Country case study – Maldives

Climate for Sustainable Growth

Andrei Marcu, Project Leader
Wijnand Stoefs
David Belis
Katja Tuokko*

November 2015

This paper was prepared for the CEPS Project entitled Climate for Sustainable Growth.

The views expressed are attributable only to the authors in a personal capacity and not to any institution with which they are associated, or the funders and supporters of this project.

* The authors of this case study would like to gratefully acknowledge the cooperation of Aaron Cosbey and Tomasz Chruszczow, who worked closely with the project team.

This case study is part of the CEPS project 'Climate for Sustainable Growth', whose main objective is to analyse the impacts of climate change mitigation measures on the three pillars of sustainable development: the economic, environmental and social dimensions.

It does so by looking at the positive as well as negative, both intended and unintended, impacts of climate change mitigation policies and projects. While this case study fully recognizes that policies have both positive and negative impacts, the focus of is on (potential) negative impacts of climate change mitigation policies.

The structure of this case study comprises of four sections:

(1) Country characteristics,
(2) Climate-related policies,
(3) Environmental, social and economic impacts of climate mitigation policies,
(4) Measures to mitigate impacts of mitigation policies,

This case study, and the methodology it follows, are not intended to analyse the merit of the policies and measures that are being implemented, or their effectiveness and efficiency, but will focus on their socio-economic-environmental impacts, and measures to alleviate these impacts in the period of transition.

It is important to note that lack of information and analysis of impacts and tools to mitigate negative impacts can act as a brake on ambitious climate action. This case study and the overall project's focus should be seen in this light.

This project was made possible by the support of ENI, Hydro, Lafarge, Solvay and Government of Saudi Arabia.

CEPS
Centre for European Policy Studies
Brussels

© Copyright 2015, Centre for European Policy Studies

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, mechanical, photocopying, recording or otherwise – without the prior permission of the Centre for European Policy Studies.

Place du Congrès 1, B-1000 Brussels
Tel: 32 (0) 2 229.39.11 Fax: 32 (0) 2 219.41.51
e-mail: info@ceps.eu
website: www.ceps.eu

Electronic version can be accessed via: www.ceps-ech.eu/article/climate-sustainable-growth

Executive Summary

This case study, which is part of the 'Climate for Sustainable Growth' project, looks at whether the climate mitigation policies and projects, being implemented for the transition of the Maldives to a low GHG economy, have been put in place in a sustainable way. It identifies their intended and unintended impacts on the three dimensions of sustainable development: 1) economic 2) social and 3) environmental.

This is critical for the speed with which mitigation measures can be implemented, for the buy-in they receive from stakeholders and for ensuring that they meet the conditions for sustainable development, which implies there is progress on all three dimensions in a harmonious way.

The case study focuses on the domestic and international measures that are in place to mitigate the (potential) negative and unintended impacts of climate mitigation policies.

The report analyses climate-related policies and projects that have an impact on two selected sectors: tourism and energy, which together account for more than 63% of the Maldives' GHG emissions. Due to the nature of many energy sector policies, there are also implications for the domestic transportation and fisheries sectors, which account for an additional 30% of Maldives' GHG emissions.

First, the study looks at domestic policies, for example the reform of electricity subsidies and the deployment of renewable energy projects in the energy sector, or energy-efficiency projects in the tourism sector.

Second, it looks at policies initiated in other countries that could have an impact on the Maldives. Such policies encompass the inclusion of international aviation and international maritime transportation in the EU emissions trading system.

Third, it analyses international policies, that is, policies set up under international agreements such as planned climate mitigation policies under the International Civil Aviation Organization (ICAO) and international maritime transportation under the International Maritime Organization (IMO).

The study finds that climate change mitigation policies bring about a wide range of both intended and unintended and both positive and negative impacts on the three dimensions of sustainable development. However, because most policies are young or at the early stages of implementation, very few impacts have so far been observed.

In the **energy sector**, domestic policies and projects created a wide range of economic, environmental and social impacts. Positive impacts include savings for the government on indirect fossil fuel subsidies, the diversification of the energy matrix and the enhancement of energy security.

There are however also short-term impacts that could pose some challenges, such as the necessity for large up-front investment in renewable energy and energy efficiency. This investment is a challenge for the government of the Maldives and domestic energy utilities, because of the lack of domestic tools to finance them. The cost of installing solar PV systems under three renewable energy projects has been estimated to be $379.5 million or nearly 18% of GDP.

However, in the long term, the economic impacts are very positive for the Maldives' economy and households, as costly imports of fossil fuels are decreased.

Additional intended negative economic impacts include increased fuel prices due to biofuel mandates, and increased electricity prices for large households and businesses due to the reform of electricity subsidies. These price increases aim at reducing government spending on importing fuels and electricity subsidies, while incentivizing decreased consumption of fuels and electricity.

The social and environmental impacts of energy sector policies and projects are limited. Positive impacts include health benefits from reduced (non-)GHG emissions by replacing diesel generators with solar PV installations, and the creation of jobs related to installing and operating those solar PV installations in a new green economy.

The scaling back of other development policies due to a lack of financial capacity, or the siting and construction of renewable energy projects, could cause unintended negative social and environmental impacts. The impacts of deploying renewable energy projects would likely be temporary and can be prevented and mitigated at the project level.

The **tourism sector** is mostly at risk of unintended impacts from policies initiated in other countries and international bodies, such as the inclusion of aviation in the EU ETS and the international aviation market measure under discussion at ICAO. An international climate change mitigation measure for the aviation industry could impact the Maldives' economy and employment adversely, as tourism is the most important sector of the economy, contributing 28% of GDP directly in 2012.

Another international policy that could impact the Maldives is an international maritime transportation carbon pricing measure, which is currently being discussed at IMO. While this could help decrease the Maldives' trade deficit by increasing the cost of imports and making local substitutes (when available) more competitive, it could also increase the price of exports. This would harm the competitive position of Maldives' exports, such as fish.

The case study finds that while not all the negative impacts of domestic policies were mitigated, several policy-specific flanking measures were put in place to address the impacts of climate change mitigation policies and projects.

For example in the energy sector, international funding was used to leverage investors to finance the development of new renewable projects. Additionally, these projects need a detailed Environmental and Social Management Framework to identify and mitigate unintended negative impacts. If the findings of these frameworks are implemented on the ground, the social and environmental impacts of renewable projects can be significantly mitigated.

However, there is a lack of domestic capacity to perform impact assessments for domestic policies and projects, to identify and manage impacts ex ante. Also, the Maldives does not currently approach the ex post monitoring of impacts in a comprehensive and systemic way.

The international policies that could affect the Maldives are yet to be implemented. But their impacts can be mitigated ex ante, for instance by insisting that *de minimis* thresholds are included in upcoming legislation or regulation, in order to exclude countries with minor aviation activities, or developing countries.

The Maldives government is implementing two economy-wide policies to mitigate impacts:

a) The Maldives Green Fund is set to integrate all domestic and international funding for all environmental and energy investments, which would shield the government from the burden of financing these investments.
b) An economic diversification strategy is underway to limit the Maldives' vulnerability to external shocks, such as climate change policies. Diversifying the economy would, among other things, serve to decrease the weight of the tourism sector in the economy. This would limit the potential impacts of climate change policies in the international aviation sector.

Flanking policies and tools are therefore present at two levels: policy-specific and economy-wide. International tools focus on finance and capacity-building. It is clear, however, that the development of more comprehensive domestic and international tools, including monitoring tools, is needed.

However, it must be emphasized that this discussion must not be in any way be interpreted or construed as encouraging lack of mitigation action. On the contrary, it must be seen as providing a way forward that will ensure that action can be undertaken with full support by all stakeholders, domestic and international.

Table of contents

Country case study – Maldives

Climate for Sustainable Growth

Andrei Marcu, Project Leader
Wijnand Stoefs
David Belis
Katja Tuokko*

1. Country characteristics

In order to discuss climate change policies and projects, and their impacts on the Maldives, it is necessary to briefly reflect on the recent past of the country and its ongoing transition towards a low GHG society, in particular the recent economic, social and environmental developments that are of concern for this case study. Since this project focuses on climate change policies and projects and the mitigation of negative impacts resulting from those policies and projects, the discussion of the country characteristics is limited to six areas:

- Geographic and international context
- Economic performance and key sectors
- Main sources of GHG emissions
- Sector selection
- Drivers for transition
- Concerns or barriers related to the implementation of climate policies that are prevalent in the country

1.1 Geographic and international context

The Maldives is very much at risk of rising sea levels due to climate change. It is one of the lowest lying countries in the world, with an average ground elevation of 1.5 metres above sea level. Over 40% of the population and nearly half of all structures are located within 100 meters of the coastline. The Maldives also faces other hazards linked to climate change: depletion of freshwater reserves, coral reef bleaching and land erosion; in 2009 97% of all islands reported land erosion (Maldives Ministry of Finance and Treasury and UNDP, 2014, CIA, 2015 and Maldives Ministry of Housing, Transport and Environment, 2009).

Because of this, the Maldives has played a prominent role in international climate change discussions during the last two decades. It is not only party to a large number of international environmental treaties, but is an active member of the Small Island Developing States (SIDS) group and the current Chair of the Alliance of Small Island States (AOSIS) in the United Nations (UN) (Small Islands Developing States Network, 2015).

1.2 Economic performance and key sectors

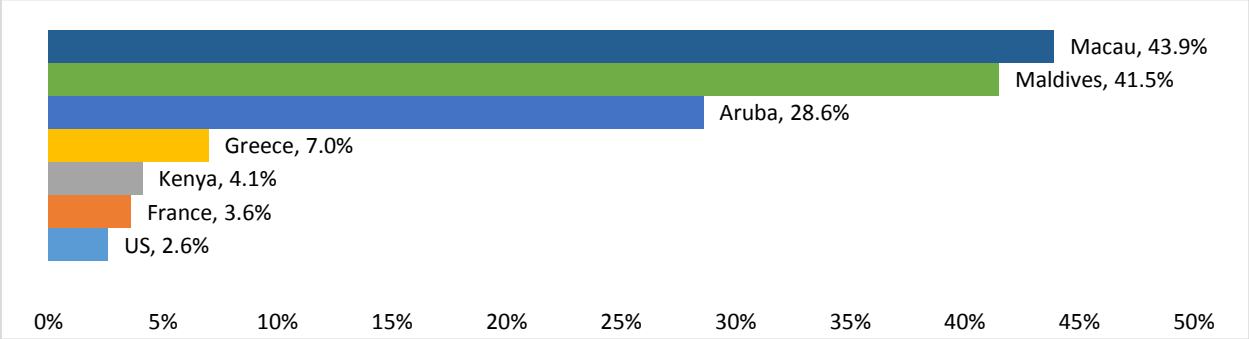
The Maldives is an upper middle income small island economy that graduated in 2010 from the list of Least Developed Countries. Gross domestic product (GDP) per capita was $275 in 1980 but has increased 25 times up to $6,657 per capita in 2012. In the 1980s the Maldivian economy was built on

* *Andrei Marcu is Head of Carbon Market Forum at CEPS. Wijnand Stoefs is Research Assistant at CEPS Carbon Market Forum, David Belis is Research Assistant at CEPS Carbon Market Forum and Katja Tuokko is Research Assistant at CEPS Carbon Market Forum.* *The authors of this case study would like to gratefully acknowledge the assistance and comments provided by Ali Shareef, Amjad Abdulla, Ahmed Ali, Moosa Zameer and Ingrid Jegou.*

four more or less equally important pillars: agriculture, fisheries, tourism and manufacturing. However, the tourism sector has grown in importance since then and is now the key sector of the economy, contributing 27.7% of GDP directly in 2012. Tourism grew much faster than other sectors in the economy, which has resulted in a high dependence on this sector.

In 2014 travel and tourism directly supported approximately 48,000 jobs, or 32.2% of total Maldives employment (World Travel & Tourism Council, 2014), highlighting the unique importance of this sector for the Maldivian people and the economy. The direct contribution of tourism to the Maldives' economy is also high when compared to other island tourism destinations such as Aruba (see Figure 1). The World Trade Organization estimates that tourism accounted for approximately 75% of total exports in 2012 (World Trade Organization, 2015).

Figure 1. Direct contribution of travel and tourism to GDP, 2014



Data source: World Travel and Tourism Council, 2015.

Fisheries has represented the second most important Maldivian export sector for the past three decades. The sector's 161.5 million USD in exports accounted for 98% of the value of all domestic exports in 2013 (excluding services trade such as tourism and re-export of jet fuel for airlines). Most of this fish is exported to Europe and Asia.

As a developing small island country, the Maldives relies on imports of several crucial goods, most notably petroleum products, which account for over one-third of total imports. The value of imports into the Maldives is nearly 10 times the value of exports excluding tourism (imports amounted to 1.6 billion USD in 2010). The trade deficit is mitigated by the large amount of foreign currency brought in by the tourism industry, however (Ministry of Finance and Treasury, 2014).

It must be noted that both the tourism and fisheries sectors are vulnerable to external shocks such as international economic crises or natural disasters. The entire Maldives economy and society can therefore be considered as particularly vulnerable to external shocks.

1.3 Sources of GHG emissions

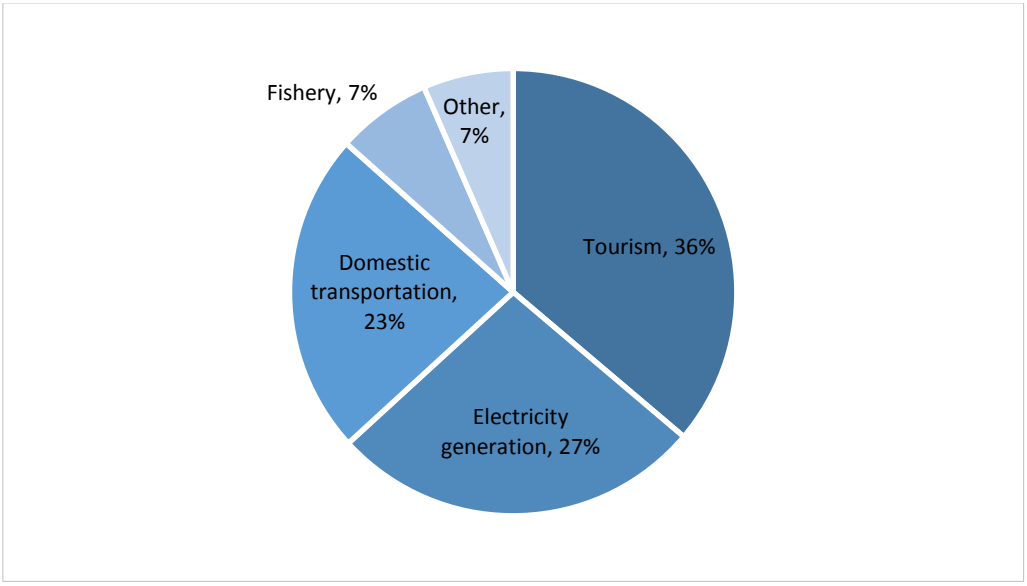
While the Maldives is a country at great risk from the effects of climate change, its own contribution to GHG emissions is minimal. The most recent GHG inventory – the Maldives' Carbon Audit 2009 – was prepared in 2009 (BeCitizen, 2010), and adapted by researchers at UNEP Risø in their in-depth analysis of low carbon development strategies in the Maldives.

