was intended to be held in the Auditorium of the Ministry of Tourism and Environment (MTE), formerly known as the Ministry of Climate Change, Environment and Energy (MCCEE). Which was reclassified and will be referred to as Ministry of Tourism and Environment (MoTE) effective from February 1, 2025. However, given the fire incident on 12th of December 2024 which rendered the building non-operational – the training was held in the Meerumaa Events Hall.

This training was targeted at professionals involved in energy data management, climate change mitigation, energy planning, GHG inventory development, and tracking Nationally Determined Contributions (NDCs). A total of 24 (18 male, 6 female) participants attended the training, representing key institutions and stakeholders, including the Climate Change Department and Energy Department of the Ministry, Utility Regulatory Authority (URA), Housing Development Corporation (HDC), FENAKA Corporation, Maldives Transport and Contracting Company (MTCC), Malé Water and Sewerage Company (MWSC), Dhivehi Raajjeyge Gulhun (Dhiraagu), Maldives Airports Company Limited (MACL), non-governmental organizations (NGOs) and private sector companies.

The session was conducted by the consultants of the project, Sri Lanka Energy Managers Association (SLEMA) in association in Epoch Associates of Maldives (EPOCH), as part of the Deliverable “Capacity Building Report on Energy Statistics and Energy Balance” to Conduct Energy Supply and Demand Study issued by CBIT Maldives Project.

1. Introduction

The Capacity Building Initiative for Transparency (CBIT) project of Maldives is aimed to strengthening institutional capacity for tracking mitigation and adaptation actions and establishing climate finance tracking system in the Maldives. It aims to establish and enhance the Maldives' transparency system, in line with Enhanced Transparency Framework (ETF) of Paris Agreement funded by the Global Environmental Facility (GEF) with assistance from United Nations Environment Programme (UN Environment).

As part of the Maldives CBIT project, Sri Lanka Energy Managers Association (SLEMA) in association with Epoch Associates of Maldives (EPOCH), was awarded the consultancy contract to conduct a study on Energy Supply and Demand of the Maldives. The main objective of the assignment is to develop the energy balance for the period between 2018-2022 and establish a mechanism for continuous publishing of energy balances. As part of the assignment, the consultant developed a draft report "Energy Supply and Demand Study for Maldives for the year 2018-2022" across all sectors and a mechanism for Utility Regulatory Authority (URA) to verify the power production data and a mechanism for continuous publication of the energy balance.

The training was held on Thursday, 30th January 2025 under the Capacity Strengthening for Improved Transparency of Climate Change Mitigation and Adaptation Actions in the Maldives (CBIT Maldives) Project, funded by the Global Environment Facility (GEF) and supported by the United Nations Environment Programme (UNEP).

The training began with opening remarks from Dr. Muaviyath Mohamed, Minister of State for Ministry of Tourism and Environment (MoTE), who highlighted the significance of energy statistics in shaping national policies and tracking mitigation efforts.

After the inauguration, presentations were given to the participants. The presentations were given in four separate sessions with the opening session providing an overview on the fundamentals of the energy statistics. The second session was dedicated to the practical exercise with developing basic energy balance using representative data. The third session focused on quantifying climate impacts of energy systems followed by the final session on energy data collection and validation.

This report is aimed to archive the main discussions and the presentations given during the training on developing continuous energy collection practices with basic energy balance frameworks. This report outlines as the following.

- **Objectives:** the section includes the key objectives of the training session.
- **Presentations:** this section describes the four presentations given to train the participants on the fundamentals of energy data collection methods with quantifying said data to develop comprehensive reporting mechanisms with robust energy balance calculations.
- **Discussions:** this section captures the main discussions and recommendations between the consultants and participants on the data analysing methods for developing the draft energy supply and demand study and the continuous reporting mechanism suggested.

2. Objectives of the Training

The objectives are as follows:

- Enhance stakeholder capacity in energy statistics and energy balance preparation.
- Conduct practical exercises on developing energy balances, with methodologies for quantifying climate impacts of energy systems, including emissions calculations and their relevance to GHG inventories and NDC tracking.
- Ensure the participants are given thorough training on data collection and validation techniques with best practices, tools, and methods to improve accuracy in energy data management and reporting.
- Ensure alignment with the Enhanced Transparency Framework (ETF) under the Paris Agreement.

3. Presentations

3.1 Fundamentals of Energy Statistics

This presentation was given by Dr. Harsha Wickramasinghe, the Team Leader, and Energy Expert of the consultancy project. The main content of this presentation includes the following.

- Energy and economy – How cheap, reliable, and sustainable energy is essential for a strong economy as it enables labour replacement, resource accessibility, and value addition.
- Importance of energy security and the components of a secure energy system - Infrastructure development, price volatility management, Investment attraction, Innovation and efficiency, Resilience, and sustainability.
- Energy Statistics and Data Management - Energy Information Management System (EIMS) to ensure reliable data collection for policymaking and effective monitoring of energy resources and consumption.
- Components of a National Energy System
 - Energy Resources: Biomass, solar, wind, petroleum, coal, natural gas, nuclear.
 - Energy Supply Chain: Resource extraction → Conversion → Transportation → Market Distribution.
 - Energy Markets & End-Use Sectors: Industry, Transport, Residential & Commercial and Non-energy uses such as feedstock for industries.
- Why Energy Balances Are Important - Helps track energy efficiency and policy target achievements (e.g., renewable energy adoption), provides insights into economic productivity and energy security risks and assists in monitoring greenhouse gas (GHG) emissions.
- Energy Flow and Supply-Demand Relationship
 - Primary Energy: Direct energy from natural resources (e.g., crude oil, coal, solar).
 - Secondary Energy: Processed energy carriers (e.g., electricity, petroleum products, hydrogen).
 - Energy Demand-Supply Model follows basic economic principles.
- Structure of an Energy Balance (EB)
 - Energy Supply Data: Imports, production, and transformation losses.
 - Energy Demand Data: Sector-wise consumption such as Industry, Transport, and Residential.

- Challenges in Energy Data Collection: Inconsistent reporting formats, lack of mandatory data recording, misclassification of imports, and untracked small-scale power generation.
- The Maldivian Context in Energy Balance and challenges
 - Simple energy system without a national grid.
 - Heavy reliance on imported petroleum products.
 - Scattered data sources and informal energy sectors.
- Data Collection Solutions
 - Strengthen data governance and mandatory reporting.
 - Improve cross-sector coordination.
 - Introduce standardized data collection methods.

The presentation slides have been attached in Annex 01 of this training report.

3.2 Hands on Practical Exercise

This presentation training was given by the entire SLEMA team on how to use the excel template for basic energy balance in the Maldivian context. As such only categories relevant for the country is in the template file for ease of training and linearity. The training was conducted by showcasing how to plug in the values from the sample data sheet provided for the participants to actively follow along.

The main content of the training content includes the following.

- The energy balance is presented in 3 different units which are the original units, thousand toe and Tera Joules.
- The categories of energy sources are only 6: Solar Power, Diesel, Petrol, Jet A1, LP Gas and Electricity.
- The energy balance consists of 3 main tables to input the values: Energy Supply, Energy Conversion and Energy Use.
- The Energy Supply focuses on how the basic sources of energy are entering in and out of the country. Accounting for statistical difference through imports, exports, foreign aviation, and bunkering.
- The Energy Conversion accounts for all the quantifiable losses in conversion such as power generation conversion losses, transport, and distribution.
- The Energy Use covers all the relevant categories in Maldives Energy Context such as resorts, household and commercial.
- Heavy emphasis on accurate data collection from all categories given how much discrepancies can affect the overall results.
- The data sheet provided is a clean reference for ease of following along the training. The SLEMA team implored how imperative compiling all the data in single reference file is for

The presentation slides and excel templates with data sources are attached to Annex 02 of this report.

3.3 Quantifying Climate Impacts of Energy Systems

This presentation was given by Dr. Amila Wickramasinghe, the Energy Statistician of the consultancy project and Mr. Harsha Wickramasinghe, the Team Leader, and Energy Expert of the consultancy project. This presentation mostly covers how energy data is crucial for GHG emission reporting. Additionally, how GHG inventories provide a baseline for NDC tracking and climate policy. The main content of this presentation includes the following.

- Greenhouse Gas (GHG) Emissions in Energy Systems
 - Challenges in Maldives' Energy System - Heavily reliant on fossil fuels (mainly diesel) and the recent solar PV integration has added complexity to emissions calculations.
 - Key emission sources - Fossil fuel combustion (CO₂ emissions), waste decomposition (methane emissions) and HVAC refrigerants (fluorinated gas emissions).
- Transparency and Climate Commitments
 - Paris Agreement Goals - Keep global temperature rise below 2°C (preferably 1.5°C) by ensuring climate-resilient and low - emission development by aligning financial flows with climate targets.
 - Enhanced Transparency Framework (ETF) - Replaces the MRV (Measurement, Reporting, and Verification) system with a Standardized biennial reporting for all countries. Thus, ensuring accountability through GHG inventories and NDC tracking.
 - Key Reporting Elements include –
 - National Inventory Report (GHG emissions data).
 - Progress on NDC implementation.
 - Climate adaptation strategies.
 - Financial/technological support received and needed.
- Role of GHG Inventories in NDC Tracking
 - Policy Guidelines - Cover all emission sources such as energy used in fuel combustion, industry, and waste treatment. The benefits from tracking can help predict future emission pathways and guide climate change mitigation policy actions.
- Using Energy Data for Emission Reporting
 - Primary method for CO₂ emission calculation is by multiplying the fuel consumption by emission factor from IPCC 2006 guidelines.
 - Emission factors used for different sectors such as transport - Diesel, petrol, jet fuel consumption.
 - Industry - Electricity and fuel use.

- Households & Commercial - Electricity and LP gas consumption.
- Strategies to Reduce Energy Sector Emissions.
 - Increase Energy Efficiency - Upgrading power generation systems.
 - Renewable Energy Integration - Installing rooftop solar to cut down diesel use. For example, a 13.5 kW solar system can reduce diesel power demand by 54 kWh/day. This leads to an annual CO₂ reduction from 32.3 tons to 7.89 tons.

The presentation slides are attached to Annex 03 of this report.

3.4 Data Collection and Validation

This presentation was given by Dr. Amila Wickramasinghe, the Energy Statistician of the consultancy project and Mr. Harsha Wickramasinghe, the Team Leader, and Energy Expert of the consultancy project. This presentation places a heavy emphasis on how accurate data collection and validation are essential for energy balance reporting. As such it explores reliable data collection through Energy Information Management System (EIMS) and regular surveys and administrative reporting.

- Key Data Required for Maldives' Energy Balance
 - Energy Supply Data such as Petroleum-based fuel supply and renewable energy generation (solar, wind, etc.).
 - Energy Conversion Data: Diesel and solar power converted into electricity by STELCO, FENAKA, and resorts independent power generators.
 - Energy End-Use Data: Main consumer categories and their respective fuels such as households, businesses, and government using electricity and LPG consumption and Transport using Petrol and diesel usage.
- Data Collection Methods
 - Administrative sources such as the Customs Service, Bureau of Statistics, Utility Regulatory Authority (URA) mandating to report statistics from utility providers such as STELCO, FENAKA and MWSC.
 - Statistical Surveys through National Census and Sample Surveys.
 - Modelling energy use for application such as resort energy use based on room occupancy and fisheries energy use based on fish catch modelling.
 - Direct Measurements from electricity meters in solar PV systems and Reverse Osmosis (RO) plants.

- Data Validation Strategies
 - Fuel import data from MCS (Customs Service) should match supplier records (STO, FSM, Villa Gas).
 - URA to collect solar PV and diesel-based electricity generation data from STELCO, FENAKA, MWSC, MACL, and resorts.
 - Renewable energy validation where a central repository should store all key data such as daily fuel consumption and electricity generation for each generator.
 - Surveys to assess installed capacities before implementing mandatory reporting.
 - Resorts validating bed-night-based energy estimates through annual surveys, tracking fuel issued and resort energy profiles updated every five years.
 - Transport sector annual active vehicle/vessel fleet count, fuel use breakdown by diesel, petrol, and electric vehicles and surveys every five years to assess fuel efficiency (km per litre).
 - Fisheries sector conducting annual data collection on fishing trips and fuel use and to use historical 10-year averages if the data is unavailable.

The presentation slides are attached to Annex 04 of this report.

4. Main Discussions

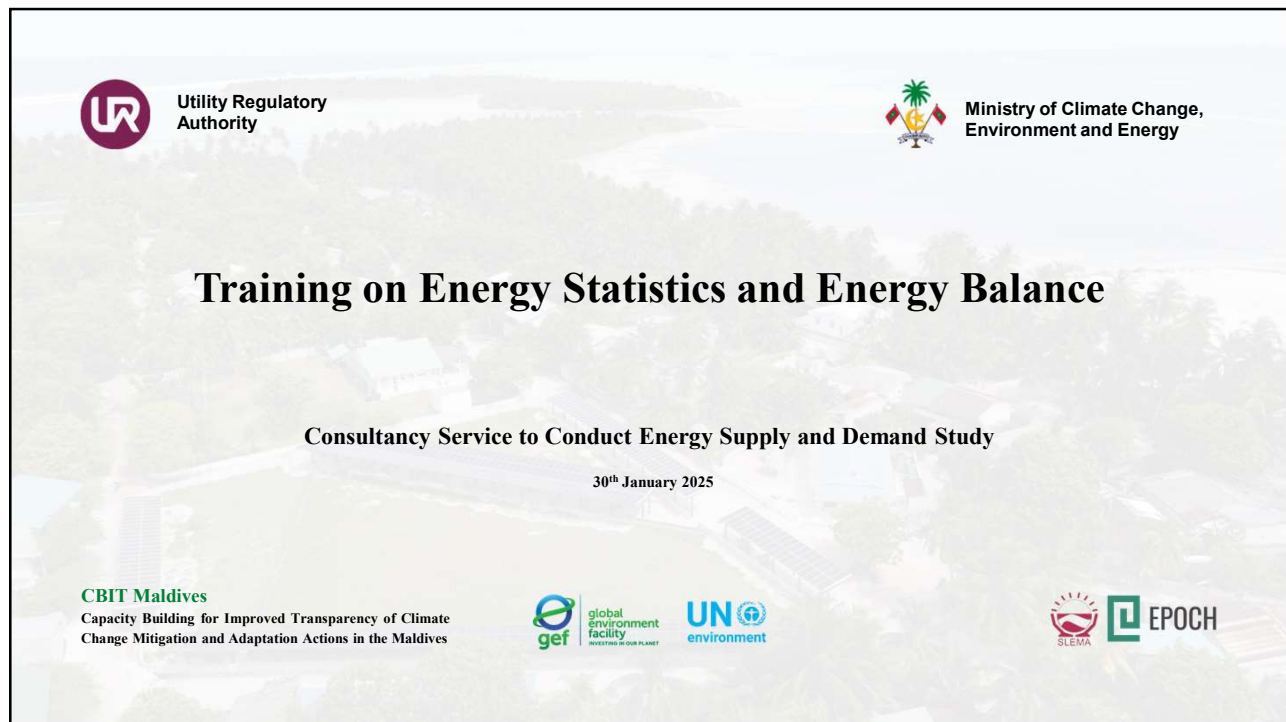
The following Table 4-1 summarizes the main discussions and recommendations by the participants on the data collection methods, assumptions, methodologies and the proposed mechanism for continuous publishing of the energy balance. A copy of the participants list is attached with this report as Annex 05.