Total GHG emissions in the Maldives in 2009 stood at 1.1 million tonnes of CO_2e (UNDP Risø Centre and Ministry of Environment and Energy, 2014), or 0.003% of global emissions, up from an estimated 0.7 million tonnes of CO_2e in 2005 (World Bank, 2015a). It is estimated that emissions will reach 2 million tonnes of CO_2e by 2020 (UNDP Risø Centre and Ministry of Environment and Energy, 2014).

Without mitigation policies, emissions will increase steadily as the economy develops further, the population grows, and consumption patterns change.

The main emitting sectors are: tourism, energy, domestic transportation and fisheries; together accounting for 93% of Maldives' domestic emissions. Figure 2 shows the share of each sector in national GHG emissions. The activities and associated GHG emissions that these sectors represent is explained in detail below.

Figure 2. Maldives' domestic emissions, split up by sector, 2009



Data source: UNDP Risø Centre and Ministry of Environment and Energy, 2014.

1.3.1 Tourism sector emissions

Tourism sector emissions include GHG emissions from the maritime transportation of tourists, domestic leisure trips, and electricity generation and cooking on resort islands; emitting a total of 0.41 million tonnes of CO_2e combined. However, emissions from the tourism sector do not include other tourism-related transportation activities such as road and maritime transportation of goods destined for island resorts or international and domestic flights.

Aviation is important for this sector, as most tourists enter the Maldives by international flights, and then domestic (seaplane) flights to reach resorts. These two sources of GHG emissions are discussed under the domestic transportation sector below.

Table 1. Emissions from the tourism industry

	Emissions in million tonnes of CO_2e	Percentage of total 2009 Maldives emissions
Electricity generation on resort islands	0.283 million tonnes	25%
Maritime transportation of tourists and leisure trips	0.069 million tonnes	6%
LPG and kerosene consumption on resort islands (for example for cooking)	0.058 million tonnes	5%
TOTAL	**0.41 million tonnes**	**36%**

Source: UNDP Risø Centre and Ministry of Environment and Energy, 2014.

1.3.2 Energy sector emissions

Emissions from the energy sector encompass electricity generation on all islands except resort islands. Because of the remoteness and geographic spread of the Maldives, it is currently not possible to either import electricity from the Indian subcontinent, or to have an integrated grid across islands. Each island has its own small and independent electricity grid, and electricity access in the Maldives is universal.

In 2010, total installed capacity was 245 MW and 99.9 % of that was based on fossil fuels – mostly diesel generators (UNDP Risø Centre and Ministry of Environment and Energy, 2014). Imports of fossil fuels have increased by 77% between 2002 and 2011 (World Bank, 2011). The Maldives faces the highest cost of power generation in South-Asia due to the need to import fuels and transport them to dispersed islands and, sometimes, use of inefficient generators and distribution grids. Costs vary between 30 and 40 USD cents per kilowatt-hour (kWh), and could be significantly higher in the most remote islands (UNDP Risø Centre and Ministry of Environment and Energy, 2014).

Renewable and energy efficiency solutions present an opportunity to reduce the dependence on imported fossil fuels, increase energy security and decrease GHG emissions. Currently there is 4 MW of renewable capacity installed, with projects in the pipeline to increase this to 40 MW by December 2019. Most of these projects are solar PV, but wind and waste-to-energy projects are also being proposed. Renewables could account for 5-10% of total generating capacity by 2019, depending on how fast electricity generation increases, and how many existing diesel systems are replaced by renewables or integrated into hybrid systems.

GHG emissions from burning fossil fuels for electricity generation in 2009 (excluding resort islands) was 0.306 million tonnes of CO_2e or 27% of total Maldives emissions.

1.3.3 Domestic transportation sector emissions

The bulk of domestic transportation-related emissions come from the maritime transportation of passengers and goods (excluding transport of tourists and leisure trips). The limited size of the islands and their geographic spread makes ship-based transport more practical and competitive than other forms of transportation. However, the capital Malé has become increasingly congested with vehicles. With the introduction of domestic airports and seaplanes, these modes are often used to reach remote and resort islands (the Maldives has the largest seaplane fleet in the world). Flights between the nine domestic airports spread around the islands are also included under domestic transportation.

Table 2. Emissions from domestic transportation

	Emissions in million tonnes of CO_2e	Percentage of total 2009 Maldives emissions
Maritime transportation of goods and passengers (not tourists or leisure trips)	0.154 million tonnes	14%
Road transportation	0.057 million tonnes	5%
Domestic flights	0.051 million tonnes	5%
TOTAL	**0.262 million tonnes**	**23%**

Source: UNDP Risø Centre and Ministry of Environment and Energy, 2014.

This does not include GHG emissions from international flights, however. The 655,852 tourists in 2009 emitted an estimated 1.3 million tonnes of CO_2e flying to and from the Maldives. This is nearly 20% more than the total domestic emissions (1.1 million tonnes of CO_2e) in that same year (BeCitizen, 2010). In 2013 more than 1.1 million tourists visited the Maldives, with associated international aviation emissions estimated at 2.2 million tonnes of CO_2e.

1.3.4 Fishery sector emissions

Maldivian fishing boats are usually diesel fuelled, and emitted 0.078 million tonnes of CO_2e in 2009, or 7% of total Maldives emissions. However, data on industries related to fisheries – such as canning and freezing– are not available. These sectors are therefore not included in this category.

1.4 Sector selection

The limited resources of this project oblige us to focus and limit the scope of the research. For this reason the selection of sectors is based on two variables: a) the share of total GHG emissions and b) the importance to the Maldivian economy. Two sectors will thus be examined in depth: **tourism and energy.**

These two sectors account for 63% of the Maldives' domestic GHG emissions. Additionally, they are important sources of employment and high standards of living to the people of the Maldives; tourism on its own directly contributes nearly 30% of GDP.

The energy sector is not only important for the provision of basic services such as drinking water, health care and education, but is also closely linked to the transportation and fisheries sector. Energy, transportation and fisheries are all three highly dependent on diesel imports. Policies affecting fuel supply therefore also impact the two other important sectors.

1.5 Motivation and drivers for transformation

There are a number of important drivers that move the Maldives to a low GHG economy. These drivers relate to both the economic and societal vulnerabilities of the Maldives.

Economic drivers include the pressure that the consumption of fossil fuel places on public finances in the Maldives; according to the Maldives Ministry of Energy and Environment over 400 million USD (approximately 18% of GDP) was spent in 2014 on importing fossil fuels. Increasing dependency on imported fuel is considered a threat to economic growth and sustainable development in the country (Minivan News, 2014). Reducing the use of fossil fuels would free up funds to address other development issues, such as health care and education.

There is also a strong environmental driver. Being extremely vulnerable to the impacts of climate change, the Maldives adopts an active role in international negotiations and shows leadership in order to raise awareness of this vulnerability to build capacity to ensure a sustainable and prosperous future. Rolling out low carbon technologies, for instance in the energy sector, also serves to showcase the viability of a transition towards a low carbon economy.

However, a number of climate change policies and projects are supported by international donors and their priorities are likely to have an impact on the implementation of climate change policies.

1.6 Barriers to the adoption and implementation of climate mitigation policies

Although concerns related to climate change and its possible impacts are well-recognised in the Maldives, there are also concerns about the implementation of climate change policies and projects. One such concern is that climate change policies, if not conducted globally, in a sustainable way, could lead to instability in energy markets.

Climate change mitigation efforts, both domestic and international, could limit the supply of fossil fuels by reducing incentives for the exploration of new sources of fossil fuels or by increasing the cost of exploiting proven reserves. Climate change policies could also make burning fossil fuels more expensive, for example by putting a price on GHG emissions. Climate change policies and projects are perceived as potentially increasing fuel prices or increasing uncertainty and volatility in international fuel markets.

This could potentially impact the Maldives because changes in fuel prices are felt directly, and indirectly, throughout the country. Desalination plants, for example, provide a significant share of the drinking water in the Maldives, but are dependent on fuel imports and could pass increased fuel prices on to their customers.

Other concerns related to potential increases in fuel prices caused by international and domestic climate change policies include:

- a reduction in tourists, if the cost of flying increases for the aviation industry (for example market-based measures discussed in the International Civil Aviation Organization (ICAO) or the inclusion of international aviation in the EU Emissions Trading Scheme (ETS);
- an increase in the prices of goods and services for households and industries. The prices of many goods and services are dependent on fuel prices. Fuel is necessary for shipping or flying imports into the country:
- a loss of competitiveness for export-oriented sectors such as fisheries and manufacturing; shipping (for export, transportation or fishing) uses fossil fuels input; and
- given the dependence on imported fossil fuels, short-term fluctuations in fuel prices could put the country's energy security at risk. However, climate change policies such as the development of renewable energy would provide energy security in the long run.

A lack of funding and absorptive capabilities have been mentioned as adding to the challenge of implementing ambitious climate change policies and projects in a small country that is still developing economically. Capacity-building remains an ongoing concern in the Maldives.

1.7 Conclusion

The Maldives has benefited from major improvements in living standards the last three decades, but remains a very vulnerable country. Economically it is vulnerable due to its reliance on tourism and

strong dependence on imported fossil fuels. The Maldives is also environmentally vulnerable due to its low-lying geography.

While the Maldives is currently not a major source of emissions, its simultaneous economic and demographic growth, coupled with changes in consumption patterns are likely to lead to a higher carbon footprint.

We can therefore expect that without mitigation policies in place, the domestic emissions of the Maldives will increase steadily. Because tourist arrivals are also expected to increase, the associated emissions from international flights to and from the Maldives will increase as well. However, current and future mitigation policies could focus on a limited number of sectors with significant emissions: tourism, energy, transportation and, to a lesser extent, fisheries.

Given their concerns over climate change and their stance on ambitious international action, there are strong incentives in the Maldives to decrease emissions, but the most important driver is an indirect and economic one: reducing the fossil fuel bill. The major national and international climate change policies that impact various stakeholders in the Maldives are discussed in the next chapter, with a focus on the tourism and energy sectors.

2. Climate change mitigation policies

This chapter focuses on domestic and international climate change mitigation policies and projects, outlining first the governance of climate change policy, then mapping overarching policies and sectoral policies according to the sector they focus on. Direct and indirect climate change policies and projects are incorporated into this analysis. Finally, international climate change policies and projects that are impacting, or could potentially impact, the Maldives are considered.

The full list of national and international climate change policies that could impact the Maldives is too long to discuss in depth; the following boundaries are considered when discussing national policies:

- Recent policies and projects are considered more relevant as changes in the administration have led to changes in priorities and delays in the implementation of older policies and the drafting of new policies. A number of the policies considered are therefore drafts, but they are expected to be published soon without major amendments.
- Three levels of policies are examined:
    - Overarching policies
    - Sectoral policies and sectoral ‘master plans’
    - Projects and programmes
- The focus is on the policies and projects within those levels where impacts can be identified

Sectoral plans contain major strategies, targets and visions, while the policy actions are the translation of these policies into concrete actions on the ground. The impact analysis will therefore mainly focus on the effects of the policy actions and projects.

For international policies, both climate change mitigation policies in other countries and under discussion in international fora are analysed, with a focus on those expected to be implemented in the coming years and to have significant impacts for the Maldives.

We consider only those policies and projects that have a clear international dimension, i.e. that are implemented elsewhere or are part of a multilateral agreement as “international”. Projects that are implemented domestically, but receive international support (grants, loans), are listed as “domestic”.

2.1 Governance of climate change in the Maldives

2.1.1 Governance of climate change policies and projects in the Maldives

The goal is to include climate change considerations into core economic and social development goals (Ministry of Environment and Energy, 2015b). This is done by discussing the sectoral implications and options in sector policy frameworks, such as the Fourth Tourism Masterplan and Energy Sector Strategy Action Plan (discussed below under sectoral policies).

However, climate change policies do not currently benefit from a strong governance model, which sometimes results in them not being prioritised: economic and social concerns often take precedence over climate change concerns.

New policies are usually drafted by the ministry in charge of the topic, which then arranges for input from other government agencies, as well as public stakeholders. This is done through a number of workshops before they are finalised and implemented. There are a number of issues related to this approach:

1) Formal impact assessments are often lacking. However, impact assessments are compiled for projects sponsored by international donors (such as the World Bank Group).
2) There is no well-defined institutional mechanism to ensure that climate change concerns and priorities are sufficiently taken on board during policy drafting. The mandate for climate change mainstreaming lies with the Ministry of Environment and Energy who handles the climate change portfolio. Other Ministries focus on their sectoral plans.
3) Once policies are enacted, there is a lack of capacity to monitor and eforce compliance with regulations. For example, resort islands are required to have an environmental management system, but resorts remain essentially self-regulated as this is not frequently enforced by authorities (UNDP Risø Centre and Ministry of Environment and Energy, 2014).

2.1.2 Public commitment to low GHG emissions

The Maldives has been committed to tackling climate change, especially through international fora such as the UNFCCC. As climate change puts the very existence of the island nation at risk, they (and other members of both AOSIS and SIDS) have kept pressure on international climate negotiations. The Maldives has for instance launched the Malé Declaration on the Human Dimension of Global Climate Change at the 2007 SIDS international conference (Small Island Developing States, 2007).

Domestically the Maldives government is using pilot projects to showcase the potential for improved energy efficiency and consequential emission reductions. For example, the harbour and streetlights in Malé were recently replaced with highly efficient LED lighting (UNDP Risø Centre and Ministry of Environment and Energy, 2014).

2.2 General climate-related policies

Maldives Climate Change Policy Framework (2015)

This strategic paper focuses on listing strategic goals and creating a framework for adaptation and mitigation policies to be implemented between 2015 and 2025. However, the actions and measures necessary to reach those goals are not discussed in depth. Low emission development is explicitly stated as a driver of the strategic framework.

Maldives Low Carbon Development Strategy (2014; UNEP-Risø and Ministry of Environment and Energy)

The Maldives Low Carbon Development Strategy is the result of cooperation between the UNEP Risø Centre (currently UNEP DTU) and the Maldives Ministry of Environment and Energy. This paper focuses on how to achieve low GHG development and includes a list of 22 low carbon development mitigation options, spread over a different sectors (such as transportation, desalinisation and waste). The majority of projects is in the energy sector: energy efficiency and renewable energy (RE) projects (mostly solar photovoltaic – PV).