Table 4-1: Main discussion and recommendations

Section	Main Discussion	Response
Hands-On Exercise (Session 2)	<ul style="list-style-type: none"> Participants inquired why the results obtained were not the same. Given the numerical values are rounded off in the source data excel file, some of the participants manually input the values from the source data excel file into the energy balance calculator excel file. 	<ul style="list-style-type: none"> Recommended to create an additional sheet within the energy balance calculator excel file and transfer the contents from the data source excel file to this sheet. This ensures that the full values are transferred. This was the best practise, given how much more reliable and easier it is to transfer data between sheets within the same file rather than between two different excel files.
Hands-On Exercise (Session 2)	<ul style="list-style-type: none"> Participants inquired if the excel files can be converted to software such as google sheets and still function as intended. 	<ul style="list-style-type: none"> SLEMA team highlighted that the functions and formulas in google sheets is enough to process the information. However, excel is still the superior software in processing large data sets. Moreover, the industry standard for energy data being exported is in excel format. Additionally, it is recommended to process such large data sets with computers having a minimum RAM of 16 GB.
Questions & Answers	<ul style="list-style-type: none"> Participant from MWSC inquired regarding the margin of error on the Sankey Diagram. 	<ul style="list-style-type: none"> SLEMA team informed that a 5% error is acceptable by IEA and anything above 8-10% raises questions on the values.
Questions & Answers	<ul style="list-style-type: none"> Consultants inquired regarding the data collection method kept by FENAKA and how the mechanism can be improved. 	<ul style="list-style-type: none"> To maintain a central database in the head office of FENAKA which can be updated through the cloud by the individual FENAKA offices located on the islands. The consultants also advices on ensuring the data input methods are as streamlined as possible as there could be human errors involved during data entry.
Questions & Answers	<ul style="list-style-type: none"> What are the validation methods used by the consultant to validate the data 	<ul style="list-style-type: none"> The consultants highlighted that the validation of the data received,


	and assumptions that were made in presenting the data	and the output reflected in the energy balance has be cross checked with the source data provided by Customs Maldives and STO.
Questions & Answers	<ul style="list-style-type: none"> • Participants inquired where the Battery Energy Storage System (BESS) would be placed in the energy balance schematic. • Went into details regarding BESS systems where if it is charged by solar then it should be considered PV. Additionally, if it is connected to the main grid, then the charge and discharge must be accounted for. • Highlighted how the BESS would always be in consumption due to high losses. 	<ul style="list-style-type: none"> • BESS acts as an intermediary in the energy supply system and is not a primary source of power. Given this is the case then BESS would not be accounted in the energy balance schematic.

Annex 1: Presentation on Fundamentals of Energy Statistics





Utility Regulatory
Authority




Ministry of Climate Change,
Environment and Energy

Training on Energy Statistics and Energy Balance


Consultancy Service to Conduct Energy Supply and Demand Study

30th January 2025



CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
INVESTING IN OUR PLANET




UN
environment





1


Fundamentals of Energy Statistics

Harsha Wickramasinghe






Utility Regulatory
Authority




Ministry of Climate Change,
Environment and Energy



CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
INVESTING IN OUR PLANET



UN
environment

2

Energy and Economy

- Energy is an amplifier of economic output
 - It replaces labour
 - Grant access to resources otherwise inaccessible
 - Convert natural resources to usable goods and services
 - Add value
- No energy = No economy
 - Relevant to the present day civilisation
- Economic development = Supply of cheap, reliable energy in an environmentally sustainable manner
- Hence the term 'energy - economy nexus'



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
investing in our planet



3

A View From Afar...

- A national economy has a heavy dependence on energy
- It must be properly seen and understood
 - Where is it coming from?
 - Where did it went?
 - Most importantly, what did it do..? After going 'in to' the economy.??
- A picture of the energy-economy interplay (a snapshot)
 - It is also a movie (several snapshots in a sequence)
- A national energy balance provides all these and more
 - We have dubbed it the Maldivian Energy Balance (MEB)



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
investing in our planet

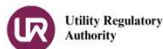
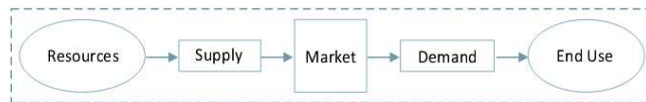


4

Importance of energy security

A well functioning economy has a secure energy system. To ensure energy security of a country, it is essential to:

- Develop and maintain energy infrastructure (from resource to market)
- Manage price volatility
- Attract investments (timely investments)
- Foster innovation and efficiency
- Build resilience into energy infrastructure
- Ensure environmental sustainability



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility



EPOCH

5

Importance of Energy Statistics

A functional energy system which ensures energy security of a country has a well laid Energy Information Management System (EIMS). Main functions of a such EIMS are:

- Monitor and manage energy resources and various aspects of energy supply and use
- Assure that policy decisions are informed by reliable and appropriate data
- Develop systems to produce quality and consistent energy information
- Ensure cross country compatibility and consistency of energy information
 - Note: **EI** – Energy Information, **EIA** – Energy Information Administration, **EIM** – Energy Information Management,
EIMS – Energy Information Management System
 - These terms must be kept in mind



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility



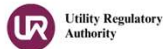
EPOCH

6

Energy system of a country

The energy system in any country can be represented by:

- Energy resources
- Energy Supply including conversion/transport-transmission and distribution
- Energy Markets
- End Uses



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



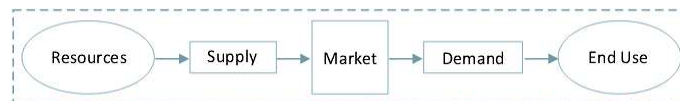
global
environment
facility
investing in our planet



7

Energy flows

This energy flow diagram explains that, owing to various end uses of energy, a demand exists in the market, which is fulfilled by the energy supply using the available resources.



This follows the basic demand supply economic model valid for any scarce resource.



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
investing in our planet



8

Energy Resources

Indigenous Resources

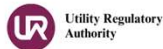
- Biomass
- Solar
- Wind..?

Global Resources

- Crude Petroleum Liquids
- Coal
- Natural Gas
- Nuclear Energy

Energy Supply

- Biomass
- Finished Petroleum Products
- Coal
- Electricity



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
improving the lives of people



9

Primary Energy Supply

- Primary energy (PE) is an energy form found in nature that has not been subjected to any conversion or transformation process.
- It is energy contained in raw fuels, and other forms of energy received as input to a system.
- Primary energy can be non-renewable or renewable.
- Total Primary Energy Supply (TPES) is an important number which communicate the size of an energy system of a country
 - Hence the size of the economy too



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



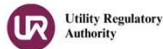
global
environment
facility
improving the lives of people



10

A Typical Secondary Energy Table

Source (ktoe)	2005	2010	2012	2013	2014	2015
Biomass	4,584.12	4,932.65	4,847.15	4,797.02	4,884.03	4,792.88
Petroleum	2,786.31	3,008.46	3,320.28	3,148.21	3,246.69	4,092.94
Coal	64.92	59.93	62.24	52.79	61.59	54.54
Electricity	623.74	791.93	895.04	907.68	944.12	1,009.72
Total	8,059.1	8,793.0	9,124.7	8,905.7	9,136.4	9,950.1
Share (%)						
Biomass	56.88	56.10	53.12	53.86	53.46	48.17
Petroleum	34.57	34.21	36.39	35.35	35.54	41.13
Coal	0.81	0.68	0.68	0.59	0.67	0.55
Electricity	7.74	9.01	9.81	10.19	10.33	10.15



13

Energy Markets and End Uses

- Energy market is where the supplies and demands meet and transactions happen.
- Markets are complex phenomena which can have a global, regional or national and even sub-national character.
- The true consumer of a product or service.

Four main end use sectors

1. Industry
2. Transport
3. Other (including residential, commercial and many more things)
4. Non-energy uses (mostly solvents and feedstock for industries)



14

The Need for an Energy Balance

Energy Balances offer a large portfolio of services to a country, especially to its planners. Some key needs met by an energy balance are as follows:

- Provide essential information for analysis and energy policy purposes,
- Base data for the construction of various energy indicators (e.g. consumption per capita)
- A basis for monitoring energy efficiency
- Monitor progress of energy policy targets (e.g. increasing the share of RE, reducing the growth of energy use and reducing dependency on energy imports)
- Growth or decline trends of energy demand and supply
- Linking with GDP to see the ultimate energy productivity index; Energy Intensity of Economy
- Flag energy security concerns (e.g. whether the country is heavily dependent on one resource)
- A dashboard for economic output of the country (when sector level data is available)
- Hinting on other structures of the economy (e.g. vehicle fleet and housing available, even hotel guest nights on offer)
- Maintaining greenhouse gas inventories
- To keep track of physical flow of energy products



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility



15

Nature of an Energy Balance

- It is a neat way to depict the energy-economy interplay
- Constituted by some basic energy ingredients
 - Energy supply
 - Energy demand
 - Energy waste
- Also some economic ingredients
 - Demography of the economy
 - Economic profile of the country
 - Energy input to economy (interaction between energy and economy)
 - Market prices of energy products and services



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives

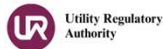


global
environment
facility



16

Firstly, the Energy Ingredients of the EB...



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
investing in a better world



17

Type of Energy Data

• All types of energy sources

- Coal, crude oil, finished petroleum products, renewable energy, LP gas, fuel wood, wood waste, residues...
 - How much came ? From where ? During which period ? Stock position ?

• Types of transformation going on

- Crude oil to oil products and gas products
 - How much fuel went in ? How much electricity generated ?
- Coal or oil to electricity generation
 - How many tonnes of coal went in ? How much electricity generated ?



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



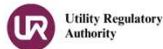
global
environment
facility
investing in a better world



18

Types of Energy Data...

- Who is using the energy supplied ?
 - Industrial concerns ? Transport system ? Buildings ?
 - Any fuel being used as a feedstock (non-energy use) ?
 - What amount of energy is wasted and lost ?
- Snapshot is the key word here
 - A careful and methodical noting down of transacted volumes of energy commodities at each transaction point
 - Within a pre-set period (usually a calendar year)



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility



19

EB is a Complex Matrix

- A matrix of many rows and many columns for a complex industrialised, and integrated country
- Columns represent groups of energy products that are available for use in the national territory
- Rows represent energy flows – from resources to final use
- Rows and columns should contain homogeneous information – a single unit of measurement.
 - Most countries manage with Joules and kWh



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives

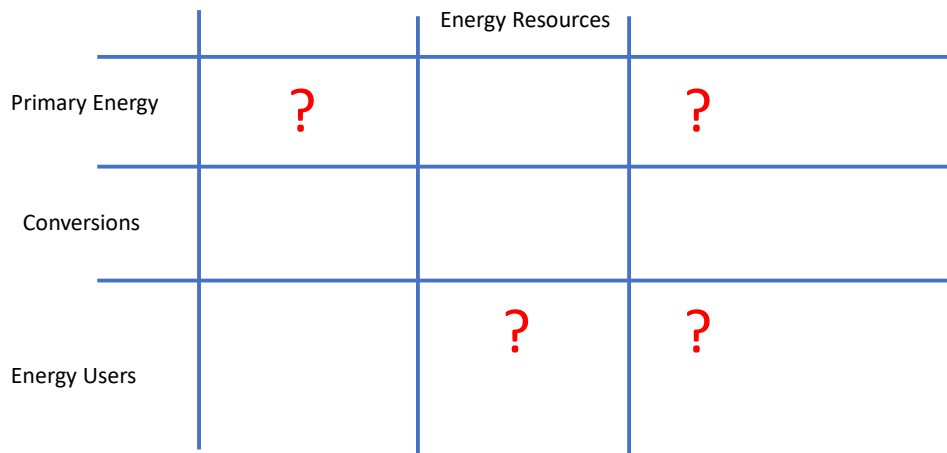


global
environment
facility



20

Overview of energy supply and demand data



21

Overview of energy supply and demand data

Nature of energy supply data is very different to the nature of energy demand data. Planners always view the supply side as the 'easy' part and the demand side the 'trouble'.

Energy Supply Data

- All energy supply records e.g. how much fuel went to power generation facilities and how much electricity came out, how much petroleum was imported and what is left in the tanks ?.
- Units of measure and relevant aberrations are well understood and quantified.
- Most follow common templates, easy to harmonise for a national requirement.
- Commercial transactions well documented and reverse calculated to get energy data.

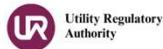
Energy Demand Data

- Different users use different approaches to note down energy use (some does not have any)
- No one really knows what happens to the energy commodities purchased by a user
- Uncountable number of methods and varieties of data types
- No proper track record of final use

22

The Complex Matric

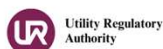
Singapore 2012 (ktoe)	Coal	Peat	Oilshale and Oil Sands	Crude Oil	Oil Products	Natural Gas	Nuclear	Hydro	Geothermal	Solar, Wind, Others	Biofuels & Waste	Electricity	Heat	Heat Output from non-specified comb fuels	Total
Production	-	-	-	-	-	-	-	-	-	-	1.12	602.21	-	-	603.32
Imports	7.41	-	-	49,780.68	97,249.69	7,325.96	-	-	-	-	-	-	-	-	154,363.77
Exports	-	-	-	-300.90	-83,326.50	-	-	-	-	-	-	-	-	-	-83,627.40
International marine bunkers	-	-	-	-	-41,092.26	-	-	-	-	-	-	-	-	-	-41,092.26
International aviation bunkers	-	-	-	-	-6,849.58	-	-	-	-	-	-	-	-	-	-6,849.58
Stock changes	-	-	-	-	1,655.62	-	-	-	-	-	-	-	-	-	1,655.62
Total primary energy supply	7.41	-	-	49,479.78	-32,363.03	7,325.96	-	-	-	-	1.12	602.21	-	-	25,053.47
Transfers	-	-	-	6,844.20	-6,844.25	-	-	-	-	-	-	-	-	-	-0.05
Statistical differences	-	-	-	-0.00	-782.46	546.40	-	-	-	-	-	-	-	-	-234.06
Main activity producer electricity plants	-	-	-	-	-1,278.28	-6,397.53	-	-	-	-1.12	-602.21	3,887.11	-	-	-4,392.02
Autoproducer electricity plants	-	-	-	-	-341.38	-337.22	-	-	-	-	-	147.66	-	-	-530.93
Main activity producer CHP plants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Autoproducer CHP plants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Main activity producer heat plants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Autoproducer heat plants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat pumps	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Electric boilers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chemical heat for electricity production	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gas works	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil refineries	-	-	-	-56,323.98	54,761.94	-	-	-	-	-	-	-	-	-	-1,562.03
Coal transformation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Liquefaction plants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Non-specified (transformation)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy industry own use	-	-	-	-	-2,069.67	-9.99	-	-	-	-	-	-161.42	-	-	-2,261.08
Losses	-	-	-	-	-	-	-	-	-	-	-	-64.76	-	-	-64.76
Final consumption	7.41	-	-	-	11,062.88	1,129.64	-	-	-	-	-	3,808.60	-	-	16,008.53
Industry	7.41	-	-	-	2,669.92	978.57	-	-	-	-	-	1,613.17	-	-	5,169.06
Iron and steel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



23

More Properties of an EB

- Compiled with respect to a clearly defined reference period (ideally a calendar year)
- A separate row is reserved for statistical difference, calculated as the numerical difference between the total supply of a fuel, electricity or heat and the total use of it
- Supply of primary and secondary energy as well as external trade in energy products, stock changes, final energy consumption and non-energy use should be clearly separated to better reflect the structure and relationships between energy flows and to avoid double-counting.



24

Top Block – Energy Input to the Country

Supply-Use \ Resources		Coal	Peat	Oil shale and oil sands	Crude oil	Oil products	Natural gas	Nuclear	Hydro	Geothermal	Solar, Wind, Others	Biofuels and waste	Electricity	Heat	Heat output from non-specified combustible fuels	Total
1	Indigeneous Supply															
2	Imports															
3	Exports															
4	Bunkers															
5	Stock Change															
6	Total Primary Energy Supply (TPES)															



Utility Regulatory
Authority



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility



EPOCH

25

Total Primary Energy Supply (TPES)

- It is the most important indicator of the size of the energy industry of a country
 - Involves crude oil, finished oil products, natural gas, hydropower, coal, biomass, nuclear power and renewable energy in a developed country
 - Limited to finished oil products (including LP gas) and solar electricity in the Maldives
- In closely connected countries, cross border electricity and pipeline systems add severe complexities to energy balances
 - Involves concepts of 'net' imports after deducting exports.



Utility Regulatory
Authority



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility

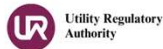


EPOCH

26

Energy Resources

- In the case of fossil fuel deposits found in the country under consideration, various other aspects come into play
 - Proven resources + exploration activities
 - Annual production volumes by mine / well
 - Losses, torches and flares
 - Crude supplied to local refineries vs. crude exported
 - Monitoring of stock levels



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
investing in a better planet



EPOCH

27

Middle Block - Transformations

Supply-Use \ Resources		Coal	Peat	Oil shale and oil sands	Crude oil	Oil products	Natural gas	Nuclear	Hydro	Geothermal	Solar, Wind, Others	Biofuels and waste	Electricity	Heat	Heat output from non-specified combustible fuels	Total
7	Transfers															
8	Statistical differences															
9	Electricity plants															
10	Captive Electricity plants															
11	CHP plants															
12	Captive CHP plants															
13	Heat plants															
14	Captive Heat plants															
15	Heat pumps															
16	Electric boilers															
17	Chemical heat for electricity generation															
18	Gas works															
19	Oil refineries															
20	Coal transformation															
21	Liquefaction plants															
22	Non-specified (transformation)															
23	Energy industry own use															
24	Losses															
25	Final consumption															



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives

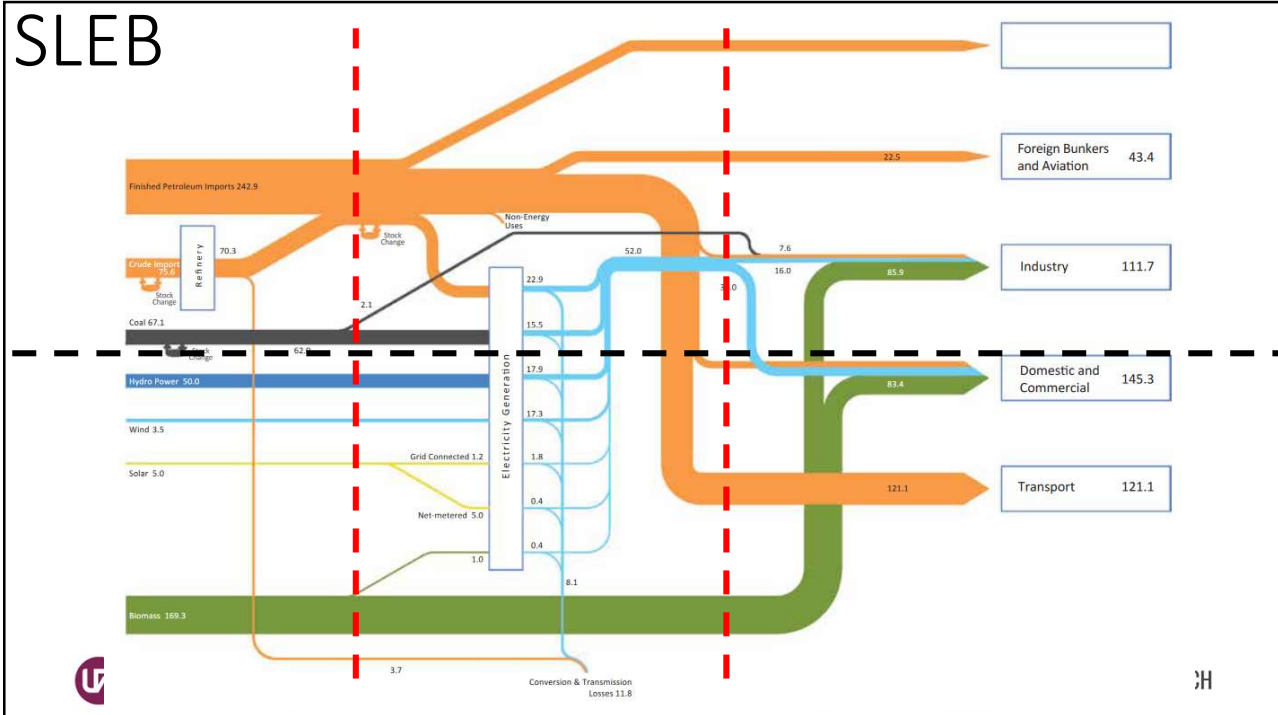


global
environment
facility
investing in a better planet



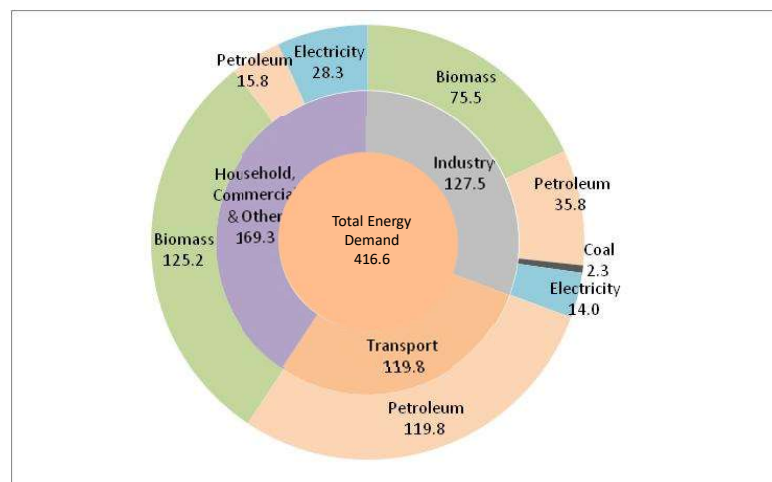
EPOCH

28



33

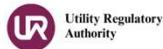
Energy Supply & Demand Profile



34

Consideration of the National Context

- Maldives, like many other countries in the region have simple economic profiles and simple energy systems
 - Operate in isolation from other countries
 - Relatively limited number of energy products in use
- Other complications could exist
 - Non-availability of an interconnected 'national' grid
 - Many loading / unloading points
 - Existence of a large informal sectors (both energy and economic)



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



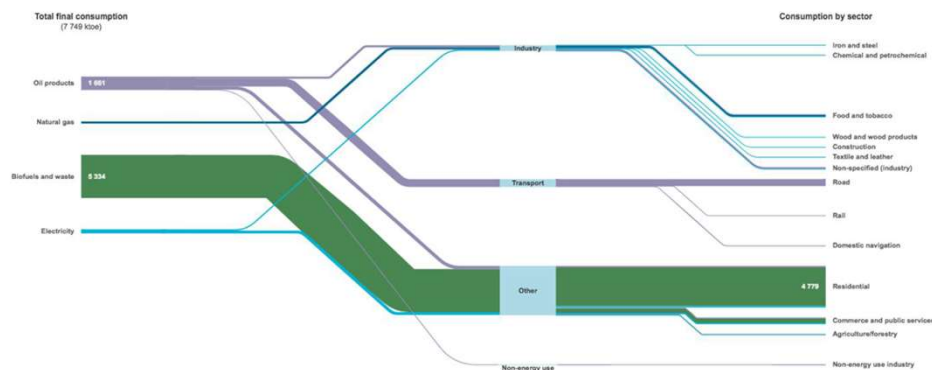
global
environment
facility
investing in a better planet



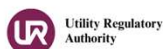
EPOCH

35

A Similar Economy from Africa



Source: International Energy Agency (IEA) from Energy Balance Flows © OECD/IEA [online]. [Accessed on September 10, 2017]. Available from: <http://www.iea.org/Sankey>



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
investing in a better planet



EPOCH

36

A Simpler Matrix

Supply-Use \ Resources	Oil products	Solar, Wind, Others	Biofuels and waste	Electricity	Total
1 Indegenous Supply					
2 Imports					
3 Exports					
4 Bunkers					
5 Stock Change					
6 Total Primary Energy Supply (TPES)					
7 Transfers					
8 Statistical differences					
9 Electricity plants					
10 Captive Electricity plants					
22 Non-specified (transformation)					
23 Energy industry own use					
24 Losses					
25 Final consumption					
26 Industry					
34 Food, beverages and tobacco					
37 Construction					
38 Textiles and leather					
39 Non-specified (Industry)					

Supply-Use \ Resources	Oil products	Solar, Wind, Others	Biofuels and waste	Electricity	Total
40 Transport					
41 Road					
42 Domestic aviation					
45 Domestic navigation					
46 Non-specified (transport)					
47 Other					
48 Residential					
49 Commercial and public services					
50 Agriculture/forestry					
51 Fishing					
52 Non-specified (other)					
53 Non-energy use					
54 Non-energy use industry/transformation/energy					
55 Non-energy use in transport					
56 Non-energy use in other					
57 Memo: Non-energy use chemical/petrochemical					
58 Electricity output in GWh					
59 Electricity Generation from Electricity plants					
60 Electricity Generation from Captive Electricity plants					
68 Plant Efficiencies					
69 Electricity plants					
70 Captive Electricity plants					



Utility Regulatory
Authority



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
improving resilience to climate change



EPOCH

37

Secondly, the Economic Ingredients of the EB...



Utility Regulatory
Authority



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
improving resilience to climate change



EPOCH

38

Demography and Characteristics

- Population and number of dwellings in relevant administrative units (smaller the unit, better it is)
- Mean temperatures (minimum and maximum in a given period – daily / weekly / monthly)
- Work patterns (open / close days), seasonal aspects such as crop cycles



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility



39

Economic profile of the country

- Major constituents of the GDP at market prices and factor cost prices must be known (a long term data set will be invaluable)
- Economic output from different sectors
 - Fisheries and tourism to be in focus
 - Ideally the sectors recognised in the smallest disaggregation



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility

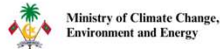
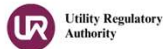


40

Classifying an Entire Economy

- Main ISIC table with two-digit categorisation

Section	Divisions	Description
A	01-03	Agriculture, forestry and fishing
B	05-09	Mining and quarrying
C	10-33	Manufacturing
D	35	Electricity, gas, steam and air-conditioning supply
E	36-39	Water supply; sewage, waste management and remediation activities
F	41-43	Construction
G	45-47	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	49-53	Transportation and storage
I	55-56	Accommodation and food service activities
J	58-63	Information and communication
K	64-66	Financial and insurance activities
L	68	Real estate activities
M	69-75	Professional, scientific and technical services
N	77-82	Administrative and support service activities
O	84	Public administration and defence; compulsory social security
P	85	Education
Q	86-88	Human health and social work activities
R	90-93	Arts, entertainment and recreation
S	94-96	Other service activities
T	97-98	Activities of households as employers; undifferentiated goods and services producing activities of households for own use
U	99	Activities of extranational organisations and bodies



41

Energy Input to the Economy

- Interaction between energy and economy, a fine depiction of how energy efficient a country is...
 - Energy intensity of economy (e.g. Joules which went into produce a million USD)
- Per capita use of energy
 - kgOE per capita in a given year
 - kWh per capita in a given year



42

Market prices of energy products and services

- Carefully maintained records of energy prices during the period of interest
 - Every price revision of every fuel, electricity and energy supply must be recorded
 - Average price for the period of interest calculated on weighted basis
- It will be fruitful to record the international price movements too
 - A clear indication of taxation on energy and efficiency of the energy sector utilities can be elicited
 - Not forgetting the subsidies on energy commodities



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
implementing UNFCCC projects



43

Understanding Energy Flows and Balances

Energy system of a country involves two main sets of players i.e. energy industry (or supply side) and end users (demand side). Although connected through a marketplace, these two groups are very unique in their attributes.