It is unclear which options will be implemented in the Maldives. There is no discussion on possible prioritisation. In the draft Energy Sector Strategic Action Plan (2014), however, a number of these actions are taken over and scheduled for implementation.

2.3 Energy sector policies and projects

Draft Maldives Energy Sector Strategic Action Plan (June 2014)

This draft document has been announced as the central strategic pillar of the Maldives energy policy for the short to medium term. Two of the main policy goals are direct or indirect climate change policies: promote energy conservation and efficiency and promote renewable energy technologies. These policies are linked to actions assessed in the Maldives Low Carbon Development Strategy, such as converting island power grids to hybrid configurations (consisting of solar PV linked to diesel-generators) and biofuels targets. The latter example extends beyond the energy sector into the transportation and fisheries sectors.

Maldives Scaling up Renewable Energy Programme for low income countries (SREP) Investment Plan, 2013-17 (2012)

The SREP is a Climate Investment Funds programme which is designed to demonstrate the economic, social and environmental viability of low carbon development pathways in the energy sector in low-income countries. It is set up to support renewable energy (RE) projects developed by local or international companies and is the major policy financing the development of renewable energy. Major partners within the context of this investment plan are: the World Bank (leading actor), the Islamic Development Bank, Asian Development Bank and the European Investment Bank.

At the moment two major sub-projects have been launched: the 'Accelerating Sustainable Private Investments in Renewable Energy' (ASPIRE) programme and the 'Preparing Outer Islands for Sustainable Energy Development' (POISED) programme. ASPIRE aims to help relieve the lack of domestic and governmental financial capacity by leveraging private sector finance with World Bank guarantees offered to investors. It addresses barriers to finance, such as high risk of investing due to high capital cost and repatriation of profits, limited local familiarity with the technology and the small scale of power distribution and dispersed investment projects that make reaching economies of scale and private financing difficult. (Ministry of Environment and Energy, 2014a).

The POISED programme is a five-year Asian Development Bank-led programme and aims to rehabilitate the existing diesel generators, in solar PV-diesel hybrid systems. The project would transform the existing grids through physical investments in renewable energy, energy management and control systems, storage and improvements in distribution networks and significantly reduce the requirement for diesel to generate electricity. Private sector investment projects to support solar photovoltaic investments on larger islands are under consideration outside and complementary to the project.

Electricity subsidy reform (2015)

Previously, the Maldives had a uniform flat subsidy for electricity consumers. Because the vast majority of electricity in the Maldives is generated using diesel generators, this subsidy acts as an indirect fossil fuel subsidy (National Social Protection Agency, 2013). The Maldives government paid the difference between the price of imported fuels and a previously determined threshold, effectively shielding both consumers and producers of electricity from changes in international oil prices. Government expenditure on the subsidy increased fivefold between 2010 and 2012, from approximately 5.35 million euros in 2010 to approximately 27.5 million euros in 2012 (1.4% of GDP) (World Bank, 2013).

The reform focused on decreasing support for large consumers while maintaining low energy prices for poorer households (National Social Protection Agency, 2013). The subsidy was reformed mainly because of economic incentives: the reform is estimated to reduce government spending on the fuel surcharge by 42%. Mitigation effects such as reducing emissions through the promotion of more efficient electricity use and the reduction of fuel consumption were not central to this reform, but are seen as added advantages.

Maldives National Strategy for Sustainable Development (NSSD) (2009)

The Maldives National Strategy for Sustainable Development of 2009 was launched as a holistic strategy to ensure sustainable development in the Maldives. This policy document has however been shelved, and several of its climate change related goals and strategies have been superseded by new policy proposals. Nevertheless, one main goal has been kept and underscored by the government: reducing final energy consumption by 7.5% by 2020 (relative to 2010 levels) by means of efficiency improvements.

2.4 Tourism sector policies and projects

Maldives Low Carbon Development Strategy (2014; UNEP-Risø and Ministry of Environment and Energy) and Draft Maldives Energy Sector Strategic Action Plan (June 2014)

This study, discussed above, also includes policies and actions aimed at the tourism sector. The tourism-related actions in this document include more efficient air conditioning and refrigeration units and the development of renewable energy sources on resort islands (with the focus on solar PV).

Fourth Tourism Master Plan (2013)

The Ministry of Tourism, Arts and Culture has a longstanding tradition of setting strategies for the tourism sector via so-called Tourism Master Plans. The Master Plans consider the main challenges and opportunities for the tourism sector, as well as policies that are necessary to respectively counter and use them. The Fourth Tourism Master Plan (2013-2017) explicitly mentions mitigating emissions by implementing a low carbon programme for the tourism industry through, among others, developing carbon-neutral model resorts and developing renewable energy options.

2.5 International policies

International policies include those implemented internationally and domestic actions taken by other countries that could impact the Maldives. The latter category currently consists of two EU policies: i) the possible inclusion of international flights into the EU Emissions Trading Scheme (ETS) and ii) a potential carbon pricing mechanism for maritime transportation within EU territory resulting from the proposed MRV requirements for large ships starting in 2018 (European Commission, 2013a).

In this case study the only international policies discussed in depth are the impact of climate change policies on the aviation and maritime transportation sectors. Currently, there are international discussions underway in the two main international organisations for international shipping, the International Maritime Organisation (IMO), and international aviation, International Civil Aviation Organisation (ICAO). Climate change policies in both of these transport sectors could have a large impact, if increased transportation costs are passed through to Maldivian consumers or deter tourists.

International maritime transportation

Currently the IMO has implemented a number of direct and indirect climate change policies. The main climate change policy is Annex 6 of the International Convention for the Prevention of Pollution from Ships (MARPOL). Three climate change mitigation measures are currently in place:

- the International Air Pollution Prevention Certificate scheme; large ships such as oil tankers and container ships are checked on, among others, the emissions of certain GHGs, fuel quality and on-board incineration of waste
- the Energy Efficiency Design Index (EEDI); the design of new ships needs to meet minimum energy efficiency levels, tightened every five years. This promotes more energy efficient (or less polluting) equipment and engines and stimulates continued innovation and technical development (International Maritime Organisation, 1997).
- the Ship Energy Efficiency Management Plan (SEEMP); managing ship and fleet efficiency performance over time and incorporating best practices for fuel-efficient ship in order to improve the energy efficiency by (International Maritime Organization, 2015c).

A global market-based measure (MBM) to mitigate GHG emissions from the maritime sector is currently under discussion at the IMO, although the time-line for the agreement and implementation of a MBM is as yet unclear. MBMs under consideration include an offsetting fund financed by a tax on bunker fuels, an energy efficiency crediting and trading scheme and a global ETS for international shipping.

Concerns from developing countries are taken on board via discussions on mitigation of adverse effects, for instance through a rebate mechanism compensating developing countries (International Maritime Organization, 2015d).

Domestic climate change actions in other jurisdictions that could impact the Maldives are currently considered in the EU (European Commission, 2013b). The EU is supporting discussions on a global ETS by preparing for its possible implementation by setting MRV requirements for emissions from large vessels visiting EU ports from 2018 onwards. This could facilitate IMO discussions by testing the viability of a ship-based ETS and the necessary data requirements.

Mention has also been made of an EU-wide GHG reduction target enforced through a MBM if IMO discussions do not deliver a global mechanism (European Union, 2015a). This EU mechanism could be a model for a potential global mechanism, and would be aligned with an emerging global policy.

International aviation

The EU started an international debate on aviation emissions by announcing the inclusion of aviation in the EU ETS. This was however put on hold with the so-called Stop the Clock-measure, in response to the decision at ICAO's 2013 General Assembly to develop a global MBM. The EU has thereby given ICAO time to develop this MBM, but, in order to maintain pressure, has retained the option of

expanding the EU ETS to all flights to and from the EU. At the moment only flights within the European Economic Area are included in the EU ETS (European Commission, 2015b).

The ICAO's MBM should be developed by 2016 and enter into force by 2020 (International Civil Aviation Organization, 2013d). The contents of ICAO discussions on the MBM are kept confidential. However, interviews with stakeholders have indicated that the most likely candidate for global implementation is an offsetting mechanism, allowing carbon units from a wide variety of offsetting mechanisms such as REDD+. This would be coupled with a previously confirmed aspirational goal of carbon-neutral growth in the aviation sector after 2020.

Thresholds determining the scope of the mechanism and whether some operators or routes would be expected to offset more are currently on the table, with a *de minimis* provision to exclude countries or routes that do not contribute significantly to international aviation activities. This provision would help simplify the international market-based mechanism by excluding small operators and could potentially be used to help shield developing countries from the negative impacts of the measure[1] . It is likely that ICAO will settle for a route-based approach to limit the scope of the MBM. Routes that are used frequently by airline operators would then be the focus of the mechanism and, depending on the height of the *de minimis* threshold, a significant number of both developed and developing countries would be excluded from the scheme.

Although there is no clarity on the form and scope of future climate change policies for the aviation sector, it is reasonable to assume that climate change measures will be introduced in the mid-term, and that they will increase costs for airlines. The potential impacts of these measures are discussed in the next section on impacts of policies.

3. Impacts of climate change mitigation policies

This section analyses the economic, social and environmental impacts of climate change policies and projects in the Maldives energy and tourism sectors. These impacts can be positive and negative, but can also be classified as intended or unintended.

Quantifying the impacts of climate change policies in the Maldives is challenging due to:

a) the lack of formal impact assessment procedures during policy design, especially on potential environmental and social impacts;
b) the relatively recent drafting and implementation of many climate change policies and policy changes due to changes in the administration;
c) the scarcity of data assessing the impacts ex-post through reviews after the completion of mitigation projects;
d) Lack of institutional capacity, both technical and human expertise, for monitoring and evaluation.

This makes it very difficult to fully assess all positive and negative impacts of policies and actions identified in the previous section. The management of climate change is the clear societal challenge and for that long-term climate change mitigation policies are necessary.

In the short term all impacts are important, however it is clear that the ones that need management are the negative unintended impacts of climate change mitigation policies.

[1] ICAO has provisions determining that aviation regulation has to take members' Special Circumstances and Respective Capabilities into account – similar to Common but Differentiated Responsibilities in the UNFCCC context

The lack of impact assessments and follow-up procedures limits the number of policies and actions that can be assessed in this case study. On the energy side the focus is on the (currently draft) Maldives Energy Sector Strategic Action Plan and the Scaling-up Renewable Energy Programme (SREP). On the tourism side international aviation and maritime transportation are discussed.

To prevent unnecessary repetition, the impacts of energy policies that are related to the tourism sector (such as development of PV on resort islands) are covered under the energy sector impacts.

3.1 Energy sector

Energy policies and projects discussed in this case study focus on three areas: biofuels, energy efficiency improvements and the rolling out of renewable energy capacity. Social, environmental and economic impacts are analysed separately.

3.1.1 Energy sector: economic impacts

A. Positive impacts

1. Financial Savings for the government.

Fuel savings through energy efficiency and RE has the clear intended impact of decreasing dependency on fossil fuel imports, which in turn reduces the national debt. Switching from high cost diesel-based electricity generation to lower cost solar PV electricity generation could also allow reductions in the previously mentioned fuel surcharge subsidy.

2. Diversified energy matrix and enhanced energy security

Fuel savings through energy efficiency and RE could lead to a decreased dependency on fossil fuel imports and greater energy security self-sufficiency, which in turn increases overall economic resilience. It also brings down the nation's exposure to the volatility of global fuel prices. These are also intended impacts of energy sector policies.

3. Potential increase in household disposable income and/or business revenues

Fuel savings through energy efficiency and RE also aim to reduce the cost of electricity at household level, which is likely to result in cost savings, improve standards of living and increase disposable income levels of households.

The SREP Investment Plan promotes renewable energy development. As mentioned before, solar PV generation in the Maldives has multiple benefits. The World Bank estimates that annual monetary savings from reduced fuel consumption from the development of 20 MW of renewables would be between 7.5 and 8 million USD. Depending on fuel price projections and the necessary replacement and maintenance of the country's stock of diesel generation assets, the annual savings could be significantly higher.

The SREP Investment Plan focuses on remote islands, where diesel fuelled generation is relatively inefficient and where fuel is even more expensive due to higher transportation costs. The project outline mentions electricity production costs of between 0.30 and 0.40 USD/kWh in the larger islands, and even higher in the remote small islands.

However, as the analysis of the assessments by the UNEP Risø centre shows, renewable energy (most notable solar PV) is already at grid-parity, costing between 0.21 USD and 0.29 USD/kWh depending on the location of the project. Solar PV development would therefore result in significant cost savings for the generation of electricity, which can be passed on to consumers.

B. Negative impacts

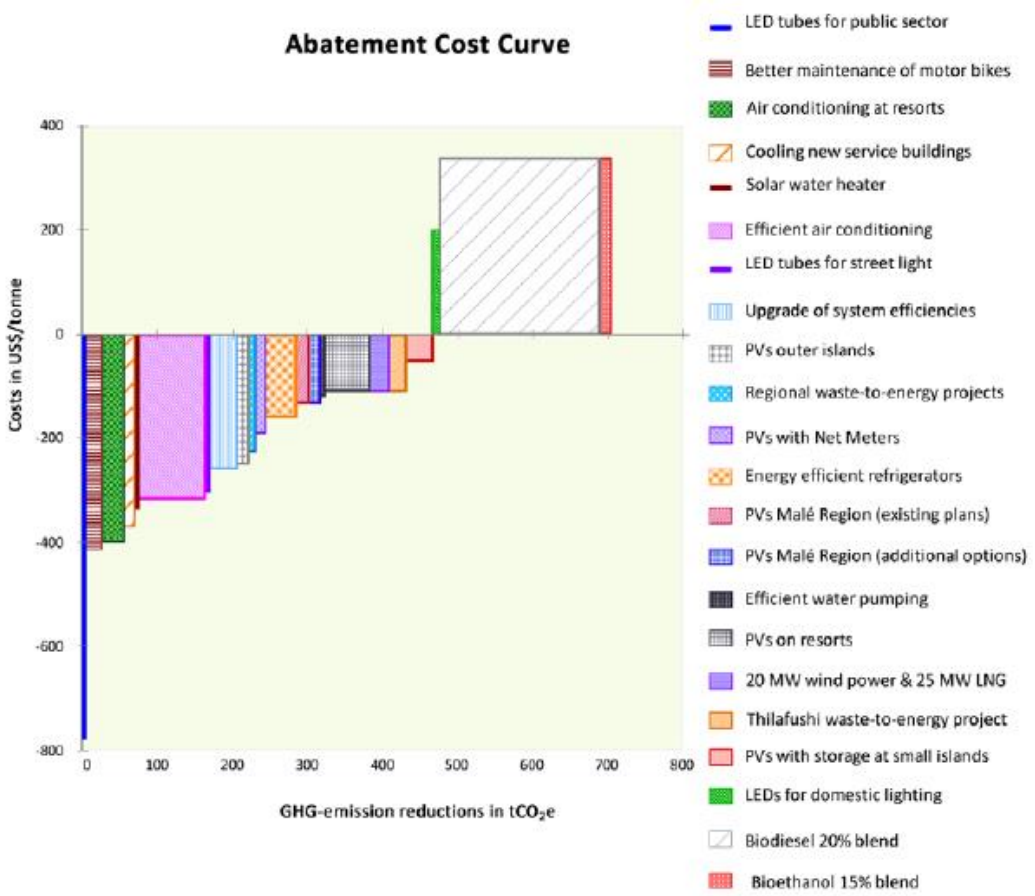
1. High up-front investment cost which could lead to increased electricity prices for consumers

The government, energy providers and energy consumers often do not have the financial capacity to upgrade existing infrastructure or invest in new systems such as PV projects. Investing in these projects would represent a fiscal opportunity cost: governments would have to decrease spending on other development priorities. Additionally, the lack of domestic financing options would force the investors (government or utilities) to pass on the costs of these investments in the short term. This could increase electricity bills for all consumers substantially.