Energy Industry (Supply Side)

- Includes power generation facilities, petroleum importers and storage facilities, informal sector.
- Knows the energy industry nomenclature quite deeply (deals with tonnes and GWh)
- Relatively lesser in number
- Commodity accounts, stock positions and releases are very well documented

End Users (Demand Side)

- Four main categories (i.e. Industry, Transport, Non-energy uses and Other)
- Commercial transactions define energy uses (e.g. litres, kWh and LPG cylinders)
- Large number of users in any given sub sector
- Data are often aggregated and very difficult to untangle



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives

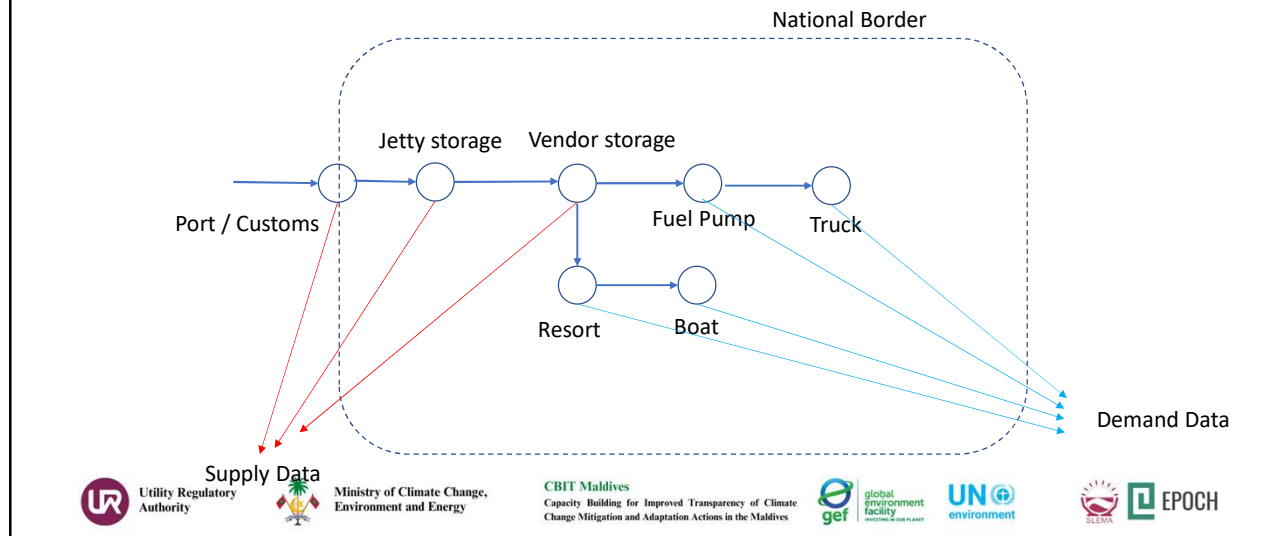


global
environment
facility
implementing UNFCCC projects



44

Sources of Energy Data



45

Probable Sources of Data

- Ministry of Climate Change, Environment and Energy
- Maldives Utility Regulatory Authority
- Maldives Bureau of Statistics
- Ministry of Tourism
- Ministry of Finance
- Maldives Monetary Authority
- Waste Management Corporation
- Ministry of Transport and Civil Aviation
- STELCO
- FENAKA
- Ministry of Fisheries and Ocean Resources
- Maldives Transport and Contracting Company
- State Trading Organisation
- Oil Importers and Gas Importers
- Renewable Energy Equipment Vendors
- Maldives Ports Limited
- Maldives Customs Services
- Maldives Airport Company Limited
- Maldives Industrial Fisheries Company
- Domestic Airlines

46

What type of data to be collected ?

- Electricity data
 - STELCO
 - FENAKA
 - Independent Power Producers
 - Generation
 - Use
 - Information about power plants
 - Information of small power producers
 - Fuel consumption in power plants
- Petroleum data
 - State Trading Organisation
 - Other Oil Companies
 - Imports
 - Exports
 - Uses
 - Pricing information
- Biomass data
 - Informal sector
 - Assumptions
 - Domestic / commercial
 - Industrial



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



47

There are many issues and challenges in securing good energy data. Some are affecting all countries, and some are specific to the Maldives. Some examples of these issues are:

- Energy industry is scattered and operates in isolation due to the geographic context of the country.
- Record keeping and data reporting is not yet practiced on a mandatory basis. Energy industry is not scheduled as yet.
- Incomplete (from an energy perspective) sources of administrative data, including the business register.
- Unreported facilities and events (e.g. Large captive power plants in industries and solar rooftop systems)
- Importation of energy commodities declared as some other good.
- Non-availability of actual vehicle fleet in operation.
- Non-energy uses reported as energy uses.
- Inconsistent reporting formats and frequencies.
- Unintended aggregation of different data streams.



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



48

Thank You..!



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
improving our planet



EPOCH

Annex 2: Hands on Practical Exercise

Maldives Energy Balance (in original units)					
	Solar Power (GWh)	Diesel (kt)	Petrol (kt)	Jet A1 (kt)	LP Gas (kt)
Supply					
Primary Energy					
Imports					
Direct Exports					
Foreign Aviation and Bunkering					
Statistical Difference					
Total Energy Supply					
Energy Conversion					
Thermal Power Plants					
Solar PV					
Own Use					
Conversion Losses					
Losses in Transport and Distribution					
Consumption for Non Energy Use					
Total Energy Conversion					
Energy Use					
Industry					
Water Suply					
Transport					
Road Transport					
Domestic Navigation					
Domestic Aviation					
Others					
Household, Commercial, Agriculture and Other					
Total Energy Use					

Maldives Energy Balance (in thousand toe)					
	Solar Power	Diesel	Petrol	Jet A1	LP Gas
Supply					
Primary Energy					
Imports					
Direct Exports					
Foreign Aviation and Bunkering					
Statistical Difference					
Total Energy Supply					
Energy Conversion					
Thermal Power Plants					
Solar PV					
Own Use					
Conversion Losses					
Losses in Transport and Distribution					

Consumption for Non Energy Use					
Total Energy Conversion					
Energy Use					
Industry					
Water Suply					
Transport					
Road Transport					
Domestic Navigation					
Domestic Aviation					
Others					
Household, Commercial, Agriculture and Other					
Total Energy Use					

Thousand toe =	41.868	TJ
----------------	--------	----

Maldives Energy Balance (in Tera Joules)					
	Solar Power (GWh)	Diesel (kt)	Petrol (kt)	Jet A1 (kt)	LP Gas (kt)
Supply					
Primary Energy					
Imports					
Direct Exports					
Foreign Aviation and Bunkering					
Statistical Difference					
Total Energy Supply					
Energy Conversion					
Thermal Power Plants					
Solar PV					
Own Use					
Conversion Losses					
Losses in Transport and Distribution					
Consumption for Non Energy Use					
Total Energy Conversion					
Energy Use					
Industry					
Water Suply					
Transport					
Road Transport					
Domestic Navigation					
Domestic Aviation					
Others					
Household, Commercial, Agriculture					
Total Energy Use					

Imports			
Fuel	Qty	Unit	Data source
LP gas	18	kt	Maldives Customs
Petrol	89	kt	Maldives Customs
Jet A1	222	kl	MACL
Diesel	644	kt	Maldives Customs

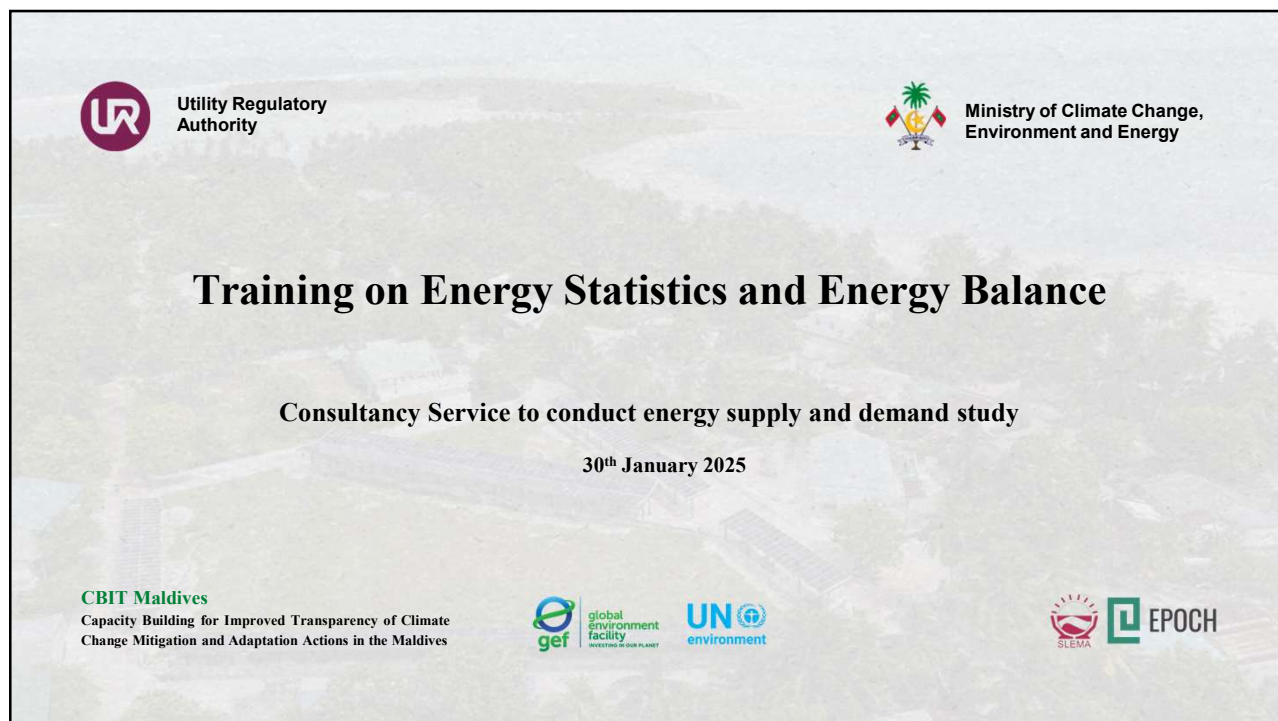
Type of fuel	Density g/cm ³	Energy content toe/t	Emission factor tCO ₂ /toe
Diesel	0.84	1.035	3.06
Petrol	0.75	1.070	2.84
Jet A1	0.8	1.065	2.92
LP gas	0.54	1.130	2.57


Foreign aviation and bunkering			
Fuel	Qty	Unit	Data source
Jet A1	163	kl	MACL (international)
Diesel	7	kt	FSM data >> vessels leaving Maldives

Power generation			
Type	Qty	Unit	Data source
Thermal power plants	984	GWh	STELCO and FENAKA summaries - desalination power generation
Diesel consumption in thermal power	281	kl	STELCO and FENAKA summaries
Solar PV	16	GWh	STELCO and FENAKA summaries
Airport (captive generation) - diesel	10	kl	STO data >> MACL >> MGO
Airport generation	37	GWh	Back calculated from the above row
Desalination (captive generation)	58	GWh	RO plant data >> annual generation
Desalination - diesel	15	kl	RO plant data >> fuel consumption
Resort thermal generation	732	GWh	Resort data calculation >> bednight basis
Resort thermal -diesel	176	kt	Resort data calculation >> bednight basis
Resort solar generation	55	GWh	Resort data calculation >> bednight basis
Losses in transport and distribution	113	GWh	STELCO and FENAKA summaries >> difference between total generation and consumption
Thermal generation	1,810	GWh	
Solar generation	71	GWh	
Diesel consumption	433	kt	


Energy usage			
Activity	Qty	Unit	Data source
Fishing industry - diesel	31	kt	Estimated. Fisheries sheet
Desalination -electricity	58	GWh	Same as generation in RO plants
Airport - electricity	37	GWh	Same as generation of the airport
Road Transport - petrol	45	kt	Estimated/ calculated in the land transport sheet
Road Transport - diesel	13	kt	Estimated/ calculated in the land transport sheet
Domestic navigation - petrol	44	kt	Estimated/ calculated in transport sheet
Domestic navigation - diesel	167	kt	Estimated/ calculated in transport sheet
Domestic Aviation - Jet A1	59	kl	MACL >> domestic

Resorts - electricity	787	GWh	Same as generation
Resorts - LP gas	6	kt	Estimated in the resorts sheet
Household -elect	887	GWh	STELCO and FENAKA sheets
Household, -LPg	11	kt	Customs data apportioned as per Maldives gas company data
Other (aggregated elect)	1,711	GWh	
Other (aggregated LPg)	18	kt	





Utility Regulatory
Authority




Ministry of Climate Change,
Environment and Energy

Training on Energy Statistics and Energy Balance


Consultancy Service to conduct energy supply and demand study

30th January 2025



CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
INVESTING IN OUR PLANET




UN
environment





1


Data Collection

Nimashi Fernando






Utility Regulatory
Authority




Ministry of Climate Change,
Environment and Energy



CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
INVESTING IN OUR PLANET



UN
environment

2

The Process of Requesting Data

- Data collection formats should be sent to relevant institutes, at the beginning of each calendar year.
- Data should be requested for the immediate past year.
- Ex: data of 2024 should be requested in early 2025.
- Initially data collection would be difficult, but once routinised, stakeholders would respond on time.
- Data submission should ideally be obligated *via* regulations.



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
UN environment



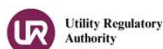
3

Sample Data Sets – Imported Fuel

STATISTICS AND RECORDS SECTION								
Maldives Customs Services								
Imports of Fuel from 2018-2022								
YEAR	MONTH	HS CODE	HS DESCRIPTION	COUNTRY	UNIT	QUANTITY	CF(MVR)	RATE
2018	1	2710191110	PETROL	CHINA	TNE	3,430.86	37,833,293.64	5
2018	2	2710191110	PETROL	MALAYSIA	TNE	3,894.98	45,074,877.20	5
2018	8	2710191110	PETROL	MALAYSIA	TNE	2,607.79	31,609,870.43	5
2018	10	2710191110	PETROL	MALAYSIA	TNE	1,918.49	24,794,969.14	5
2018	11	2710191110	PETROL	MALAYSIA	TNE	1,981.96	25,118,019.33	5
2018	1	2710191110	PETROL	SINGAPORE	TNE	176.72	1,920,173.02	5
2018	2	2710191110	PETROL	SINGAPORE	TNE	2,664.90	29,776,099.21	5
2018	3	2710191110	PETROL	SINGAPORE	TNE	177.36	2,034,632.58	5
2018	4	2710191110	PETROL	SINGAPORE	TNE	171.73	1,844,359.51	5
2018	5	2710191110	PETROL	SINGAPORE	TNE	1,615.15	19,714,144.23	5
2018	7	2710191110	PETROL	SINGAPORE	TNE	170.83	2,018,844.75	5
2018	9	2710191110	PETROL	SINGAPORE	TNE	175.46	2,025,597.57	5
2018	10	2710191110	PETROL	SINGAPORE	TNE	171.86	2,210,319.44	5
2018	12	2710191110	PETROL	SINGAPORE	TNE	6,725.37	70,294,369.49	5

Unit (t)

*Subjected to post modification



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
UN environment



4

Sample Data Sets – Imported Fuel

Energy Supply and Demand Study - Republic of Maldives

Nationwide Fuel Sales - Data Collection

Service Provider: Fuel Supplies Maldives

Atoll:

Island:

Type:

Bunkering

	Fuel Import		Fuel Supply to Vessels Leaving Maldives		Fuel Storage		Total Fuel Supply		Consumers				
	Fuel Type	Fuel Supply (l/yr)	Fuel Type	Fuel Supply (l/yr)	Opening (liters)	Closing (liters)	Fuel Type	Fuel Supply (l/yr)	Domestic		Resorts		Guest Houses/l
									Fuel Type	Fuel Sale (l/yr)	Fuel Type	Fuel Sale (l/yr)	
2018			Diesel	5,447,030			Diesel	274,921,889	Diesel	14,952,465	Diesel	64,101,757	
2019			Diesel	4,352,500			Diesel	311,311,958	Diesel	13,501,150	Diesel	94,791,371	
2020			Diesel	5,574,471			Diesel	302,672,179	Diesel	7,194,742	Diesel	71,142,715	
2021			Diesel	9,746,876			Diesel	354,547,329	Diesel	7,068,882	Diesel	77,856,034	
2022			Diesel	8,167,710			Diesel	457,955,913	Diesel	23,882,601	Diesel	105,044,958	



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



5

Sample Data Sets – Imported Fuel

Energy Supply and Demand Study - Republic of Maldives

STO - Data Collection Form

Atoll:

Island:

Type:

Diesel for Power Generation

	Fuel Import		Fuel Supply to Airports		Fuel Storage	
	Fuel Type	Fuel Supply (l/yr)	Airport	Fuel Supply (l/yr)	Opening (liters)	Closing (liters)
2018	MGO	413,756,400	MACL	9,228,960	14,823,308	8,167,354
	ULG	61,152,000			1,658,592	4,122,516
	JET A-1	158,750,000	MACL & Regional	158,750,000	79,780	61,860
2019	MGO	439,872,000	MACL	10,458,550	8,167,354	20,484,783
	ULG	65,461,200			4,122,516	4,508,656
	JET A-1	195,500,000	MACL & Regional	195,500,000	61,860	58,400
2020	JET A-1	411,798,000	MACL	7,788,000	20,484,783	13,823,208
	ULG	42,700,000			4,508,656	5,015,968



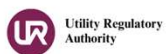
Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



6

Thank You..!



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives

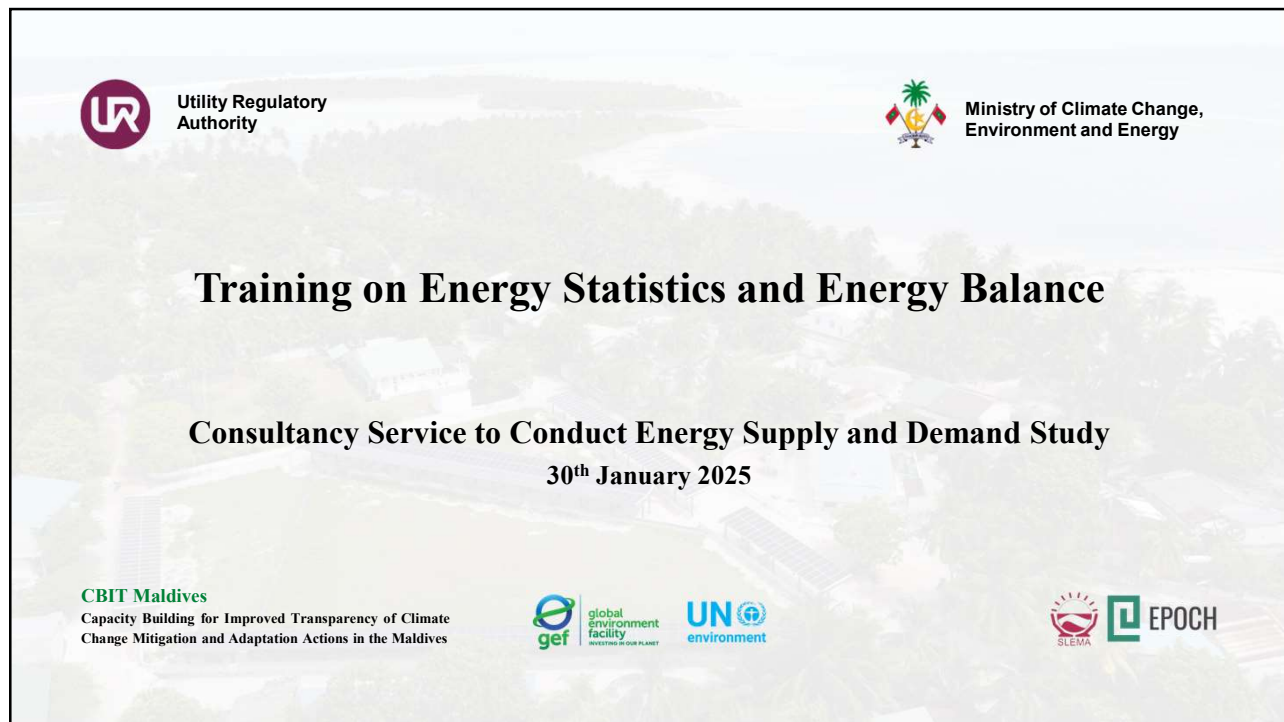



global
environment
facility
improving people's lives




EPOCH

Annex 3: Presentation on Quantifying Climate Impacts of Energy Systems





Utility Regulatory
Authority




Ministry of Climate Change,
Environment and Energy

Training on Energy Statistics and Energy Balance


Consultancy Service to Conduct Energy Supply and Demand Study

30th January 2025



CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
INVESTING IN OUR PLANET



UN
environment

1

Emissions

Introduction to The New
Requirements for
Reporting National GHG
Inventories And NDC
Tracking Under the ETF of
The Paris Agreement

Nimashi Fernando





Utility Regulatory
Authority



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
INVESTING IN OUR PLANET



UN
environment




2

Introduction

- The energy system in Maldives is heavily dependent on fossil fuels.
 - In the past, it was diesel generators only
 - Now, integration of solar PV has introduced some complexity to emission calculations
- Combustion of fossil fuels emit carbon dioxide among other greenhouse gasses.
 - Apart from this, methane generated from decomposing waste and refrigerants used in HVAC systems contribute heavily to global warming
- Emission calculations are straightforward for the Maldives.
 - It is a complex affair for countries which host large number of generators in a connected national grid
 - Calculation of Grid Emission Factor (GEF) and Average Emission Factor (AEF) needs to be done annually
- The quantity of combusted fuel should be multiplied by the emission factor.
 - Maintaining good record of fuel use is a must



Utility Regulatory
Authority



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
UNEP/World Bank/IMF



EPOCH

3

Transparency negotiations



Utility Regulatory
Authority



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



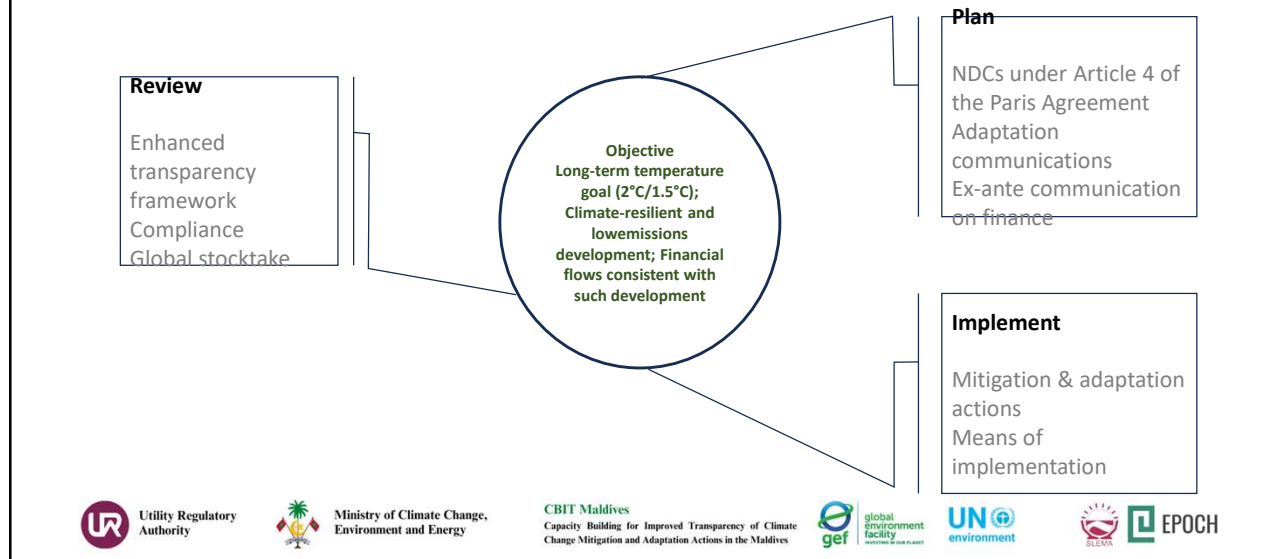
global
environment
facility
UNEP/World Bank/IMF



EPOCH

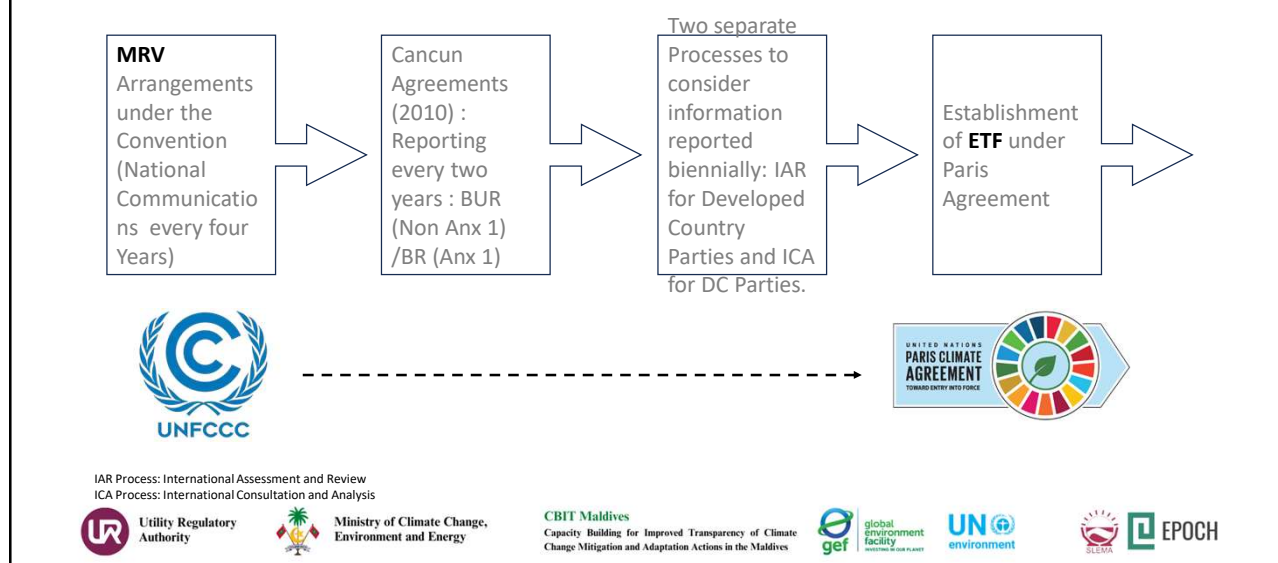
4

Paris Agreement – Going beyond ambitions



5

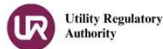
From MRV to ETF



6

The Paris Agreement and the ETF

- Article 13 decision 18/CMA.1, Paris Agreement adopts the enhanced transparency framework (ETF) for action and support.
- The ETF is a common framework applicable to all Parties, with specific flexibility provisions provided to DC Parties that need it in the light of their capacities in its implementation.
- Article 13 of the Paris Agreement goes on to outline the core elements of the ETF, which include reporting, the TER and the FMCP.



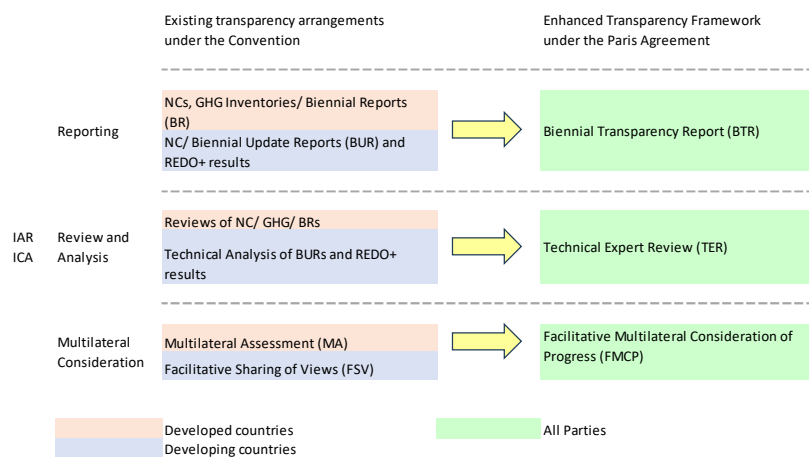
Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



7

Difference between MRV and ETF



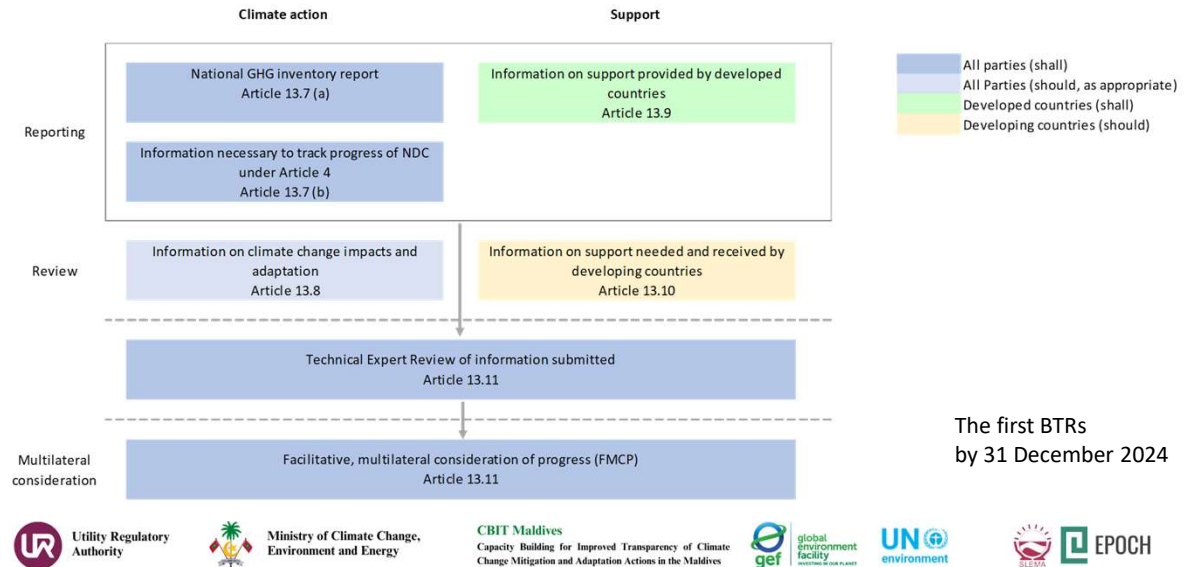
Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