It must be noted that this is a short term challenge, but that in the longer term investments in renewable energy and energy efficiency have significant financial benefits because of decreased fossil fuel imports.

The draft Maldives Energy Sector Strategic Action Plan (2014) includes a large number of energy sector actions that were first assessed by the MEE and the UNEP Risø centre in the Low Carbon Development Strategy. They are outlined in Figure 3.

Figure 3. The Abatement Cost Curve of energy sector actions discussed in the Low Carbon Development Strategy



Source: UNDP Risø Centre and Ministry of Environment and Energy, 2014.

It is clear that many of the mitigation actions above are so-called no-regrets options: implementing them would incur significant savings, often paying back the capital costs within years or even months. These mitigation measures would thus not only reduce emissions, but also benefit the

Maldivian economy and society. The quickest pay-back times are for investments in more efficient air conditioning systems.

The UNEP Risø centre estimates that these options together could reduce diesel consumption by up to 21%, drastically cutting the total costs of fuel imports. However, the actor) that conducted the investment (such as private investors such as resorts and hotel might not be reimbursed for his investment in all cases. Because of the relatively generous subsidies for electricity consumption, the government would receive, at least partially, the benefits of annual energy savings as the value of subsidies decreases.

The energy sector actions from the Maldives Energy Sector Strategic Action Plan are summarised in Table 3. Several of these actions are discussed in depth below (UNDP Risø Centre and Ministry of Environment and Energy, 2014).

Table 3. Abatement, capital and annualised costs of energy efficiency and renewable energy actions from Maldives Energy Sector Strategic Action Plan

Mitigation action	Abatement cost ($/tCO$_2$e)	Capital costs ($ million)	Annualised costs ($ million /year)
LED tubes for the public sector	-784	0	-0.8
Better maintenance of motorbikes	-413	0	-10
Energy-efficient air conditioning at resorts	-398	4.7	-12.7
Centralised cooling systems in new service buildings	-369	1.8	-4.6
Energy-efficient air conditioners	-313	9.6	-27.7
LED tubes for street lighting	-292	-0.1	-0.6
PVs outer islands	-252	42.4	-3.7
Energy efficient refrigerators	-158	41.2	-6.6
PV Malé region	-133	45	-2.1
PV resorts	-108	167.4	-6.3
PVs with storage at small islands	-52	167.1	-1.8
Replace CFLs with LEDs for domestic lighting	199	42.4	1.7

Data source: UNDP Risø Centre and Ministry of Environment and Energy, 2014.

LED tubes for the public sector

Because 70,000 LED tubes were donated by the Chinese government, the capital cost of this mitigation action is estimated at zero. These tubes only use 44% of the energy of conventional tubes in use now. This leads to annual savings of 0.8 million USD up to 2020 solely from reduced fossil fuel imports. Recently another 200,000 LED tubes became available, resulting in an estimated annual saving of nearly 3.1 million USD up to 2020.

Better maintenance of motorbikes

Motorbikes in the Maldives are mostly found in the capital Malé. However, their fuel economy was estimated at only 15 km/l, while manufacturer ranges for the most common types pointed to a predicted fuel economy of 35-55 km/l. Better maintenance of the current motorbike stock would lead to a drastic reduction in fuel consumption and lead to annual net savings of around 10 million USD for motorbike owners.

Energy-efficient air conditioning at resorts

The entire stock of air conditioners in resorts was estimated at 36,500 units by 2020. Replacing the existing stock with more energy-efficient air conditioners would cost 4.7 million USD for resorts, but over the lifespan of the new air conditioning units 12.7 million USD would be saved annually. Air conditioning units have been found to consume between 29 and 58% of all electricity at resorts.

Energy-efficient air conditioners

The entire stock of air conditioners in the Maldives (excluding resorts) in 2012 was estimated at 76,000 units, of which around two-thirds are low efficiency units. An energy audit of an office block in Malé revealed that air conditioning represented 44% of all electricity consumption. Replacing the existing stock with more energy-efficient air conditioners would cost 9.6 million USD, but over the lifespan of the new air conditioning units 27.7 million USD would be saved yearly through reducing electricity demand by 97 GWh up to 2020.

PV outer islands

121 islands were considered for the development of 12.1 MW of solar PV installations. Electricity generated by PV systems was calculated to cost 0.25 USD/kWh, while electricity from diesel generators stood at 0.46 USD/kWh. These considerable savings in electricity bills are however only possible after significant initial investments in PV systems, amounting to 3500 USD/kW, or 42.4 million USD for the entire action. While the Maldives Energy Sector Strategic Action Plan includes language suggesting a possible combination of solar PV and diesel generators (so-called hybrid configuration), no information is available on the potential costs of such installations or the scale to which they would be developed.

More recent power purchasing agreements include 0.23 USD/kWh as proposed tariff. Additionally investments in solar PV are deemed to cost 2000 USD/kWh by the Maldives Ministry of Environment and Energy. This makes the economic benefits of solar PV on outer islands even more significant.

PV Malé region

A minimum of 15 MW of solar PV was planned for the greater Malé region (consisting of Malé and several nearby islands). The cost of solar PV electricity was calculated at 0.21 USD/kWh, compared with 0.31 USD/kWh for diesel generators. The initial investment of 45 million USD would therefore lead to yearly savings of 2.1 million USD. This schedule for developing PV on Malé was also taken on in the SREP investment plan.

PV on resorts

The goal of this mitigation action was installing solar PV systems corresponding to 30% of installed capacity of resort grids; starting at 30 MW, and increasing to 47.8 by 2020. Capital costs were estimated at 167 million USD. The cost of solar PV electricity was calculated at 0.25 USD/kWh, compared with 0.34 USD/kWh for diesel generators on resort islands. An audit in three resorts

revealed that electricity savings projects with payback periods of less than five years would lead to savings in the range of 16%-37% of total electricity costs for the resorts. Hybrid solar-diesel or hybrid solar-LNG applications are probably less costly electricity generation options than diesel-only systems.

PVs with storage at small islands

The grids of 10 islands are set to be converted to full PV with storage systems under the SREP investment plan. However, this mitigation action was then planned to be extended to a further 50 small islands. Installed PV capacity to meet this is estimated at 29 MW, with storage of 10 kWh per kW of solar PV. The planned storage systems are lead-acid batteries[2], costing 150 USD/kWh. The high cost of storage brings the price of electricity on these small islands to an estimated 0.42 USD/kWh for solar PV, compared with 0.46 USD/kWh for diesel generators. Initial investment estimated at 167 million USD.

The total cost of installing solar PV systems under the three renewable energy projects above is estimated to be at 379.5 million USD or 23% of GDP.

2. Increased fuel prices due to biofuels

The intended impact of introducing biofuels is reducing the fossil fuel content and permanent emissions from fuels. Biofuels, however, have the unintended impact in the Maldives of incurring extra costs by increasing the price of fuels. This impacts all sectors of the economy: diesel-based electricity becomes more expensive, as does the transportation of people and goods. Table 4 summarises the costs linked to mandated biofuels in the Maldives. These actions are discussed in more depth below, in Table 4.

Table 4. Abatement, capital and annualised costs of biofuels actions from Maldives Energy Sector Strategic Action Plan

Mitigation action	Abatement cost ($/tCO$_2$e)	Capital costs ($ million)	Annualised costs ($ million /year)
Biodiesel 20% blend	336	0	71.6
Bioethanol 15% blend in petrol	337	0	4.9

Data source: UNDP Risø Centre and Ministry of Environment and Energy, 2014.

Biodiesel 20% blend

UNEP Risø used estimates from the OECD, FAO and IISD to estimate that the biodiesel price would be around 1.20 USD/litre up to 2020. This would lead to a significant increase in the cost of fuel; annually approximately 72 million USD up to 2020. This increase in the fuel price would reverberate across sectors in increased transportation costs for households, tourists and businesses, and in a higher electricity price as the electricity sector on any island is governed by diesel generators. Additionally the main export sector (fisheries) would become less competitive and might lose global market share. The extra cost is estimated to translate as an increase in the cost of electricity of 29%. Capital investments were estimated to be non-existent, as biofuel blends would be implemented by mandating the main oil importing company to only import the blend.

[2] The Maldives Ministry of Environment and Energy has indicated that lead-acid batteries are to be replaced with lithium-ion batteries. The unit costs of those new batteries systems is currently unclear, and therefore also the costs of initial investments.

Bioethanol 15% blend in petrol

UNEP Risø used estimates from the OECD, FAO and IISD to estimate that the bioethanol price would be around 0.83 USD/litre up to 2020. This would lead to a significant increase in fuel costs, also because 66% more ethanol is needed than petrol due to its lower energy density; annually approximately 4.9 million USD up to 2020. This increase in the fuel price would reverberate across sectors in increased transportation costs for households, tourists and businesses. Additionally, the main export sector (fisheries) would become less competitive and might lose global market share. Capital investments were estimated to be non-existent, as biofuel blends would be implemented by mandating the main oil importing company to only import the blend.

It is important to note that it is currently unclear when a biofuels mandate will enter into force in the Maldives, even though it has been on the political agenda for a number of years, and contacts within the Maldives energy sector assure us that it is in the pipeline.

3. Increased electricity prices due to subsidy reform.

The reform of the Fuel Surcharge Subsidy is intended to have cost impacts on electricity consumers: prices are estimated to change between 0% (for smallest consumers) and 63% increase (for the largest consumers). This reform aims to provide savings for the government, however the bills are then passed on to large households and businesses. Those households and businesses are thereby incentivized to reduce their electricity consumption.

3.1.2 Social and environmental impacts of energy sector policies and projects

It is challenging to determine which environmental and social impacts can be expected from a number of the domestic policies discussed in chapter 2. For example the draft Maldives Energy Sector Strategic Action Plan does not contain any reference to social or environmental impact assessments. The following impacts can be determined:

A. Positive impacts

1. Reduced GHG emissions

The GHG emission reductions brought about by the various actions proposed in the Low Carbon Development Strategy and taken up in the draft Maldives Energy Sector Strategic Framework add up to more than 0.7 million tonnes of CO_2e annually from 2020 onwards. UNEP Risø estimates these emission reductions at 35.7% of BAU emissions in 2020.

2. Reduced dependency on fuel imports and increased community resilience to changes in fuel prices

The savings in fuel consumption of the various actions that were proposed in the Low Carbon Development Strategy and subsequently taken up in the Maldives Energy Sector Strategic Framework amount to more than 21% of annual fuel imports by 2020. This is intended to increase the resilience to changes in fuel prices for local communities.

3. Health benefits

Generators in the Maldives are currently mainly diesel-fired, therefore the reduction in emissions from the deployment of renewable energy systems has positive health co-benefits. Air pollution (such as fine particles) is scaled back.

4. Green economy job creation

Shifting to renewable forms of energy will create substantial job opportunities, if the local workforce is sufficiently prepared and trained. In particular in the area of services such as installation, repair and maintenance of RE systems there is the potential for new employment opportunities.

B. Negative impacts

1. Scaling back of other development policies due to lack of financial capacity

Depending on how investments in energy efficiency or renewable energy generation are implemented and financed, significant and unintended losses of jobs and disposable income are possible. If the Maldives government finances the high upfront investments, it will need to scale back expenditure on other activities, for example social programmes or environmental protection in other areas.

2. Transportation costs increase because of biofuels

The increased transportation costs due to biofuels, discussed above under "Economic impacts of energy sector policies" could lead to a scaled down access to transportation and impact local communities.

3. Need to retrain local technical staff

Technical staff currently employed in the installation and maintenance of installations that are to be replaced will need significant retraining in order to work with the new generation of installations. However, this could also be an opportunity to improve the skills of local workers and have a positive social impact (linked to the point on Green economy job creation above under positive social impacts).

4. Impacts of construction, operation and decommissioning of installations

World Bank Group procedures requires that a thorough social and environmental impact assessment be undertaken for the SREP investment plan and its sub-programme ASPIRE. The explicit focus of these impact assessments is to identify potential negative impacts, the positive impacts are not considered. These impact assessments point to additional, small-scale social and environmental impacts.

Environmental impacts are expected as a result of the SREP Investment Plan, due to construction and installation of new RE generation systems, future decommissioning of RE installations, batteries, rehabilitation and expansion of existing power generation systems, and the disposal of inefficient or old appliances. Other risks are the generation of solid waste from construction debris, oil spills from motorised construction equipment, the accumulation of used batteries, etc. Some of these impacts could be unavoidable, especially during construction and installation.

The initial SREP proposal highlights that these impacts would likely be temporary and could be prevented or mitigated. A summary of the potential social and environmental impacts from renewable energy development under the SREP Investment Plan can be found in Table 5.

Table 5. Impacts of proposed SREP activities for the different renewable energy options

Type of impact	Solar PV	Wind Energy	Waste-to-Energy
Environmental impact / construction and operation	• Construction waste and noise • Disposal of components at end of life (batteries, PV panels, inverters, etc.)	• Possible impact on the marine environment due to fixing poles in the shallow lagoon for lagoon mounts schemes • Dealing with construction waste and impacts from workforce • Bird strikes • Visual impact as any wind energy system will be mounted on tall masts in clear spaces • Noise and dust during the construction may be nuisance to the neighbourhood • Noise during operation of wind turbine	• Construction will involve environmental disturbances normally encountered in major construction projects • Improper storage/handling of waste dumps and other sources of contaminants may lead to ground water pollution • Noise and dust during construction may be nuisance to the neighbourhood • Construction waste • Emissions from the combustion of waste • Fly ash
Social impacts	• Disruption to households during installation of solar panels and cables • Reduced fossil fuel-based power • generation and reduced dependency on fuel import costs • Increasing community resilience to changes in fuel prices • Encouraging productive usage of energy in small electricity consuming islands	• Reduced fossil fuel based power generation and reduced dependency on fuel import costs – increasing community resilience • Loss of land or other immovable properties	• Reduced primary fuel costs will help reduce energy costs and improve community resilience • Increased surface water runoff

Source: Ministry of Environment and Energy, 2012a.