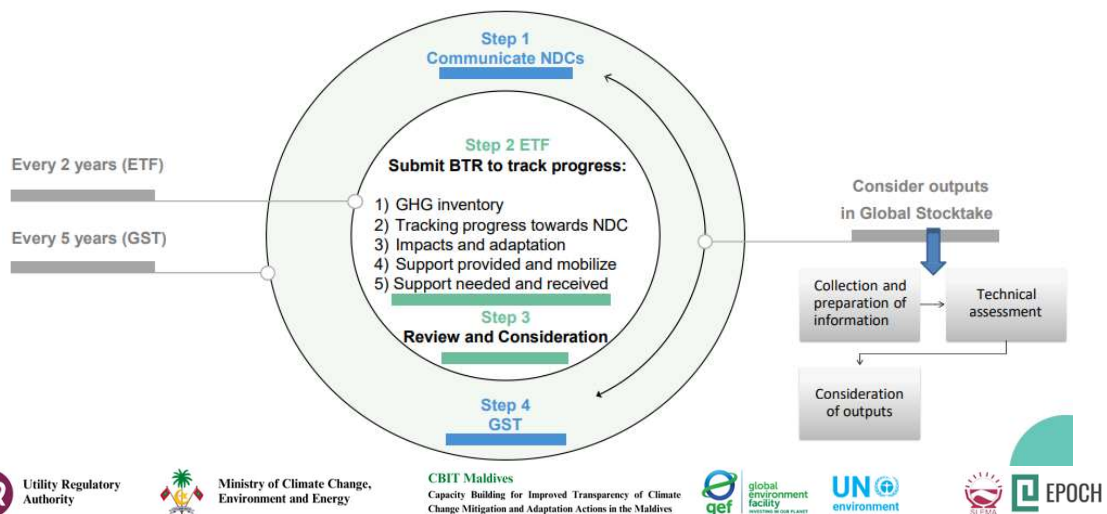
8

Outline Of the Core Elements of the ETF Under the PA



9

Paris Agreement – Linking NDCs, ETF and GST



10

Relevance for GHG inventories and NDC Tracking

- GHG Inventories form the basis for accountability framework: principles and methodologies used, shared taxonomy, nomenclatures etc.
- GHG inventories cover all anthropogenic (man made) emission sources and probable carbon storage (sinks)
- Establishing and maintaining a good GHG inventory which gives out regular / accurate estimates is an essential prerequisite for NDC tracking.
- Climate policy development is often misdirected without a proper GHG inventory in operation (for a longer period)
- Essentially a time series of climate data that presents the historical trends, which can be used to generate future pathways and trends.
- Strongly interlinked to the energy data repository of a country
 - if energy data is intact, climate data can be easily derived



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



UN
environment



11

Main Components of a GHG Inventory

- Emissions are accounted for at the source where they are emitted or sequestered (sinks) under the IPCC guidelines and the UNFCCC.
- The emission sources fall into five main sectors:
 - Energy (combustion of fuels in energy supply and use, transport and fugitives, excluding non-energy uses)
 - Industrial Processes and Product-use – IPPU (process and product emissions occurring in the industry from chemical and physical transformation)
 - Agriculture (food crops, livestock and agricultural soils)
 - Land Use, Land-use Change and Forestry LULUCF (changes in the carbon stock due to deforestation – or reforestation – and land use changes)
 - Waste (solid and liquid waste treatment plants)



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



UN
environment



12

Tracking Ndc's Using GHG Inventories

- Energy balance and energy data arranged in a time series can be used to generate emission data from the energy sector operations
- Historical data will provide the baseline energy data from which the historical emission data too can be derived, which can be used for baseline estimates
- Once the baseline estimates are made, various Policies and Measures (PaMs) can be proposed for emission reductions
- Implementation of any PaM coupled with the relevant MRV system will generate a reduced emission profile compared to the Business as Usual (BaU) or Without Measures (WoM) scenario
- Designing indicators specific to the target for a given PaM is an absolute necessity in evaluating its progress.
- Tracking NDCs is essential, not only to gauge the success of a given PaM, but also to update and derive new PaMs for NDC 3.0 and beyond.



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



UN
environment



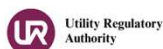
EPOCH

13

Integration with the Enhanced Transparency Framework (ETF)

Key concepts and guiding principals

- Principle 1 Respecting national sovereignty
- Principle 2 Building on the arrangements under the Convention
- Principle 3 Providing flexibility to DC Parties
- Principle 4 Promoting TACCC
- Principle 5 Avoiding double counting
- Principle 6 Facilitating improvement over time



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



UN
environment



EPOCH

14

BTR – the reporting vehicle for the ETF

1/ National Inventory Report
of GHG Emissions

All Parties
Mandatory

2/ Progress made in
implementing and achieving
the NDC

All Parties
Mandatory

3/ Climate change impacts
and adaptation

All Parties
Optional

4/ Financial, technology transfer and capacity-
building support provided

Developed country Parties
Mandatory
Other Parties that provide support
Optional

5/ Financial, technology transfer and capacity-
building support needed and received

Developing country Parties
Optional



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



UN
environment



15

Information necessary to track progress made in achieving NDC

- A. National circumstances and institutional arrangements Should be used to show a comprehensive image of the country's particular context that might impact their progress towards NDCs, including institutional, legal, procedural arrangements for implementation.
- B. Description of a Party's NDC under Article 4 of the Paris Agreement, including updates Detailed description of the NDC, including all its parameters and any updates since the last report. The purpose is to ensure a clear understanding of the country's climate commitments and any changes therein.
- C. Information necessary to track progress The goal of this section is to outline how a country tracks its progress towards meeting its NDCs. It involves detailing the specific indicators used and sharing the most recent data related to these indicators.



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



UN
environment



16

Information necessary to track progress made in achieving NDC

- D. Mitigation Policies, Actions, and Plans Section that presents policies, actions and plans in place to mitigate climate change. The goal is to highlight the measures being taken to reduce GHG emissions and the effectiveness of these measures. (Flexibility)
- E. Summary of GHG Emissions and Removals Provide a succinct summary of a country's GHG emissions and removals. This information is especially important for countries submitting a standalone national inventory report.
- F. Projections of GHG Emissions and Removals Projection of future GHG emissions and removals, based on current mitigation policies and measures. This helps to identify the potential future trajectory of a country's GHG emissions. (Flexibility)
- G. Other Information Any additional information that helps understand the progress in implementing and achieving their NDCs. This could include any unique initiatives, challenges, or plans that are relevant to the NDC progress.



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
improving lives and places



EPOCH

17

Use of Energy Statistics for Emission Reporting

Nimashi Fernando



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
improving lives and places



EPOCH

18

- Use of petroleum for electricity generation and as transport and cooking fuels results in emission of green house gases including CO₂, CH₄, and N₂O.
- However, among the emissions, carbon dioxide (CO₂) is the most prominent.
- From the national energy balance, CO₂ emissions from all energy consuming sectors are calculated
- IPCC Guidelines for National Greenhouse Gas Inventories-2006 is used for the calculation
- Tier 1 approach described in the guideline can be adopted owing to the paucity of detailed data
- Following primary relationship between emissions and fuel consumption is used to calculate CO₂ emissions;

$$\text{CO}_2 \text{ Emissions} = \text{Fuel consumption} * \text{Emission factor}$$



- Chapter 3 – Mobile Combustion of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories was referred for;
 - Transport – diesel, petrol and Jet A1 consumption
 - Agriculture – diesel consumption in fishing boats
- Chapter 2 – Stationary Combustion of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories was referred for;
 - Industry – electricity
 - Resorts – electricity and LP gas
 - Household, commercial and other – electricity and LP gas



Emission Factors

Type of fuel	Density	Energy content		Emission factor
	g/cm ³	GJ/tonne	toe/tonne	tCO ₂ /toe
Diesel	0.84	43.33	1.04	3.06
Petrol	0.75	44.80	1.07	2.84
Jet A1	0.80	44.59	1.07	2.92
LP gas	0.54	47.31	1.13	2.57

21

Emissions from an Electrical System – Sample Calculation



- A remote outpost of a Government agency
- A simple diesel generator
 - Use 35 litres of diesel / day
 - Gives out 108kWh per day

22

Emission Factor of Off-Grid Generator

- Amount of fuel used = 35 litres / day
- Density of diesel = 0.859473 kg/m^3
- Weight of diesel = $35 \times 0.859473 = 30.08$
- Amount of CO₂ emitted = $30.08 \times 2.74 = 88.51 \text{ kgCO}_2/\text{day}$
- Emission factor = CO₂ emitted / kWh generated
= $88.51/108$
= $0.81949 \text{ kgCO}_2/\text{kWh}$
 - Annual emission = $88.51 \times 365 = 32.306 \text{ tCO}_2$



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
investing in a better planet



23

Possible Improvements

- Generation system upgrade
 - Replace air filter, repair engine, clean injector nozzles etc.
 - Now only 28 litres (24.07kg) of fuel is needed per day
 - To generate same 108 kWh
- Amount of CO₂ emitted = $24.07 \times 2.94 = 70.77 \text{ kgCO}_2/\text{day}$
- Emission factor = CO₂ emitted / kWh generated
= $70.77/108$
= $0.65523 \text{ kgCO}_2/\text{kWh}$
 - Annual emission = $65.94 \times 365 = 25.831 \text{ tCO}_2$



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
investing in a better planet



24

Energy Efficiency

- Reduce demand for electricity by changing all lamps to LED light sources

- Now Maha Eliya need only 87kWh/day

$$\begin{aligned}\text{Amount of CO}_2 \text{ emitted} &= \text{emission factor} \times \text{generation} \\ &= 0.65523 \text{ kgCO}_2/\text{kWh} \times 87\text{kWh}/\text{day} \\ &= 57.01 \text{ kgCO}_2/\text{day}\end{aligned}$$

- Annual emission $= 57.01 \times 365 = 20.806 \text{ tCO}_2$



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility

UN
environment



EPOCH

25

Renewable Energy

- Develop a rooftop solar system to reduce diesel generation

- Roof space available can only house 13.5kW_p capacity
 - Solar generation 13.5x4 = 54 kWh (assumption)
 - Now the office need only (87-54) 33kWh/day of diesel power

$$\begin{aligned}\text{Amount of CO}_2 \text{ emitted} &= \text{emission factor} \times \text{generation} \\ &= 0.65523 \text{ kgCO}_2/\text{kWh} \times 33\text{kWh}/\text{day} \\ &= 21.62 \text{ kgCO}_2/\text{day}\end{aligned}$$

- Emission factor $= \text{CO}_2 \text{ emitted} / \text{kWh generated}$
 $= 21.62/87$
 $= 0.24854 \text{ kgCO}_2/\text{kWh}$

- Annual emission $= 21.62 \times 365 = 7,991 \text{ tCO}_2$



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility

UN
environment



EPOCH

26

Thank you!



Utility Regulatory
Authority



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
improving our planet



EPOCH

Annex 4: Presentation on Data Collection and Validation



Utility Regulatory
Authority



Ministry of Climate Change,
Environment and Energy

Training on Energy Statistics and Energy Balance

Consultancy Service to Conduct Energy Supply and Demand Study

30th January 2025

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



1

Data Collection and Validation

Amila Wickramasinghe
PhD



Utility Regulatory
Authority



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



2

Data Required for Maldives Energy Balance

Energy Supply Data

- Energy supplied by petroleum products
- Energy supplied by renewable resources

Energy Conversion Data – (Petroleum and RE to Electricity)

- All inhabited islands are supplied electricity by either STELCO or FENAKA who converts diesel or solar power to electricity.
- All resorts maintain own diesel generators to convert diesel into electricity. In addition, some resorts have solar PV systems to convert solar power into electricity.

End Use Data

- Households, Businesses, and Government Entities – [Electricity and LPG](#)
- Transport – [Petrol and Diesel](#)
- Resorts – [Electricity](#)
- Industries including Water Supply – [Electricity](#)
- Fisheries – [Petrol and Diesel](#)



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



3

How to Collect Data?

Following sources/options are available for collection of data required for the energy balance

1. Administrative Sources
 - Maldives Custom Service (MCS)
 - Maldives Bureau of Statistics (MBS)
 - Utility Regulatory Authority (URA)
 - Utilities such as STELCO, FENAKA, MWSC
2. Statistical Surveys
 - Census
 - Sample surveys
3. Modelling
 - Room occupancy-based modelling to estimate resort energy
 - Fish catch-based modelling to estimate fishing industry energy
4. Measurements
 - Electricity meters in RO plants and solar PV systems



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



4

Features of Each Type of Data Source/Options

	Advantages	Disadvantages
Administrative data	<ul style="list-style-type: none"> • Low survey burden • Greater number of records allows more detailed breakdowns • Avoids duplication by making use of existing data • No sample error 	<ul style="list-style-type: none"> • Dependency on third parties • Definitions and information may not match statistical needs • Often requires substantial effort to set up and may be legal barriers to use
Statistical Surveys	<ul style="list-style-type: none"> • Comprehensive information on all fuels supplied and used • Good data quality • Can be used directly and as an input for model calculations • Good response rates when surveys are covered by legislation 	<ul style="list-style-type: none"> • Resource intensive and expensive • Time consuming • High survey burden • If voluntary, response rates can be low • Data validation required • Reporting of non-metered fuels, often purchases not used
Modelling	<ul style="list-style-type: none"> • Allows quantification of variables which cannot be directly measured or observed • Save resources (money and staff) • Low survey burden • Quick results • Can be used to adapt or improve survey results • Can be used to reduce survey frequency 	<ul style="list-style-type: none"> • Worse data quality compared to surveys • No Stand-alone methodology: cannot be calculated without input data • Quality of results depend on accuracy of input data and the design of the model
Measurements	<ul style="list-style-type: none"> • Detailed information on individual appliances, information on patterns of use of the equipment • High quality of the results • Input data for surveys and/or modelling 	<ul style="list-style-type: none"> • Invasive for respondents: difficulties in finding respondents willing to participate • High burden in terms of time and human resources • Expensive, so often small samples, and less representative • Constraints in monitoring equipment: limitation in the number of metering devices and monitoring incidences



Utility Regulatory
Authority



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility



UN
environment



EPOCH

5

Data Collection

	Data	Source	Method of Collection
Supply	Petroleum imports	MCS	Extract required data from the datasheets provided by MCS
	Fuel supplied for bunkering operation	FSM	Extract required data from the datasheets provided by FSM
	Fuel supplied for foreign aviation	MACL	Extract required data from the datasheets provided by MACL
	Power generation by solar PV systems	STELCO+FENAKA+Resorts	Using the electrical data collection form filled by STELCO, FENAKA and Resorts
Conversion	Power generation by diesel power plants	STELCO + FENAKA + Resorts + MWSC + Captive Generators	Using the electrical data collection form filled by STELCO, FENAKA, Resorts, MACL, MWSC, MPL, and other captive generators.
Consumption	Electricity consumed by households, commercial and other entities	STELCO + FENAKA	Using the electrical data collection form filled by STELCO and FENAKA
	Fuel supplied for domestic aviation	MACL	Extract required data from the datasheets provided by MACL
	Fuel consumed by land vehicles	MTCA	Obtain the breakdown of vehicle fleet to use in the modelling process
	Fuel consumed by transport vessels	MTCA	Obtain the breakdown of vehicle fleet to use in the modelling process
	Fuel consumed by fishing vessels	MTCA	Obtain records of fishing trips to use in the modelling process
	Gas consumed by resorts	MG, Village Gas, etc.	aggregate sales data shared by the LP gas suppliers
	Gas consumed by households	MG, Village Gas, etc.	aggregate sales data shared by the LP gas suppliers



Utility Regulatory
Authority



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility



UN
environment



EPOCH

6

Data Validation – Energy Supply Data

- Petroleum
 - Aggregate of fuel supplied by fuel suppliers operational in Maldives (STO/FSM, Hawks, Villa Gas, Maldives Gas etc.) shall tally with the fuel import data recorded by MCS.
 - URA shall collect annual fuel supply data from all fuel importers operational in Maldives and crosscheck whether total imports of each petroleum product tallies with fuel supply data provided by the supplier, adjusted for storage.
- Electricity
 - Through STELCO and FENAKA, URA shall acquire gross generation by solar PV systems operating under net metering scheme and all other solar PV generation of captive generators such as resorts, and MWSC.
 - URA shall also collect electricity generation (diesel based and renewable) through the electricity data collection form from STELCO, FENAKA, MWSC, MACL, and all the resorts



7

Data Validation - RE Generation

- A unified method of witnessing the plant commissioning should be adopted by the regulator. All important plant information can be collected to a central repository (utility owned generators and privately owned generators).
- Fuel consumption and electricity generation data for each generator to be recorded (ideally on a daily basis)
- A survey should be carried out to assess and validate the available generation capacities of all generators (utility owned, privately owned, diesel or renewable energy) before an annual reporting framework is introduced on mandatory basis.
- Regulator to be empowered to enter private premises, inspect and gather data and information on all generators



8

Data Validation – Energy Consumption by HH and Others

Electricity consumption under following types of generation need to be captured and verified by URA.

- Electricity generated by STELCO and FENAKA in inhabited islands using:
 - Diesel generators
 - Own solar PV systems
 - IPP solar PV systems
 - Net metered solar PV systems
- Electricity generated by captive generators such as by MACL and MWSC using diesel generators and solar PV systems.



Utility Regulatory
Authority



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility



EPOCH

9

Data Validation – Energy Consumption by Resorts

- Data should be collected from all resorts.
- Per bed-night calculations and estimations should be validated annually through a proper representative sample survey.
- An annual registration process can be used to acquire energy data and bed night data from all resorts.
- Fuel quantities issued from the resort storage must be properly accounted for.
- A survey should be carried out to develop a profile of a typical resort and updated at least at five-year intervals.



Utility Regulatory
Authority



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility



EPOCH

10

Data Validation – Energy Consumption in Transport Sector

- Data on the active fleet for land and water vehicles/vessels should be collected, if possible, each year. In the absence of annual data, a survey should be done at least once in three years to validate existing numbers
- A breakdown of petrol and diesel vehicles in the active/ registered fleet (land and water) should be collected annually
- Five-year surveys should be done to assess the km per day and km per liter for each category of vehicles (land and water)
- An annual registration process can be used to count the active fleet for land and the active flotilla of boats.
- A breakdown of fuel usage (electric, diesel and petrol) in the active/registered fleet (land and water) could be collected annually, if reporting of odometer readings are made mandatory
- A survey should be carried out to assess the consumption of transport service by each mode and general fuel efficiencies (km per litre) for each category of vehicles (land and water), at least at five-year intervals.



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



11

Data Validation – Energy Consumption of Fisheries Industry

- Data should be collected on number of fishing trips annually, if possible
- In the absence of annual data, number of past fishing trips for at least ten years should be used to derive an average ratio on the number of fishing trips to fish catch
- Types of fuel and average quantities per trip should be recorded annually



Ministry of Climate Change,
Environment and Energy

CBIT Maldives
Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



12

A national Energy Information Management System (EIMS)

- The EIMS will collect, validate, and record in a central repository key energy data, allowing relevant stakeholders to access and use required energy data for different purposes. Preparation of the energy balance will be one of such uses of EIMS.
- In addition to recording data, the EIMS will identify a set of standard statistical indicators for Maldives which can be directly used by stakeholders.
- Essential indicators can be chosen by the due authorities from among a longer list of indicators
- These indicators require data from both the energy sector and the national statistics
- Some indicators proposed and how these can be computed are given in the next deck of slides.



13

Petroleum Imports

1	Parameter Code	En 1
2	Parameter Name	Imports of LP gas, Jet A1, petrol and diesel
3	Definition / Description	The total quantity of each fuel imported to the country
4	Method of Computation	Summation of the total fuel qty imported
5	Unit of Measurement	kt
6	Method of Data Collection	Maldives Customs records
7	Level of Disaggregation	National
8	Authorised Institution	Maldives Customs
9	Related Institution	N/A
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual



14

Foreign Bunkering

1	Parameter Code	En 2
2	Parameter Name	Diesel usage in foreign aviation and bunkering
3	Definition / Description	Diesel usage in foreign bunkering
4	Method of Computation	Fuel qty pumped into vessels leaving Maldives
5	Unit of Measurement	kt
6	Method of Data Collection	Annual data collection from relevant institutes
7	Level of Disaggregation	National
8	Authorised Institution	FSM
9	Related Institution	N/A
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual



15

Thermal Power Plants

1	Parameter Code	Elect 1
2	Parameter Name	Power generation in thermal power plants (utility owned)
3	Definition / Description	Annual power generation in thermal power plants
4	Method of Computation	Data collection and aggregation of data from power utilities
5	Unit of Measurement	GWh
6	Method of Data Collection	Data collected from relevant institutes
7	Level of Disaggregation	National
8	Authorised Institution	STELCO and FENAKA
9	Related Institution	N/A
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual



16

Solar Power

1	Parameter Code	Elect 2
2	Parameter Name	Power generation from solar power plants (utility owned)
3	Definition / Description	Annual power generation in solar power plants
4	Method of Computation	Data collection and aggregation of data from utilities
5	Unit of Measurement	GWh
6	Method of Data Collection	Data collected from relevant institutes
7	Level of Disaggregation	National
8	Authorised Institution	STELCO and FENAKA
9	Related Institution	N/A
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual



17

Captive Generation

1	Parameter Code	Elect 3
2	Parameter Name	Power generation and consumption in the airport
3	Definition / Description	The airport is considered as a captive generation plant. Therefore, its generation and consumption are indicated separately. It is assumed that the generated power is consumed in total and losses are negligible.
4	Method of Computation	Should be obtained from the airport authorities
5	Unit of Measurement	Electricity generation and consumption in GWh and fuel consumption in kt
6	Method of Data Collection	Data collected from the airport authorities
7	Level of Disaggregation	N/A
8	Authorised Institution	MACL
9	Related Institution	N/A
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual



18

Captive Generation

1	Parameter Code	Elect 4
2	Parameter Name	Power generation and consumption in water desalination plants
3	Definition / Description	Desalination plants are considered as captive generation plants. Therefore, its generation and consumption are indicated separately. It is assumed that the generated power is consumed in total and losses are negligible.
4	Method of Computation	Data should be obtained from RO plants and aggregated.
5	Unit of Measurement	Electricity generation and consumption in GWh, capacity in MW and fuel consumption in kt
6	Method of Data Collection	Data collected from RO plants
7	Level of Disaggregation	National
8	Authorised Institution	URA
9	Related Institution	STELCO and FENAKA
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual



19

Electricity Generation in Resorts

1	Parameter Code	Elect 5
2	Parameter Name	Power generation and consumption in resorts
3	Definition / Description	Resorts use diesel as a fuel to generate power. Solar based power generation is available in certain resorts.
4	Method of Computation	Data should be obtained from a representative sample of resorts and aggregated.
5	Unit of Measurement	Electricity generation and consumption in GWh, capacity in MW and fuel consumption in kt
6	Method of Data Collection	Data collected from resorts
7	Level of Disaggregation	Atoll level
8	Authorised Institution	URA
9	Related Institution	Resorts
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual



20

Electricity Generation by HH, Commercial and Other Category

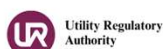
1	Parameter Code	Elect 6
2	Parameter Name	Electricity consumption in the 'Household, commercial and other' category
3	Definition / Description	Electricity consumption in the 'Household, commercial and other' category excludes the electricity consumption in captive generation plants
4	Method of Computation	Data to be obtained from relevant institutes
5	Unit of Measurement	GWh
6	Method of Data Collection	Utility records
7	Level of Disaggregation	National
8	Authorised Institution	STELCO and FENAKA
9	Related Institution	N/A
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual



21

Jet A1 Usage

1	Parameter Code	Tr 1
2	Parameter Name	Jet A1 usage in foreign and domestic aviation
3	Definition / Description	Disaggregated consumption data for Jet A1 in foreign and domestic aviation
4	Method of Computation	Jet A1 distribution to domestic and international aviation
5	Unit of Measurement	kt
6	Method of Data Collection	Annual data collection from the Airport authorities
7	Level of Disaggregation	National
8	Authorised Institution	MACL
9	Related Institution	N/A
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual



22

Fleet Data of Land Vehicles

1	Parameter Code	Tr 2
2	Parameter Name	Vehicle fleet data- land vehicle
3	Definition / Description	The breakdown of vehicles in service, by category Fuel by type and km/l
4	Method of Computation	To be obtained from the Transport authorities
5	Unit of Measurement	Nos. Percentage
6	Method of Data Collection	Survey reports and records
7	Level of Disaggregation	Atoll level
8	Authorised Institution	Transport Ministry
9	Related Institution	Maldives Customs
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual



23

Fleet Data of Vessels

1	Parameter Code	Tr 3
2	Parameter Name	Vehicle fleet data- water-borne vessels
3	Definition / Description	The breakdown of vessels in service, by category Fuel by type and km/l
4	Method of Computation	To be obtained from the Transport authorities
5	Unit of Measurement	Nos. Percentage
6	Method of Data Collection	Survey reports and records
7	Level of Disaggregation	Atoll level
8	Authorised Institution	Transport Ministry
9	Related Institution	Maldives Customs
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual



24

Agriculture

1	Parameter Code	Agr 1
2	Parameter Name	Fuel usage in the fisheries industry
3	Definition / Description	Diesel usage in fishing vessels, fish catch, number of fishing trips per annum
4	Method of Computation	To be obtained from the Transport authorities
5	Unit of Measurement	Nos. kt
6	Method of Data Collection	Survey reports and records
7	Level of Disaggregation	National
8	Authorised Institution	Transport Ministry
9	Related Institution	
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual



25

LPG Consumption

1	Parameter Code	En 3
2	Parameter Name	LP gas consumption
3	Definition / Description	Disaggregated consumption data for LP gas
4	Method of Computation	LP gas distribution to different sectors
5	Unit of Measurement	kt
6	Method of Data Collection	Annual sales data of LP gas companies
7	Level of Disaggregation	Atoll level
8	Authorised Institution	LP gas companies
9	Related Institution	Receiving agencies
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual



26

Energy Indicators

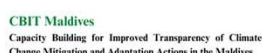
1	Parameter Code	En In 1
2	Parameter Name	Rate of electrification
3	Definition / Description	An indication of the spread and reach of electricity network in the country.
4	Method of Computation	Total number of households with an electricity connection / total number of households in the country
5	Unit of Measurement	Percentage
6	Method of Data Collection	STELCO and FENAKA
7	Level of Disaggregation	Atoll level
8	Authorised Institution	URA
9	Related Institution	[to be decided]
10	Data Collection Frequency	Annual estimates of housing units and decennial censuses
11	Dissemination Frequency	Provisional data - annually. Validation decennially
12	Notes	Should decide on including off-grid electricity, solar battery systems...etc.



27

Energy Indicators

1	Parameter Code	En In 2
2	Parameter Name	Share of household income spent on fuel and electricity
3	Definition / Description	An indication of relative impact of energy prices on standard of living
4	Method of Computation	HH income spent on fuel and electricity/ HH income
5	Unit of Measurement	Percentage
6	Method of Data Collection	HH income and expenditure survey
7	Level of Disaggregation	National
8	Authorised Institution	[to be decided]
9	Related Institution	[to be decided]
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual
12	Notes	Transport, electricity and cooking fuel should be included



28

Energy Indicators

1	Parameter Code	En In 3
2	Parameter Name	Energy use per capita
3	Definition / Description	An indication of energy use in terms of total primary energy supply, total final consumption and final electricity use per capita
4	Method of Computation	Energy use (total primary energy supply, total final consumption and electricity use)/ total population
5	Unit of Measurement	J or kWh per capita
6	Method of Data Collection	Energy Balance
7	Level of Disaggregation	N/A
8	Authorised Institution	URA
9	Related Institution	[to be decided]
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual
12	Notes	HH appliance penetration and a five year periodic survey on end-use practices is needed for validation.



29

Energy Indicators

1	Parameter Code	En In 4
2	Parameter Name	Energy use per unit of GDP
3	Definition / Description	An indication of the total primary energy supply, total final consumption and electricity used to generate a unit of gross domestic product
4	Method of Computation	Energy use (total primary energy supply, total final consumption and electricity use)/ GDP
5	Unit of Measurement	toe/USD kWh/USD
6	Method of Data Collection	Energy Balance and Statistical Reports of the Statistics Bureau
7	Level of Disaggregation	N/A
8	Authorised Institution	URA
9	Related Institution	[to be decided]
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual



30

Energy Indicators

1	Parameter Code	En In 5
2	Parameter Name	Transmission and distribution losses in the electricity system
3	Definition / Description	An indication of energy lost in electricity transmission and distribution
4	Method of Computation	Total energy lost in transmission/ total net energy generation total energy lost in distribution/ total net energy generation
5	Unit of Measurement	Percentage
6	Method of Data Collection	STELCO and FENAKA
7	Level of Disaggregation	N/A
8	Authorised Institution	[to be decided]
9	Related Institution	[to be decided]
10	Data Collection Frequency	Annual
11	Dissemination Frequency	Annual



Utility Regulatory
Authority



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
improving the resilience of
ecosystems



EPOCH

31

Thank You!