The ASPIRE and POISED sub-programmes are the most advanced sub-programme of the SREP. We will focus on only ASPIRE, as most of the findings can be projected to the POISED programme. The ASPIRE's social and environmental impacts have been studied extensively. A consultancy (CDE Consulting) prepared an "Environmental and Social Management Framework for the proposed solar PV projects under ASPIRE" to look into both programme-wide and project-specific impacts, especially those related to solar PV projects in, and around, the capital (Ministry of Environment and Energy, 2014a).

The Environmental and Social Management Framework concludes that "overall the impacts from this program are expected to be minimal and manageable". The main negative unintended, but expected environmental and social impacts include:

- Possible minor effect on vegetation cover and protected trees if they obstruct the use of solar panels and need to be pruned to allow sunlight through.
- Public resentment could arise if cultural and historic buildings (such as mosques) are selected as sites for PV installations.
- Additional (minor) social effects could arise from not involving and respecting the local community. For example, by using manpower from other islands or countries while local qualified manpower is available, by using community buildings without benefits going back to the community or by disregarding local opinions during the decision-making process.
- The largest expected negative impact is caused by the eventual decommissioning of the solar panels. Solar panels are listed in the Maldives as 'Special waste' due to the presence of harmful substances, and local waste regulations require that specially registered handling facilities be used for the decommissioning of installations containing such waste.
  At the moment there are no facilities in the country capable of handling large quantities of such waste. Investors are required to transport the waste linked to the decommissioning of solar panels overseas. Transporting the waste could increase environmental risks.

3.1.3 Summary of energy sector impacts

Climate change mitigation policies and projects in the Maldives have both positive and negative, intended and unintended impacts. In the medium to long term the impacts are positive and include GHG emission reductions, improved energy security and decreased financial costs from importing fossil fuels for the government and citizens.

These positive impacts are significant and outweigh the short-term negative impacts. However, the negative impacts need to be managed to enable the continued transition towards a low GHG economy.

The main negative unintended economic impacts from policies in the energy sector are the high capital costs related to installing new renewables capacity and replacing energy-inefficient systems.

The government, energy providers and energy consumers do not often have the financial capacity to upgrade existing infrastructure or invest in new systems such as PV projects. Investing in these projects would represent a fiscal opportunity cost: governments would have to decrease spending on other development priorities. Additionally if power utilities were to make the investments, the lack of domestic financing options would force them to pass on the costs of these investments in the short term. This could increase electricity bills for all consumers substantially. These costs are paid back in the short to medium term through reduced fossil fuels bills, however.

Energy, transportation, and fisheries face higher fuel costs from biofuels, which would then be passed on to all sections of the Maldivian society.

Impact assessment and formal stakeholder consultations are lacking for many policies. This could point to an insufficient understanding and management of the environmental and social impacts of the main energy policies. These topics have only been analysed in detail for the SREP investment plan, where the World Bank process requires a full environmental and social impact assessment for each project they support.

Jobs linked to the operation and maintenance of diesel generators and the import of fossil fuels and energy-inefficient installations are likely to be scaled back. However, a substantial number of jobs will also be created during the construction and operation of the energy efficiency and renewable energy projects.

Construction work for large-scale renewable projects such as wind farms could have a detrimental impact on the environment if environmental considerations are not taken into account. For example, the siting of wind farms in shallow waters could impact coral reefs and other sections of the sensitive underwater ecosystem.

However, the overall negative environmental and social impacts of energy efficiency and renewable energy projects are expected to be relatively small and manageable. The positive environmental and social impacts include increased community resilience to international fuel prices, reduced GHG emissions and health improvements due to that reduction in emissions.

3.2 Tourism sector

Some of the most relevant domestic climate change mitigation policies and projects impacting the tourism sector have been analysed under the section on impacts of energy policies and projects. These actions could have negative impacts on the tourism industry due to the cost of replacing existing infrastructure or higher initial investments related to building new resorts.

This section focuses on the potential impacts of an ETS or other global market-based mechanism (MBM) for the international aviation industry in the tourism sector. Air transport is responsible for an increasing share of all tourism and travel related GHG emissions, currently already at over 60% (UNDP, 2015).

Climate policies for international maritime transportation impact the Maldives economy as a whole, and therefore also the tourism industry, which depends on it for imports of food and fuel among others. The impacts of international maritime transportation climate change policies are therefore also analysed.

3.2.1 Economic impacts climate change policies for international aviation and maritime transportation

B. Positive impacts

The positive economic impacts of aviation and maritime transportation climate change policies are minor. According to modelling by Climate Strategies (2013) a market-based measure (MBM) on both international aviation and maritime transportation would result in small reduction of the Maldives trade deficit 10 years after implementation (0.25% change in the trade balance for a global ETS with 100% auctioning). The maritime sector MBM is estimated to increase GDP by 0.038%. That positive effect is likely due to an improvement in the trade balance.

In the context of ICAO and IMO, the revenues of the planned MBMs may be used to compensate adversely affected developing countries, potentially including the Maldives. Increased investments in CDM or similar baseline-and-credit mechanisms may also occur in the Maldives and act as a cost mitigation measure.

C. Negative impacts

The negative and unintended economic impacts of international aviation and maritime transportation policies can be summarised as:

1. Decreased numbers of tourists due to price increases for international flights

In 2009 more than 655,000 tourists visited the Maldives, of which 75% came from the EU. The GHG emissions from the international flights used by these tourists totalled 1.28 $MtCO_2e$, significantly more than the total domestic emissions of the Maldives (1.1 $MtCO_2e$). Any cost increase in international aviation due to emissions pricing (an intended impact) could potentially impact the tourism industry (an unintended impact) (BeCitizen, 2010). The question is how to identify and quantify the impacts.

Because no carbon costs have been imposed on international flights just yet, the question of what impact such costs would have are left to projections and modelling. There have as yet been no measureable impacts of carbon pricing or other climate change mitigation policies in the aviation sector.

Currently there are no MBM on international aviation that include travel to the Maldives. However, we can expect future carbon pricing for aviation to impact the costs of flights, which may deter visitors coming to the Maldives or limit their budget while in the Maldives.

A Vivid Economics report states that if carbon costs were incurred by airlines, these carbon costs would be passed through to passengers: ticket price increases would be almost equal to the carbon cost (Vivid Economics, 2007). This could in turn result in fewer journeys sold. But how many fewer? Estimations of the impacts of an inclusion of aviation into the EU ETS on long-haul tickets prices vary.

Table 6. Estimates of ticket price increases for long haul return flights

Organisation	**Estimates of ticket price increases for long haul return flight**
European Commission (2006)	7.9 € - 39.6 € (Carbon costs of 6 € and 30 € per tonne)
CE Delft (2007)	10 € - 30 € (Carbon cost of 15 € and 45 € per tonne)

Source: European Commission, 2006 and CE Delft and MVA Consultancy, 2007.

Both the European Commission and DECC impact assessments state that as a proportion of the total ticket price, these increases appear modest and would therefore have a limited impact on reducing demand. For the UK the average tickets price would increase by around 7% for a long haul flight. Note that passenger demand for a service such as international mobility is relatively unresponsive to a change in price (United Kingdom Department of Energy and Climate Change, 2010).

The International Centre for Trade and Sustainable Development (ICTSD; 2011) estimated the changes in demand for airline tickets caused by various carbon costs. This report states that the European Union level price elasticity of demand for air travel is -0.6, meaning that a 1% price

increase leads to 0,6% drop in demand. Their estimates for changes in demand are summarised in the following table:

Table 7. Expected effects of carbon pricing on ticket prices and overall demand

Allowance price	€ 10	€ 30	€ 50
Ticket price increase	1,3%	4,0%	6,5%
Percentage change in demand	-0,5%	-2,4%	-2,6%

Source: International Centre for Trade and Sustainable Development, 2011a.

International aviation is currently not covered by the EU ETS (or any other carbon pricing mechanisms), however, and allowances prices in the EU ETS are currently around 8 euros. We therefore do not expect the impacts in Table 7 to materialise in the near future. It is important to note that while Europe remains the largest market for Maldivian tourism, China and South-East Asia are catching up fast. This region is closer to the Maldives than the EU, which means that average flights for tourists visiting the Maldives are getting shorter. Shorter flights means lower potential impact from a carbon pricing mechanisms for international aviation.

Figure 4. Tourist arrivals from top 6 countries, 2013

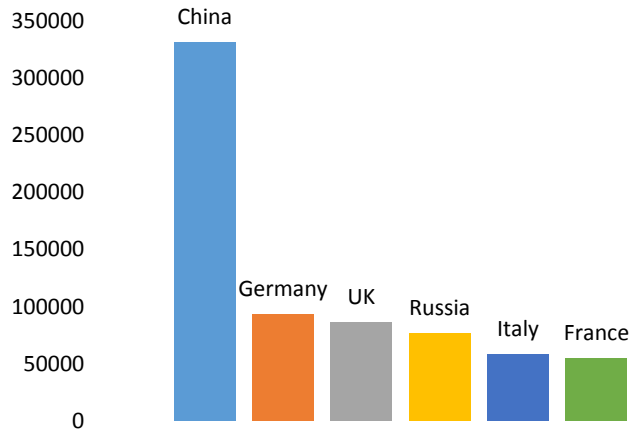
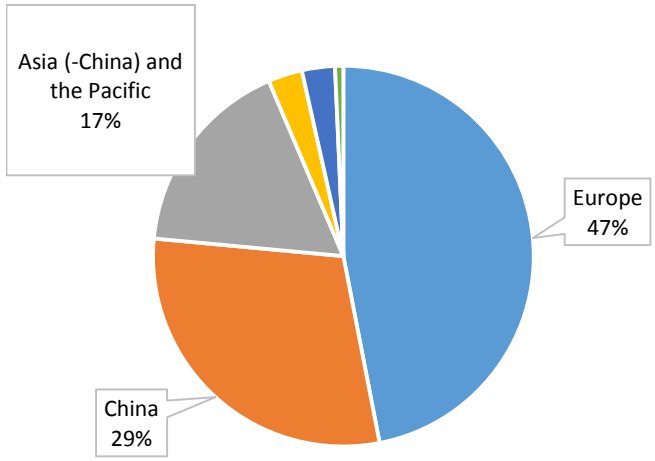


Figure 5. Regional share of tourist arrivals, 2013



Source: Ministry of Tourism, 2014.

Any impact on tourism could however have significant economic consequences for the people and economy of Maldives.

2. GDP losses due to the increased cost of shipping

Estimates of the potential impacts of global carbon pricing on international shipping also vary widely. While the internalization of GHG-emissions in international shipping has the intended impact of increasing shipping costs, it can have far-reaching unintended impacts on economies that depend on international maritime transportation for imports and exports.

One of the most comprehensive studies on the topic comes from the ICTSD (2010). The study analyses the potential impact of a levy per ton of CO_2 in the EU (for example through inclusion of shipping in the EU ETS). An EU carbon pricing mechanism would potentially lower the GDP of Small Island Developing States (SIDS) between 0.2 and 1.8% (respective carbon prices of 15 and 30 USD)

solely through reducing trade the EU and the SIDS. If this carbon pricing mechanism were to be rolled out internationally, the author states that potentially "GDP losses will be tremendous".

The Energy Efficiency Design Index and linked Ship Energy Efficiency Management Plan respectively impact large ship builders and operators of large vessels; both industries are not considered significant in the Maldives; impacts of these two IMO policies on the Maldives are therefore not especially significant for this study.

3. Combined impact of carbon pricing on international maritime and aviation

The aforementioned study by Climate Strategies (2013) assessed and modelled the combined economic impact of an MBM on both international maritime and aviation. It finds that the economic impacts of MBM for international shipping and aviation on developing countries are small overall: reductions in GDP of less than 0.01% on average, and less than 0.2% GDP for nearly all countries studied.

Countries dependent on tourism and trade (such as the Maldives) are however likely to experience greater impacts. The Maldives is one of the countries singled out for analysis in that paper. The global MBM encompassing both international aviation and shipping would have a slightly positive effect on the trade deficit in the Maldives 10 years after implementation (0.25% change in the trade balance for a global ETS with 100% auctioning).

But this would not be sufficient to mask the negative impacts of the market-based measure on the tourism sector. Decreased numbers of tourists could reduce GDP by up to 0.22%. Summing up the positive (maritime) and negative (aviation) effects leads to a GDP reduction of 0.182%.

3.2.2 Environmental and social impacts of climate change policies for aviation and international maritime transportation

There is currently little or no research into the potential environmental and social impacts of climate change policies for international aviation and maritime transportation on island nations such as the Maldives. The main environmental impact is, however, clear: GHG emission reductions in both sectors. Social impacts depend on the choice and practical implementation of climate change policies.

If the tourism sector sees a large decrease in incoming tourists, the social impacts would be wide-ranging. Job losses in the tourism sector and supplying sectors could be immense.

3.3 Conclusion

Domestic climate change policies have so far had limited observable impacts. Policies with potentially major economic impacts such as biofuels have not yet been implemented, and the timeframe for their eventual implementation is currently unclear. Renewables and energy efficiency projects have one main economic impact: upfront investment costs that could be prohibitively high.

The unintended effects of international mitigation policies could be mixed. While some studies show relatively low impacts of aviation policies on the Maldives economy, GDP could be reduced by more than 1.8% by an ETS for international shipping. However, the design of international policies would determine the exact positive and negative impacts, and could include equivalent measures that enable the Maldives to benefit. For example, an international aviation market-based measure could include the possibility to use offsets generated from projects in developing countries. This would ensure that the revenue of the MBM stays in the Maldives.

The next section discusses how these impacts are, or can be, mitigated, and the current political agenda in the Maldives for the introduction of policies to mitigate the negative impacts of national and international climate change policies.

4. Mitigation of impacts of climate change policies

While the road to a low GHG emission society is one that is accepted as necessary to combat climate change, how that transition is managed is what preoccupies many stakeholders, and will determine whether the transition is sustainable. The long-term promise of win-win may be true, but in the short term adjustments will need to be made, and a safety net put in place. This chapter is about the measures put in place to mitigate the unintended impacts of climate change policies.

That safety net should include domestic measures put in place by the government of the Maldives, as well as international cooperative agreements and tools.