Utility Regulatory
Authority



Ministry of Climate Change,
Environment and Energy

CBIT Maldives

Capacity Building for Improved Transparency of Climate
Change Mitigation and Adaptation Actions in the Maldives



global
environment
facility
improving the resilience of
ecosystems



EPOCH

32

Annex 5: Training Participant List



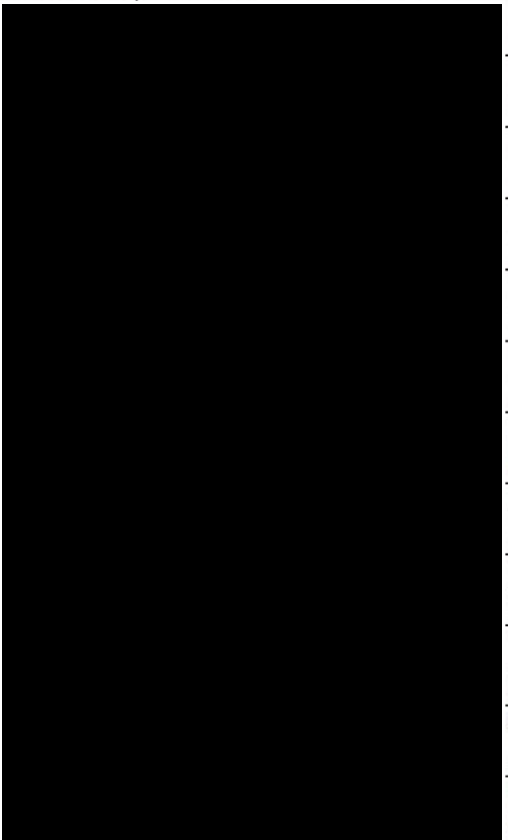



පරිසර, වායු සහ බලශක්ති අමාත්‍යාංශය
Ministry of Climate Change, Environment and Energy

Ministry of Climate Change, Environment and Energy

Training on Energy Statistics and Energy Balance - Consultancy Service to Conduct Energy Supply and Demand Study

Attendance Sheet

Date: 30th January 2025		Time: 09:00 - 15:00hrs	Venue: H. Meeruma		Section: Climate Change Department	
	Name	Designation	Organisation	Contact no.	Email Address	Signature
1	Dr. Amila Wickramasinghe	Energy Statistician	SLEMA			
2	Harsha Wickramasinghe	Team Leader	SLEMA			
3	Nimashi Fernando	Consultant	SLEMA			
4	Mithma Wijesinghe	Project Director	SLEMA			
5	Hussain Rasheed	Project Manager	EPOCH			
6	Mohamed Nazran Nazeer	Project Coordinator	EPOCH			
7	Mohamed Inaz	Project Technical Coordinator	MCCEE			
8	Fathimath Raufa Moosa	Project Technical Coordinator (BTR)	MCCEE			
9	Ahmed Masoon	Programme Officer	MCCEE			-
10	Raniya Husnu-Al-Suood	Programme Officer	MCCEE			
11	Hassaan Mohamed	Deputy Minister	MCCEE			-

12	Rizna Ahmed Rasheed	Assistant Engineer	MCCEE		
13	Ahmed Maisam Musthafa	Electrical Building Services Engineer	Housing Development Corporation		
14	Abdulla Mubaah	Electrical Engineer	Housing Development Corporation		
15	Mariyam Adheela	Deputy Manager	Fenaka Institute for training and research		
16	Ahmed Ali	Director	Fenaka Corporation Limited		
17	Saif Ali	Assistant Engineer	Fenaka Corporation Limited		
18	Ibrahim Miflal Fayaz	Senior Engineer	Fenaka Corporation Limited		
19	Ibrahim Zain Waleed	Director	Fenaka Corporation Limited		
20	Suma Khalid Mohamed	Senior Engineer	Fenaka Corporation Limited		
21	Mohamed Ivan	Electrical engineer	Fenaka Corporation Limited		
22	Ahmed Anees	Audit Manager	Fenaka Corporation Limited		
23	Fathmath Fizna Yoosuf	Director- Planning and Market Development Section	Utility Regulatory Authority		

24	Abdulla Ziyaan Tholhath	Assistant Enforcement Officer	Utility Regulatory Authority		
25	Ahmed Naufal	Engineer	Utility Regulatory Authority		
26	Hussain Fizah	Chief EIA Consultant	MTCC		
27	Aminath Hanan Shafeeg	EIA Consultant	MTCC		
28	Adam Saaneez	Civil Engineer	Ministry of Education		
29	Mohamed Shaulan Sadiq	Water and Environmental Engineer	MWSC		
30	Naahee Nadheem	Mechanical engineer	MWSC		
31	Hussain Rizam	Senior Engineer - Data center Infrastructure	Dhiraagu PLC		
32	Mohamed Anash	Engineer Power System	Dhiraagu PLC		
33	Azidh Ali	Assistant Manager	MACL		
34	Hussain Arubaan Fawwaz	Manager	MACL		
35	Ali Niyaz	Assistant Manager	MACL		
36	Ahmed Fizal	MD	Fizal Environmental Consultancy Pvt Ltd		
37	Hassan Mohamed	Editor	Obliq Media		

38	Aman Haleem	Editor	Adhadhu Online			
39	Mohamed Rasheed	Managing Partner	Consonant Solutions			
40	Abdul Raheem Mohamed	Student	NA			
41	Ahmed Afrah Ismail	Co-Founder	Zero Waste Maldives / Coalition for Open Governance			
42	Ali Baggan	Head of ICF	Ooredoo Maldives			
43	Nafiz Abdulla	Sr. Mgr. Digital	Ooredoo			
44	Shimla Ahmed	CEO	AO News			
45						
46						
47						
48						
49						
50						

Total: 24
Male: 18
Female: 6

Annex 6: Photographs







Annex 7: Agenda



Ministry of Climate Change, Environment and Energy

Training on Energy Statistics and Energy Balance

Date: 30th January 2025 | Venue: H. Meeruma, Male', Maldives

Overview and objective

The objective of the training is to enhance stakeholder capacity in energy statistics and energy balance preparation, improve data collection methodologies and tools, and ensure alignment with the Enhanced Transparency Framework (ETF) under the Paris Agreement. The training is part of the broader Capacity Strengthening for Improved Transparency of Climate Change Mitigation and Adaptation Actions in the Maldives (CBIT Maldives) project, funded by the Global Environment Facility (GEF) and supported by UN Environment.

The training is targeted to professionals involved in energy data management, climate change mitigation, energy planning, GHG inventory development, or tracking Nationally Determined Contributions (NDCs). Participants should ideally have a background in energy, environment, or related fields. Experience in data analysis is preferred but not mandatory.

The training will be conducted by experts from the Sri Lanka Energy Managers Association (SLEMA) in partnership with Epoch Associates Pvt under the consultancy for the development of the energy supply and demand study.

The training will be provided in English and will include presentations on methodologies, hands-on exercises, software demonstrations, and interactive sessions to ensure comprehensive learning. Participants who complete all sessions will receive a certificate of participation.

Agenda

Time	Topic
8:45 AM – 9:00 AM	Participants arrival and registration
9:00 AM – 9:15 AM	Welcome and Opening Remarks
9:15 AM – 9:30 AM	Tea Break
9:30 AM – 9:45 AM	Introduction to Training Objectives
9:45 AM – 10:45 AM	Session 1: Fundamentals of Energy Statistics <ul style="list-style-type: none">• Importance of energy data, types of energy commodities, units of measure, reporting frequencies and types of databases.• The many uses of energy balances• Components of an Energy Balance, sources of energy data and data flow paths<ul style="list-style-type: none">○ Overview of energy supply and demand data○ Understanding energy flows and balances

CBIT MALDIVES

Capacity Strengthening for Improved
Transparency of Climate Change
Mitigation and Adaptation Actions in
the Maldives Project





Ministry of Climate Change, Environment and Energy

10:45 AM – 12:00 PM	Session 2: Practical Exercise <ul style="list-style-type: none"> Hands on exercise: developing a basic energy balance using representative data
12:00 PM – 01:00 PM	Lunch
1:00 PM – 1:30 PM	Session 2: Practical Exercise (Continuation...) <ul style="list-style-type: none"> Hands on exercise: developing a basic energy balance using representative data
1:30 PM – 02:15 PM	Session 3: Quantifying climate impacts of energy systems <ul style="list-style-type: none"> An introduction to calculation of emissions from energy data How energy balances can be relevant to GHG inventories and NDC tracking
2:15 PM - 3:15 PM	Session 4: Data Collection and Validation <ul style="list-style-type: none"> Data collection systems (paper based old systems to new single portal data clearing house approaches, including spreadsheet solutions) Techniques for ensuring data accuracy Tools and templates for data validation Reporting and Visualizing Energy Data (how history is reported, Sankey diagrams, trends and narrations)
3:15 PM - 3:30 PM	Wrap up and closing
3:30 PM	Tea

Background of the CBIT Maldives Project

Anthropogenic climate change is widely accepted as the most significant environmental challenge faced by the world in the 21st century. The Fifth Assessment Report (AR5) (2014) and the Global Warming at 1.5°C (2018) special report by the Intergovernmental Panel on Climate Change (IPCC) confirm that climate change is an existential threat for low lying coral islands like Maldives. The Maldives is one of the most vulnerable countries for adverse impacts of global climate change.

Maldives' Nationally Determined Contribution (NDC) highlights food security, critical infrastructure, public health, water security, coastal protection, and coral reef biodiversity as key vulnerabilities of the country. In addition to these vulnerabilities, Maldives, like other Small Island Developing States (SIDS), face specific developmental challenges. They include high transportation and logistical costs, exploitation of natural resources, poor management of waste and pollution, and a small population leading to unsustainable economies of scale for different development agendas.

The 21st Conference of the Parties (COP21) was a key milestone for the international climate negotiations due to adoption of the Paris Agreement (PA), which came into force in 2016. Maldives was among the first countries to sign and ratify the PA in April 2016. One of the unique aspects of the PA is the contribution of both Annex 1 Parties and non-Annex 1 Parties

CBIT MALDIVES

Capacity Strengthening for Improved
Transparency of Climate Change
Mitigation and Adaptation Actions in
the Maldives Project



global
environment
facility
INVESTING IN OUR PLANET





Ministry of Climate Change, Environment and Energy

in climate change mitigation and adaptation efforts in the form of NDCs. Article 13 of the PA outlines the transparency framework relating to the transparency of action and support. The main purpose of the transparency framework is to improve mutual accountability amongst the Parties in terms of their efforts for emissions reduction, adaptation efforts and support needed and received for addressing climate change.

Despite being a country with very limited emissions, the Maldives is committed to support the temperature goal of the PA. Maldives' submitted a very ambitious updated Nationally Determined Contributions (updated NDC) in October 2020. Maldives aims to achieve net zero emissions by 2030, on condition that extensive support is received. Even if the required support is not received, Maldives has committed to reduce its BAU emissions by 26%.

Parties to the United Nations Framework Convention on Climate Change (UNFCCC) agreed on the Katowice climate package during the 24th Conference of the Parties (COP24) held in Katowice on December 2018. The Katowice climate package included eight guiding principles for the modalities, procedures and guidelines (MPGs) of the Enhanced Transparency Framework (ETF) under the PA, these include 1) Building on and enhancing the transparency arrangements under the Convention, recognizing the special circumstances of the Least Developed Countries (LDCs) and Small Island Developing States (SIDS), and implementing the transparency framework in a facilitative, non-intrusive, non-punitive manner, respecting national sovereignty and avoiding placing undue burden on Parties; 2) The importance of facilitating improved reporting and transparency over time; 3) Providing flexibility to those developing country Parties that need it in the light of their capacities; 4) Promoting transparency, accuracy, completeness, consistency and comparability; 5) Avoiding duplication of work and undue burden on Parties and the secretariat; 6) Ensuring that Parties maintain at least the frequency and quality of reporting in accordance with their respective obligations under the Convention; 7) Ensuring that double counting is avoided; and 8) Ensuring environmental integrity. Furthermore, the ETF requires all Parties to compile national greenhouse gas (GHG) inventories and to report on the implementation of mitigation actions (tracking of NDC implementation) on a regular basis.

The Maldives is committed to meet the requirements of the ETF, despite of the flexibility provided for SIDS. There is need, therefore, for the Maldives to (i) establish a permanent institutional arrangement for GHG inventory compilation and tracking of NDC commitments, (ii) develop a centralized climate data management system for GHG data, tracking of mitigation actions, adaptation actions and support received and needed and (iii) develop tools and train experts to meet the enhanced transparency framework under the Paris Agreement.

This CBIT project has been developed with the objective of strengthening institutional capacity for tracking mitigation and adaptation actions and establishing climate finance tracking system in the Maldives. It aims to establish and enhance the Maldives' transparency system, in line with ETF of the PA.

To achieve this objective, the following efforts are needed:

- i. strengthening and formalizing long-term institutional arrangements.
- ii. systemizing data collection and processing.

CBIT MALDIVES

Capacity Strengthening for Improved
Transparency of Climate Change
Mitigation and Adaptation Actions in
the Maldives Project



global
environment
facility
INVESTING IN OUR PLANET





Ministry of Climate Change, Environment and Energy

- iii. developing indicators and advancing methodologies, as well as improving the overall data quality and management procedures, for preparing GHG inventories, tracking mitigation and adaptation actions and climate finance in an integrated manner. The final goal is to inform the national decision-making process as well as regularly report to the UNFCCC process.

The project includes two components:

- Component 1: The Maldives' National Greenhouse Gas (GHG) Inventory System improved.
- Component 2: The Maldives' Transparency Framework for mitigation and adaptation actions and resilience building, including tracking support for implementation.

Component 1 is designed to enable Maldives to meet the GHG inventory reporting requirements under the Modalities, Procedures and Guidelines (MPGs) outlined under the ETF of PA. Particularly, Chapter II of the MPGs contained in the annex of decision 18/CMA.1.

Component 2 is designed to meet the NDC tracking requirements of MPGs and both components are aimed to enable Maldives to submit the Biennial Transparency Reports (BTRs) in a timely and regular manner.