This section covers three areas. First, domestic actions to mitigate the impacts of climate change policies and projects are addressed. Second, current international cooperative tools are discussed. Finally, the Maldives economic diversification strategy is analysed as the main domestic tool to improve resilience against external shocks, including international climate change policies.

4.1 Mitigating the impacts of domestic policies and projects

For some policies, there is no publically available information on how impacts will be mitigated. This is usually due the lack of identification of impacts. For example, there is no information on expected impacts and their mitigation when it comes to the energy efficiency targets mandated in the Maldives National Strategy for Sustainable Development or the low carbon development programme that is to be developed for tourist resorts.

For other policies, impacts have been clearly identified and quantified, but the management of those impacts was not addressed. The increase in fuel prices linked to a future biofuels mandate has not been sufficiently mitigated.

Additionally, some domestic policies have only been scrutinised for one or two types of impact. The Low Carbon Development Strategy includes economic impacts such as investment costs and price increases for fuels, but does not address the potential social and environmental impacts of these actions. On the other hand, the SREP ASPIRE and POISED programmes scrutinise social and environmental impacts, but do not include the assessment or management of economic impacts.

The approaches and tools for mitigating the impacts of domestic policies are analysed below.

4.1.1 Mitigation of economic impacts

The **reform of the fuel surcharge subsidy**, an indirect subsidy for electricity consumption, increased electricity costs for large electricity consumers. A recent reform of electricity subsidies in Malé increased the electricity price by an average of 35% in the capital (World Bank, 2014b). Two mitigation strategies are used to limit the impacts of this subsidy reform.

1) It was timed to take advantage of low international oil prices. This mitigated the initial impacts of the subsidy reform, and also gave consumers time to adapt to the new pricing mechanism, e.g. by investing in energy efficiency.
2) The reformed subsidy was developed to only impact a limited section of Maldivian society. Households and businesses that consume less electricity – usually lower income households and smaller businesses – saw far smaller changes in their electricity prices than larger

consumers. Electricity prices for the poorest households were left unchanged, while the largest consumers saw price increases of up to 63%.

The economic impacts of replacing diesel generation on remote islands with renewable projects and the impacts on workers currently employed to operate and maintain the existing diesel generators are also mitigated by implementing hybrid generation: renewables are supported by using the existing diesel generators as fall-back positions.

4.1.2 Mitigation of social and environmental impacts

The **SREP Investment Plan** was accompanied by an impact assessment procedure, whose results are presented in Table 4. Another part of that impact assessment dealt with the mitigation of expected and identified negative impacts of the deployment of renewable energy projects throughout the Maldives.

The various strategies to limit the negative impacts cover best managerial practices (such as waste disposal) and precautionary measures during construction (such as siting decisions). An overview can be found in Table 8 below.

The development of an Environment and Social Management Framework (ESMF) outlines preventative, control and remedial measures for potential negative environmental and social impacts. Community consultation plays a large role in identifying and mitigating such impacts. The ESMF process for each activity would consist of:

- screening for projects requiring significant environmental/social impact assessments;
- scoping to identify potential positive and negative environmental and/or social impacts on the communities and natural environment;
- determining the likely negative environmental and social impacts;
- undertaking stakeholder consultations and public disclosure;
- setting and implementing the appropriate mitigation and management measures; and
- monitoring and reporting on environmental and social parameters during the implementation of project activities.

Table 8. Mitigation measures for identified negative impacts of RE projects under SREP investment plan

Type of impact	Solar PV	Wind Energy	Waste-to-Energy
Mitigation: environmental impacts	• Proper disposal of construction waste • EPA will be developing and enforcing regulations on safe disposal of components at end of life • To minimise the social impacts, efforts need to employ Maldivians during the construction and operation stage of the projects • Proper siting decisions can help to avoid aesthetic impacts to the landscape and seascape. Siting decisions will be taken in consultation with all local stakeholders • Good construction management practices in place that reduce negative impacts to the environment • Arrangements for safe disposal of solar panels and batteries on decommissioning or replacement	• Siting of turbines to avoid areas of live coral cover and marine life. • Proper disposal of construction waste and avoiding marine spillage • Chances of bird strikes are extremely rare but may not be completely avoidable • Proper siting of the wind farms to avoid aesthetic impacts to the landscape and seascape. Siting decisions will be taken in consultation with all local stakeholders • Carrying out the work during acceptable hours of the day, contractor prepares schedule of activities and keeping public informed • Maintaining coastal vegetation belt	• Selection of site that has least impact on biodiversity and water • Best practicable technology to effectively control gaseous emissions need to implemented to control the air quality • Effective storage mechanism that addresses ground water contamination, odour, etc. • Acceptable disposal site in place for ash disposal • Good construction management practices in place that reduces negative impacts to the environment • Management of fly ash
Mitigation: social impacts	• Maintaining site cleanliness during construction • Carrying out the work during acceptable hours of the day, contractor prepares schedule of activities and keeping public informed • Equipment and machinery kept in good condition in meeting acceptable noise standards • Public complains registration	• Place wind turbines away from the community as much as possible • Replacement of lost assets	• Construction site fencing • Careful management of site operations

Source: Climate Investment Funds, 2012.

The **Accelerating Sustainable Private Investment for Renewable Energy (ASPIRE) and Preparing Outer Islands for Sustainable Energy Development (POISED) programmes** (two sub-programmes of the SREP) include a detailed Environment and Social Management Framework. As they are very similar, we will focus on the ASPIRE Environmental and Social Management Framework which wasput in place to minimise potential negative environmental and social impacts. This was done by outlining the process used to identify negative impacts at a project-level and provides guidelines for:

- preparing the environmental and social mitigation plans to address adverse impacts and
- describing the implementation and institutional arrangements for managing environmental and social impacts.

A grievance mechanism is also foreseen in the case of unexpected impacts. The Framework refers to World Bank performance standards for private developers as the benchmark for safeguarding the environment and society in the Maldives from possible negative impacts from PV installations. As an example it ensures an environmental and social management system and appropriate stakeholder engagement are concluded before the investors start construction.

The World Bank has Safeguard Policies that ensure that World Bank operations do not harm either people or the environment (such as an Environmental Assessment). These safeguards are translated into operational procedures that World Bank staff and partners (in this case private investors) must follow. The specific role and responsibilities of the private partner are further described in eight 'performance standards'. For illustration, performance standard no. 3 states:

1) avoid or minimise adverse impacts on human health and environment by avoiding or minimising pollution from project activities
2) promote more sustainable use of resources, including energy and water
3) reduce project-related GHG emissions

This framework ensures that environmental and social impacts are identified before the project is started and are suitably tackled. In order to demonstrate this, the Environment and Social Management Framework includes a list of potential impacts (discussed under section 3) and a list of indicative mitigation measures. These mitigation measures span the lifetime of the project, from pre-construction to waste disposal after decommissioning. Table 9 provides a summary of the most important mitigation measures.

Table 9. Mitigation measures for environmental and social impacts PV projects under ASPIRE programme

Impact	Pre-construction phase	Construction phase	Operation and Maintenance phase
Air emissions	Identify suppliers that have products that comply with ISO or other industry best practices standards	/	/
Noise emissions	/	- Undertake installation activities only during daytime - Inform neighbours about schedule	Undertake maintenance work only during daytime
Chemicals	Identify suppliers that have products, particularly solar panels and inverters, which comply with ISO or other industry best practices standards	/	For decommissioning: see waste disposal. If the roof is used for rainwater harvesting: frequents checks for damage are necessary.
Cultural heritage	Avoid selecting culturally or religiously sensitive sites for the project	/	/
Social conflicts	- Ensure fair competition by creating a level playing field - Ensure access to information and transparency in decisions - Undertake public consultation and information dissemination - Establish and create awareness on grievance redress procedure	Create awareness on grievance redress procedure	Same as construction phase
Employment	Train local workers, wherever possible	Wherever possible, use local labour for installation, particularly in outer installations	Same as construction phase
Waste disposal	Identify suppliers that have products which comply with ISO or other industry best practices standards	Dispose of packaging and construction waste properly at approved waste management sites using registered transport facilities. This waste should not be treated as domestic waste.	- Have a temporary storage facility that can contain the waste until disposed - Enter into contract with an overseas recycling facility or waste disposal facility capable of handling solar panel waste

Source: Ministry of Environment and Energy, 2014a.

4.1.3 Conclusion on domestic mitigation of impacts

Impact assessments are often lacking during the drafting of climate change mitigation policies in the Maldives, therefore it is also considered that there is a lack of identification of potential impacts and linked options to mitigate those impacts.

On the domestic level some of the main social and environmental impacts that were identified can be mitigated, usually during the planning stage of the projects discussed. The identification and mitigation of these impacts was however largely due to 1) the fact that they were mandated by international donors, 2) a recently developed project-level Maldivian Environmental Impact Assessment procedure. Job losses in the logistics sector linked to fossil fuel imports and the operation of diesel generation are not sufficiently addressed.

Biofuels are estimated to increase fuel prices throughout the Maldivian economy and society, but these impacts are neither sufficiently identified, not mitigated. The major economic cost impact of energy efficiency and RE projects is also not tackled by domestic mitigation policies, but international tools do help to resolve this issue.

4.2 Mitigating the impacts of international policies

The two policies with the largest expected impacts on the Maldives are only in their incipient phases. International aviation is included in a limited fashion in the EU ETS, and the ICAO market-based measures are only set for implementation by 2020. GHG mitigation policies for the international maritime sector are also largely in the pipeline. Because these IMO and ICAO policies are yet to be developed, their impacts and their approach to managing those impacts remains unclear.

However, it is likely that market-based measures for both international aviation and maritime transportation will include *de minimis* thresholds. This would exclude small operators, developing countries and/or countries with a low share of global aviation and maritime emissions or activities. This would not only limit the complexity of the measures, but also serve to mitigate the impacts on developing countries such as the Maldives.

This section therefore analyses the international cooperative tools that are used in the Maldives to limit and manage the impacts of domestic and international policies.

4.2.1 International cooperative tools

The most significant impact of most RE and energy efficiency projects is the price tag attached to the necessary investments. Investing in these projects would represent a fiscal opportunity cost: governments would have to decrease spending on other development priorities. Additionally, if power utilities were to make the investments, the lack of domestic financing options would force them to pass on the costs of these investments in the short term. This impact is mitigated through the international support and financing for these projects, especially in the field of RE deployment. For example the SREP Investment Plan is a tool to mitigate the inability of private and public actors in the Maldives to finance large-scale RE projects. This is done through guarantees to international investors and support (both financial and technical) for projects in their development phase.

The SREP includes a preparation grant, initial funding and co-financing of 137 million USD from the World Bank Group and the Asian Development Bank. This leveraged private finance from the European Investment Bank, Inter-American Development Bank, the African Development Bank, the Islamic Investment Bank and the Abu Dhabi Fund. Commitments include grants and concessional

loans. Total funding exceeded 200 million USD by mid-2015, three years after the initial launch (Ministry of Environment and Energy, 2015a).

The ASPIRE sub-programme also aims to help relieve the lack of domestic and governmental financial capacity by leveraging private sector finance with World Bank guarantees offered to investors (totalling 16 million USD). It addresses barriers to finance, such as high-risk investment due to high capital costs and repatriation of profits, limited local familiarity with the technology and the small scale of power distribution and dispersed investment projects that make reaching economies of scale and private financing difficult.

ASPIRE is designed to promote private sector investments totalling between 40 and 70 million USD, which should lead to an addition of at least 20 MW of PV capacity (World Bank, 2014d). The project is also meant to catalyse investments outside the programme itself by creating an enabling environment and helping stakeholders gain experience; it is hoped that this will generate an additional 60-85 million USD in investments and 35-50 MW in PV capacity beyond the programme life (Ministry of Environment and Energy, 2014a).

Renewable energy and energy efficiency projects on resort and remote islands are also deterred by investment costs. The Maldives government is currently launching a tool to mitigate that: the proposed Maldives Green Fund. This fund would integrate all environmental and energy investments (both from domestic and foreign actors), and it is mainly aimed at relieving the government of the burden of these investments. Financing for energy efficiency, waste management and RE projects (among others) would be reviewed on a case-by-case basis.

The Maldives Green Fund would be funded through a combination of:

- Foreign development aid
- Tourism taxes, such as eco-taxes for all visitors and access fees for protected natural areas
- Levies from RE projects
- Polluter pays taxes (though this is explicitly a longer term goal and still needs to be developed in depth)

Between 2011 and July 2013 the Maldives received grants totalling over 51.5 million USD from multilateral donors (with an additional 21 million is co-financing that was to be committed before the end of 2013) and 17.4 million USD from bilateral donors solely for climate change mitigation activities.

Loans and concessionary finance for mitigation activities, financing for adaptation and capacity-building in the climate change field were estimated to be at least another 50.6 million USD (Transparency, 2013). Table 10 gives an overview of all grants from multilateral and bilateral donors over the 2009-2015 period for climate change mitigation. This includes project design, capacity-building and project development.

Table 10. Total multilateral and bilateral funding for climate change mitigation activities in the Maldives, for projects active between 2009-2015

Type of funding	Donor	Project name	Amount
Multilateral donors	World Bank	Maldives Climate Change Trust fund	8,489,650 USD
	Climate Investment Funds	SREP	30,000,000 USD
	Global Environment Facility	Preparation phase strengthening low carbon energy strategy	3,953,000 USD
		Preparation Second National Communication to UNFCCC	500,000 USD
	Asian Development Bank	Energy Regulatory Technical Assistance	400,000 USD
		Preparing outer islands for sustainable energy development	6,000,000 USD
	Multilateral Fund for the Implementation of the Montreal Protocol	HCFC Phase Out Management Plant	2,200,000 USD
Bilateral donors	Japan International Cooperation Agency	Project for Clean Energy Promotion in Malé	11,100,000 USD
	Danida	DANIDA Green Facility Phase 2	234,000 USD
	Agence Française de Développement	Maldives mapping and climate change	2,060,000 USD
	Germany ICI	Supporting the carbon neutral strategy of the Maldives	4,047,000 USD

Source: Transparency Maldives, 2013.

Total grants in the field of climate change mitigation equalled nearly 69 million USD for projects active between 2011 and 2013. Updated figures for the period 2014-2015 are currently not available. This significant sum (more than 2% of Maldives GDP in 2013) shows that the Maldives has been capable of attracting international donors in order to finance climate change policies and limit the impacts of mitigation policies on the government budget. However, note that priorities set by the government of the Maldives do not always coincide with conditions attached to the donor assistance.

The Maldives has been very active in utilising the Capacity Building Framework so far, and has registered 35 activities under this framework since 2005. Most of these activities pertain to capacity-building for reporting under various conventions, including the establishment of the second national communication to the UNFCCC, the assessment for implementation of various climate change mitigation policies and projects and assessing the possibilities for adaptation

The following possibilities under the umbrella of the UNFCCC remain to be further exploited by the Maldives in the near future:

- Technology mechanism
- Green Climate Fund
- Adaptation Fund

Taking into account its development aid record so far, it is to be expected that the Maldives will be able to successfully apply for projects under these various frameworks. Under the Adaptation Fund, one project, i.e. *Increasing climate resilience through an Integrated Water Resource Management Programme in HA. Ihavandhoo, ADh. Mahibadhoo and GDh. Gadhdhoo Island*, has already been approved by the AF Board. The UNDP is the Multilateral Implementing Entity for this project.

Other issues to bear in mind include the future and direction of the technology mechanism. Much will also depend on the pace of international negotiations in and beyond Paris, notably related to climate finance promised by developed countries to assist developing countries in the low GHG transition.

At the UNFCCC level there is a commitment by Parties to consider the adverse impacts of climate change policies and projects (also known as 'response measures'), especially for developing counties. The Kyoto Protocol includes a promise to strive to minimise the adverse economic, social and environmental impacts of climate change mitigation policies on other Parties, especially developing countries. However, there has been considerable debate on how to implement this.

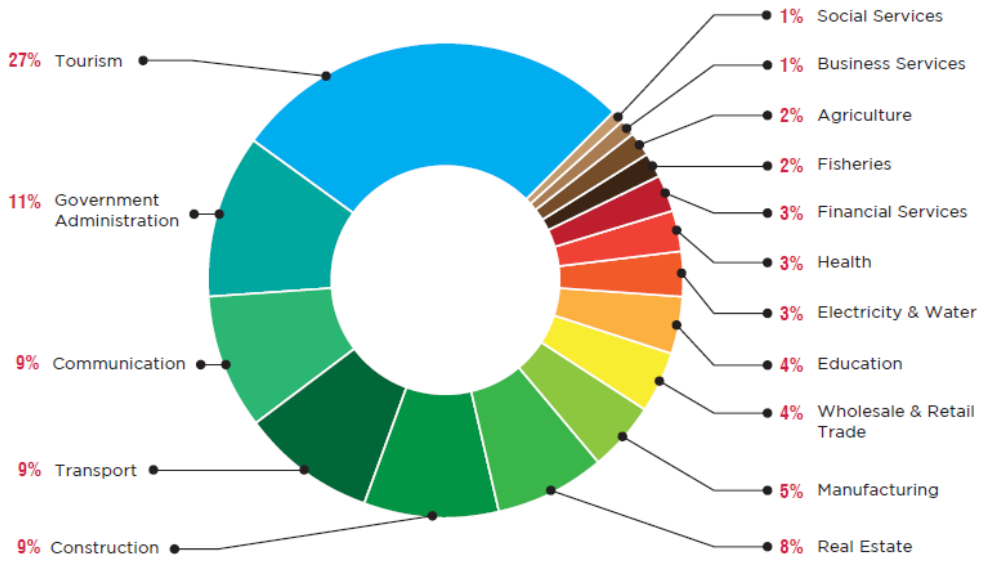
In response to the lack of information on response measures, a forum to discuss response measures was established at COP 17 in Durban. This forum is a joint agenda programme of both the subsidiary bodies, and has the specific goal of improving the understanding of the negative impacts of climate change mitigation policies and projects. However, the progress achieved through this forum has been limited. There is a discussion ongoing on the continuation of the forum; while Parties have expressed support for the continuation, the forum is currently in a grey zone. Progress on this topic is expected during COP21 in Paris.

4.2.2 Economic diversification

Economic diversification is one of the main domestic tools the Maldives government is using to reduce its vulnerability to external shocks. Such shocks include natural disasters, international macroeconomic developments (e.g. oil prices and international economic crises), but also domestic and international climate change policies that could affect the largest sectors of the Maldivian economy: the tourism sector, the energy sector, the transportation and the fisheries sectors.

As discussed in section 1, the tourism industry is the main contributing sector to the Maldives economy (see Figure 6). However, it is extremely vulnerable to external shocks such as the Asian Tsunami and the international financial crisis. As discussed in section 3, it could also be vulnerable to climate change policies. It is sensitive to the potential carbon costs related to the international aviation sector as well as IMO regulation for maritime transportation, and is highly dependent on fossil fuels for energy and transportation of goods and tourists.

Figure 6. Percentage shares of GDP by sectors 2012 (at 2003 constant prices)



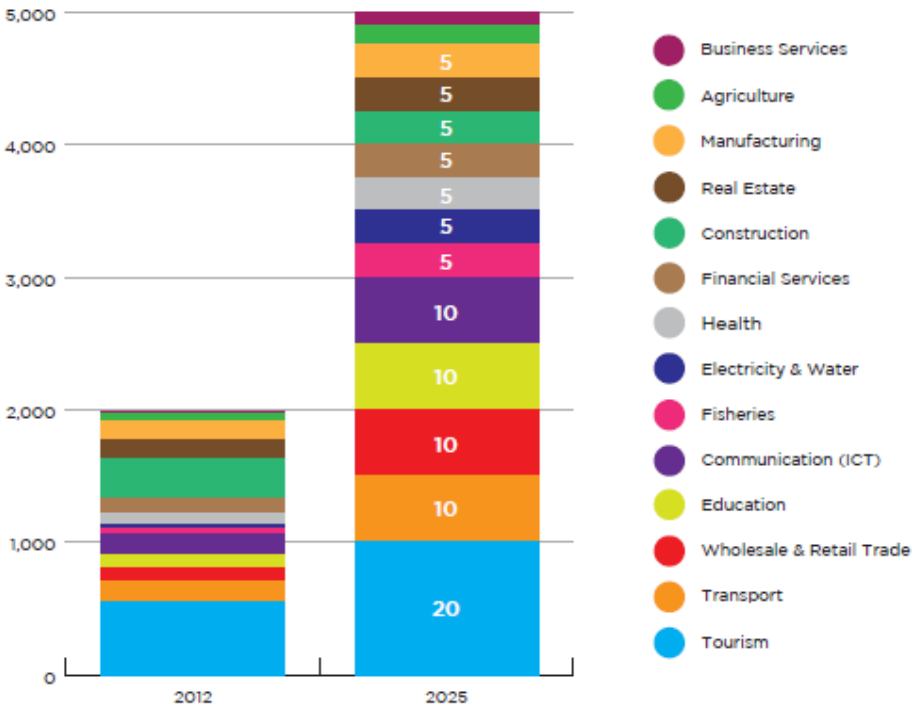
Source: Maldives Ministry of Economic Development, 2013.

The action plan to diversify the economy of the Maldives includes a number of components. Its first goal is to develop sectors other than the tourism industry faster so at least five sectors of the economy reach the threshold of 10% share of GDP by 2025 (see Figure 7).

Additionally, it seeks to become a high-income country with a broad export-based economy in contrast to the current dependence on the tourism and fisheries sectors. Using its unique geographic location transportation services would become an export.

These services include the creation of an operation hub for international and floatplane aviation, transhipment facilities and fuel bunkering. This would, however, necessitate investment in infrastructure such as extending port facilities. Higher education could also become an export, but human capital improvements need to be made in order to compete with regional players such as India. The tourism industry itself could also be diversified by developing more yacht and cruise tourism.

Figure 7. Target 2.1 of the Maldives Economic Diversification Strategy: Increasing the number of export sectors that have double-digit share in GDP by more than 5 by 2025



Source: Maldives Ministry of Economic Development, 2013.

On the environmental side the focus is on two sectors: energy and fisheries. Investing in renewable energy would decrease the dependence on imported fuels, ensure energy security and ensure competitiveness of domestic industries (such as fisheries). The export value of fisheries products should also be maximised to ensure sustainable fisheries (especially of tuna), prioritising the production of value-added products and making greater use of the large maritime exclusive economic zone.

4.3 Conclusion on mitigation of impacts

The Maldives currently has a limited history of impacts from climate change policies. Data on the impacts of already operational policies and projects are often unavailable as formal impact assessments are lacking and the identification of impacts is not yet a mainstream concern. The main negative economic impacts of domestic climate change mitigation projects that need to be managed during the transition to a low GHG economy are the higher fuel costs caused by biofuels and the short-term investment costs associated with energy efficiency and renewable energy projects. The latter impact is to some extent alleviated through the use of international donor funding, which limits cost impacts on government and private budgets.

International climate change mitigation projects do however require impact assessment, and the smaller social and environmental impacts of domestic mitigation policies can be reduced through managerial practices and precautionary measures during construction.

International policies, especially market-based measures for the aviation and maritime transportation sectors, are expected to have small, yet significant, impacts. International tools to mitigate those impacts are currently lacking, although the details of such market-based measures

could include measures to mitigate the negative impacts, especially for developing and vulnerable countries.

The Maldives government has launched an ambitious strategy to diversify the economy away from its dependence on the tourism industry. This economic diversification strategy would reduce the vulnerability of the Maldivian economy to a wide variety of international and domestic shocks, including climate change policies.

5. Conclusion

Climate change policies have so far had limited observable impacts. Policies with potentially major unintended economic impacts such as biofuels have not yet been implemented, and the timeframe for their eventual implementation is currently unclear. Renewables and energy efficiency projects have one main short term economic impact: upfront investment costs. This impact is mitigated through the use of international donor funding. In the longer term these project will, however, lead to significant savings through reduced imports of fossil fuels.

While not all the unintended negative impacts of domestic policies were mitigated, several individual flanking measures were put in place to mitigate the impacts of policies and projects.

However, there is a lack of domestic capacity to perform impact assessments for each domestic policy and project to identify and manage impacts *ex ante.* Formal impact assessments are lacking and the identification of impacts is not yet a mainstream concern. Additionally the Maldives does not currently approach the *ex post* monitoring of negative impacts in a comprehensive or systemic way.

International policies, especially market-based measures for the aviation and maritime transportation sectors are yet to be implemented. They are expected to have small, yet significant, impacts. International tools to mitigate those impacts are currently lacking. But their impacts can be mitigated *ex ante*, for instance by insisting that *de minimis* thresholds be included in upcoming legislation or regulation, in order to exclude countries with minor aviation activities, or developing countries. Alternatively, an international aviation market-based measure could include the possibility to use offsets generated from projects in developing countries. This would ensure that the revenue of the MBM stays in the Maldives.

The Maldives government has launched an ambitious strategy to diversify the economy away from its dependence on the tourism industry. This economic diversification strategy would reduce the vulnerability of the Maldivian economy to a wide variety of international and domestic shocks, including climate change policies.

Flanking policies and tools are present at two levels: policy-specific and economy-wide. International tools focus on finance and capacity building. It is clear, however, that the development of more comprehensive domestic and international tools, including monitoring tools, is needed.

Bibliography

AF-Mercados EMI (2013), “Regional technical assistance (TA 7950-REG) for smartgrid capacity development – Solar PV Integration in Maldives, Phase 1 Report”, prepared for the Maldives Energy Authority and the Asian Development Bank, (www.academia.edu/2714268/Solar_PV_Integration_in_Maldives_Power_System_Mercados_Report_)

Asian Development Bank (2014a), “Interim Country Partnership Strategic – Maldives 2014-2015”, Malé.

Asian Development Bank (2014b), “Interim Country Partnership Strategic – Maldives 2014-2015, Sector Assessment (summary): Energy”, Malé.

BeCitizen (2010), “The Maldives’ 2009 Carbon Audit”, written for the President’s Office of the Maldives and the Ministry of Housing and Environment, Malé.

Caribbean Tourism Organisation (2010), “The Impact of Air Passenger Duty And Possible Alternatives for the Caribbean”.

Caribbean Tourism Organisation (2011), “Caribbean Response to the UK Government’s Consultation on Reform of Air Passenger Duty”.

CE Delft and MVA Consultancy (2007), "Implications of EU Emission Trading Scheme for Competition Between EU and Non-EU Airlines", Draft Final Report for Directorate General for Transport and Civil Aviation, November.

Central Intelligence Agency (2015), "The World Factbook: Maldives" (www.cia.gov/library/publications/the-world-factbook/geos/mv.html).

Climate Investment Funds (2012), “Proposed Decision for Investment Plan for Maldives”, presented at the meeting of the SREP Sub Committee, October 31 2012, Istanbul, Turkey

Climate Strategies (2013), "Research to assess impacts on developing countries of measures to address emissions in the international aviation and shipping sectors", Final report and annex 6, case study on the Maldives, 6 February.

European Commission (2006), Commission Staff Working Document - Accompanying document to the Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community: Summary of the Impact Assessment, {COM(2006) 818 final SEC(2006) 1684}.

European Commission (2009), Directive 2009/29/EC of the European Parliament and of the Council, of 23 April 2009, amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community.

European Commission (2010), Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010L0075&from=EN).

European Commission (2013a), Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee: and the Committee of the Regions: Integrating maritime transport emissions in the EU’s GHG reduction policies (http://ec.europa.eu/clima/policies/transport/shipping/docs/com_2013_479_en.pdf).

European Commission (2013b), “Time for international action on CO_2 emissions from shipping”, DG CLIMA (http://ec.europa.eu/clima/policies/transport/shipping/docs/marine_transport_en.pdf).

European Commission (2013c), Commission recommendations of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations (2013/179/EU).

European Commission (2014), “ICAO progress on global Market-based Measures and international MRV”, presentation by Sceponaviciute R., DG CLIMA (http://ec.europa.eu/clima/events/docs/0100/cc1_22_en.pdf).

European Union (2015a), Regulation (EU) 2015/757 of the European Parliament and of the Council of 29 April 2015 on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport, and amending Directive 2009/16/EC, (http://eur-lex.europa.eu/legal-content/EN/TXT /PDF/?uri=CELEX:32015R0757&from=EN).

European Commission (2015b), “Reducing emissions from aviation”, DG CLIMA factsheet on aviation (http://ec.europa.eu/clima/policies/transport/aviation/index_en.htm).

Faber, J. and Brinke, L. (2011), “The Inclusion of Aviation in the EU Emissions Trading System An Economic and Environmental Assessment”, Issue Paper No. 5, published by the International Centre for Trade and Sustainable Development, Geneva.

Global Environment Facility (2013), “Maldives and the GEF”, (www.thegef.org/gef/sites/thegef.org/files/publication/Maldives%20-%20Fact%20Sheet%20-%20Feb2013_EN.pdf).

Global Environment Facility and United Nations Development Programme (2013), “Increasing Climate Change Resilience of Maldives through Adaptation in the Tourism Sector (TAP): Gaps and Disincentives that Exist in the Policies, Laws and Regulations which Act as Barriers to Investing in Climate Change Adaptationin the Tourism Sector of the Maldives”, Malé.

ICF International (2014), “Independent Evaluation of the Climate Investment Funds”, Washington, DC: World Bank (http://ieg.worldbank.org/Data/reports/cif_eval_final.pdf).

International Centre for Trade and Sustainable Development (2010), “International Transport, Climate Change and Trade: What are the Options for Regulating Emissions from Aviation and Shipping and what will be their Impact on Trade?”, Background Paper, Geneve.

International Centre for Trade and Sustainable Development (2011a), “The Inclusion of Aviation in the EU Emissions Trading System An Economic and Environmental Assessment”, Geneve.

International Centre for Trade and Sustainable Development (2011b), “Submission: Information and views relating to modalities for the operationalization of a work programme and possible forum on response measures”, Submission to the UNFCCC.

International Centre for Trade and Sustainable Development (2014), “Submission: Views and options to strengthen opportunities for cooperation and collaboration among Parties related to the forum and work programme on the impact of the implementation of response measures”, Submission to the UNFCCC.

International Civil Aviation Organization (2007), Assembly Resolutions in Force as of 28 September 2007, (http://www.icao.int/environmental-protection/Documents/A36_Res22.pdf).

International Civil Aviation Organization (2013a), Report of the Assessment of Market-based Measures, (http://www.icao.int/Meetings/GLADs-2015/Documents/10018_cons_en.pdf).

International Civil Aviation Organization (2013b), "Consolidated Statement of Continuing ICAO Policies and Practices Related to Environmental Protection - Climate Change, A38-WP/34".

International Civil Aviation Organization (2013c), Assembly Resolutions in Force as of 4 October 2013.

International Civil Aviation Organization (2013d), "Report of the Executive Committee on Agenda Item 17 Section on Climate Change", ICAO Assembly 38th Section (http://www.icao.int/Meetings/a38/Documents/WP/wp430_en.pdf).

International Civil Aviation Organization (2015a), "An introduction to market-based measures (MBMs)", presentation to ICAO Seminars on International Aviation and Environment and States' Action Plans in Warsaw, 18-20 March 2015, (http://www.icao.int/Meetings/EnvironmentalWorkshops /Documents/2015-Warsaw/).

International Civil Aviation Organization (2015b), "Emissions Trading System", ICAO factsheet on Emissions Trading System, (http://www.icao.int/environmental-protection/Pages /EmissionsTrading.aspx).

International Civil Aviation Organization (2015)c, "Market-Based Measures", ICAO factsheet on Market-Based Measures, (http://www.icao.int/environmental-protection/Pages/market-based-measures.aspx).

International Emissions Trading Association (2015d), "Overlapping Policies with the EU ETS".

International Maritime Organisation (1973), International Convention for the Prevention of Pollution from Ships – MARPOL), London.

International Maritime Organisation (1997), Amendments to the Annex of the protocol of 1997 to amend the International Convention for the Prevention of Pollution from ships, 1973, as modified by the protocol of 1978 relating thereto (inclusion of regulations on energy efficiency for ships in MARPOL Annex VI) MEPC 62/24/Add 1, Annex 19.

International Maritime Organisation (2011a), "Reduction of GHG emissions from ships: Report of the third Intersessional Meeting of the working group on greenhouse gas emissions from shops. Note by the Secretariat", Agenda item 5, Marine Environment Protection Committee, April.

International Maritime Organisation (2011b), MARPOL Annex VI Prevention of Air Pollution from Ships.

International Maritime Organisation (2011c), "Main events in IMO's work on limitation and reduction of greenhouse gas emissions from international shipping", October.

International Maritime Organisation (2015a), "Third IMO GHG Study 2014", (http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/Third%20Greenhouse%20Gas%20Study/GHG3%20Executive%20Summary%20and%20Report.pdf).

International Maritime Organization (2015b), "Energy Efficiency Design Index – rational, safe and effective", IMO factsheet, (http://www.imo.org/en/MediaCentre/HotTopics/GHG/Pages/EEDI.aspx).

International Maritime Organization (2015c), “Energy Efficiency Measures”, IMO factsheet on EEDI and SEEMP, (http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Technical-and-Operational-Measures.aspx).

International Maritime Organization (2015d), “Market-Based Measures”, IMO factsheet on Market-Based Measures, (http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Market-Based-Measures.aspx).

Lloyd's Register and DNV (2011), “Estimated CO2 emission reduction from introduction of mandatory technical and operational energy efficiency measures for ships”, study carried out by for IMO and 4th IPCC Assessment Report.

Maldives Green Fund (2014), “Maldives Green Fund – Draft outline of the Fund”, presentation.

Ministry of Economic Development (2013), Maldives Economic Diversification Strategy, Malé.

Ministry of Environment, Energy and Water (2006), National Adaptation Programme of Action, Malé.

Ministry of Environment and Energy (2009), National Strategy for Sustainable Development, Malé.

Ministry of Environment and Energy (2012a), Maldives Scaling-Up Renewable Energy Programme Investment Plan 2013-2017, Malé.

Ministry of Environment and Energy (2012b), SREP Investment Plan – Republic of the Maldives, (http://co2.org/wp-content/uploads/2012/12/Maldives-SREP-last-version-from-MM.pdf).

Ministry of Environment and Energy (2013a), “Challenges and opportunities in connecting solar power into grid systems in the Maldives”, presentation by Ali A., for the Asia Solar Energy Forum, Tashkent.

Ministry of Environment and Energy (2013b), “Maldives Green Fund”, presentation, Malé.

Ministry of Environment and Energy (2014a), Environment and social management framework for the proposed solar PV projects under accelerating sustainable private investment for renewable energy (ASPIRE) programme, prepared by Shaig, A. for CDE Consulting, Malé

Ministry of Environment and Energy (2014b), “Maldives Energy Sector Strategic Action Plan 2014-2018”, draft legislation, Malé.

Ministry of Environment and Energy (2015a), “Accelerating Sustainable Private Investments in Renewable Energy (ASPIRE) Project launched today”, News bulletin from Maldives Ministry of Environment and Energy, Malé (www.environment.gov.mv/v1/news/accelerating-sustainable-private-investments-in-renewable-energy-aspire-project-launched-today/).

Ministry of Environment and Energy (2015b), Maldives Climate Change Policy Framework, Malé.

Ministry of Environment and Energy (2015c), “Climate Change Mitigation and Impact on Tourism”, presentation by Shareef, A. for the International Experts Workshop on Carbon Management and its Implications, 29-30 April, Saudi-Arabia.

Ministry of Environment and Energy, and United Nations Environment Programme (2009), Maldives National Strategy for Sustainable Development, Malé.

Ministry of Foreign Affairs (2009), “Maldives – Climate Change, Enhanced action on financing to support adaptation, mitigation and technology transfer”, presentation at ECOFIN Joint Working Group on International Financing for Climate Action, by McMullan, P., Brussels.

Ministry of Finance and Treasury (2012) “Household Income and Expenditure Survey – Findings 2009/2010”, Department of National Planning, Malé (http://planning.gov.mv/hies/HIES2012/FINAL%20HIES%20REPORT%20april%202012.pdf).

Ministry of Finance and Treasury (2013), “Maldives Statistical Yearbook”, Department of National Planning, (http://planning.gov.mv/yearbook2013/yearbook.html)

Ministry of Finance and Treasury (2014), “Maldives at a Glance – March 2014”, Department of National Planning, (www.statisticsmaldives.gov.mv/uploads/MAG-2014-03(2015-02-19).pdf)

Ministry of Finance and Treasury (2015), data received on customs data 2006-2012 via Ministry of Environment and Energy, received on June 16.

Ministry of Finance and Treasury and the United Nations Development Programme in the Maldives (2014), “Maldives Human Development Report 2014, Bridging The Divide: Addressing Vulnerability, Reducing Inequality”, Malé.

Ministry of Home Affairs, Housing and Environment (2001), First National Communication of the Republic of Maldives to the United Nations Framework Convention on Climate Change, Malé.

Ministry of Housing, Transport and Environment (1993), Environment Protection and Preservation Act of the Maldives, Malé.

Ministry of Housing, Transport and Environment (2009), “Maldives National Strategy for Sustainable Development”, Presentation at Final NSDS Workshop, 10th to 12th September 2009, Thailand.

Ministry of Housing and Environment (2010), Maldives National Energy Policy and Strategy, Malé.

Ministry of Housing, Transport and Environment and United Nations Environmental Programme (2008), Third National Environment Action Plan, Malé.

Ministry of Tourism (2014), “Tourism Yearbook 2014”, Malé.

Ministry of Tourism (2015), data received on yearly tourist arrivals via Ministry of Environment and Energy, received on April 9.

Ministry of Tourism, Arts and Culture (2012), “Maldives Destination Development Strategies Towards Green Tourism”, presentation for UNWTO High-Level Regional Conference on Green Tourism, 3 May 2012, by Hassan, M.Z., Thailand.

Ministry of Tourism, Arts and Culture (2013), Fourth Tourism Master Plan 2013-2017, Volume 1 and 2, Malé.

Minivan News (2014), “It’s cool at 25: environment ministry launches energy saving campaign”, by Naish, A., October 23, 2014, (http://minivannewsarchive.com/environment/its-cool-at-25-environment-ministry-launches-energy-saving-campaign-90584#sthash.qKWFYpy1.aiHysgIP.dpbs)

National Social Protection Agency (2013) “Summary Findings Electricity Reform Options (Based on data from month of Dec 2012)”, Malé.

Read, R. (2010), “Trade, Economic Vulnerability, Resilience and the Implications of Climate Change in Small Island and Littoral Developing Economies”, Issue Paper No. 12, Department of Economics, Management School, Lancaster University, published by the International Centre for Trade and Sustainable Development, Geneva.

Small Island Developing States (2007), Male’ Declaration on the Human Dimension of Global Climate Change, signed 14 November 2007, Malé.

Small Islands Developing States Network (2015), (www.sids2014.org/index.php?menu=1605).

Snyder, J. (2015), “EPA Plan to Cut Airplane Emissions Won’t Take Effect Until 2018”, *Bloomberg*, 11 June.

Transparency Maldives (2012a), “General Policy Brief: Maldives Green Fund”, Malé.

Transparency Maldives (2012b), “Climate Governance Integrity – Mapping of Climate Finance”, Malé.

Transparency Maldives (2013), “An Assessment of Climate Finance Governance in Maldives”, Malé (http://transparency.mv/wp-content/uploads/2013/12/ASSESSMENT-OF-CLIMATE-FINANCE-IN-MALDIVES.pdf).

United Kingdom Department of Energy and Climate Change (2010), “Government Response to Consultation on Second Stage Transposition of EU Directive (2008/101/EC) to include Aviation in the European Union Emissions Trading System (EU ETS), 10 August.

United Kingdom Department of Energy and Climate Change (2011), “Impact Assessment of Second Stage Transposition of EU Legislation to include Aviation in the European Union Emissions Trading System (EU ETS), IA No: DECC0002”.

United Nations Development Programme (2013), “Maldives Fast Facts”.

United Nationals Development Programme (2015), “Climate Change – Tourism: Economic Impact of Mitigation and Resilience”, presentation by Tamim M., for the International Experts Workshop on Carbon Management and its Implications, 29-30 April, Saudi-Arabia.

United Nations Development Programme Risø Centre and Ministry of Environment and Energy (2014), “Maldives Low Carbon Development Strategy”, Joergen Fenhann from UNEP Risoe Centre (URC) and Marianne Ramlau consultant to URC, Malé.

United Nations Environment Programme (2011), “Towards a green economy: Enabling Conditions supporting the transition to a global green economy”.

United Nations Environment Programme DTU Partnership (2015), “Transformational change for low carbon and sustainable development”.

United Nations Framework Convention on Climate Change (2014), “Synthesis paper on the work of the forum on the impact of the implementation of response measures – Note by the secretariat”, synthesis paper to the SBSTA and the SBI, November 4.

Vivid Economic (2007), "A Study to Estimate Ticket Price Changes for Aviation in the EU ETS", A report for Defra and DfT, Defra, November.

Wold, C., Gourlie, D. and Schusser, AM; (2014), “Climate Change, International Trade, and Response Measures: Options for Mitigating Climate Change Without Harming Developing Country

Economies", Lewis and Clark Law School J.D (http://docs.law.gwu.edu/stdg/gwilr/PDFs/46-3/2%20Wold.pdf).

World Bank (2011), "Scaling-up Renewable Energy Program for Low Income Countries (SREP), Scoping Mission January 24-27, 2011", aide-mémoire after scoping mission, Malé.

World Bank (2013), "Sustainability, Efficiency and Equity of Electricity Subsidies in Maldives. Where do we stand and options moving forward", presentation by Silvia Redaelli.

World Bank (2014a), "Maldives Accelerating Sustainable Private Investments in Renewable Energy Program - Project Information Document Appraisal Stage", World Bank Project Information Document Report Number AB 7462 (www-wds.worldbank.org/external/default/WDSContentServer /WDSP/IB/2014/04/16/000414397_20140417180226/Rendered/PDF/Appraisal0Stag08200Approved0by0CD0.pdf).

World Bank (2014b), "International Development Association Project Appraisal Document on a Proposed Series of IDA Guarantees in the amount of SDR 10.325 million (US$16 million equivalent) and a proposed grant from the scaling-up renewable energy program in low income countries (SREP) of the strategic climate fund on the amount of SDR 7.540 million (US$11.684 million equivalent) to the Republic of Maldives for an Accelerating Sustainable Private Investment in Renewable Energy (ASPIRE) Project", Washington.

World Bank (2014c), "Maldives: Country Snapshot", Washington, DC (www.worldbank.org/content/dam/Worldbank/document/SAR/maldives-country-snapshot-spring-2014.pdf).

World Bank (2014d), "World Bank Supports Maldives to Leverage Private Investments to Scale Up Renewable Energy Program" (www.worldbank.org/en/news/press-release/2014/07/17/maldives-private-investments-scale-up-renewable-energy-program).

World Bank (2015a), "World Development Indicators Database Archives" (http://databank.worldbank.org).

World Bank (2015b), "Maldives: Climate Change Adaptation Project Process Framework for Regulated Access to Designated Protected Area in Fuvamulla and Hithadoo Islands" (www-wds.worldbank .org/external/default/WDSContentServer/WDSP/IB/2015/02/05/000333037_20150205213348/Rendered/PDF/RP17180V20P15300Box385429B00PUBLIC0.pdf).

World Trade Organization (2015), "Maldives Country Trade Profile", (http://stat.wto.org/CountryProfile/WSDBCountryPFView.aspx?Language=E&Country=MV).

World Travel & Tourism Council (2014), "Travel & Tourism: Economic Impact 2015 - Maldives", World Travel & Tourism Council.

http://www.environment.gov.mv/v1/news/accelerating-sustainable-private-investments-in-renewable-energy-aspire-project-launched-today/

[1] Source : World Bank 2014: http://www.worldbank.org/en/news/press-release/2014/07/17/maldives-private-investments-scale-up-renewable-energy-program