Long-Term Strategies for Climate Change

A REVIEW OF COUNTRY CASES

July 2020

The Coalition of Finance Ministers for Climate Action

DISCLAIMER AND COPYRIGHT

This work is a product of the Coalition of Finance Ministers for Climate Action. The findings, interpretations, and conclusions expressed in this paper are entirely those of the author(s). The boundaries, colors, denominations, and other information shown on any map or infographics in this work do not imply any judgment on the part of the Coalition of Finance Ministers for Climate Action concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Internet: https://www.financeministersforclimate.org

Long-Term Strategies for Climate Change

– Review of Country-cases for Ministers of Finance –

REPORT on Helsinki Principle 1

The Coalition of Finance Ministers for Climate Action

Table of contents

Acknowledgments

The Report has been compiled by Dr. Saara Tamminen, Dr. Outi Haanperä, Samuli Puroila, Alexander Kohl of the Finnish Innovation Fund (Sitra), and Weijen Leow of the World Bank. It has been prepared in close co-operation with experts from countries that have been reviewed - Costa Rica, Ethiopia, Fiji, Finland, Germany, Netherlands, Spain, Uganda, United Kingdom. The Coalition is very grateful to the experts involved and especially to Sitra and the World Bank for their commitment to carry out the work.

Foreword

The Coalition of Finance Ministers for Climate Action ("Coalition") is a group of fifty-two finance ministers, as of June 2020, engaged in efforts to address climate change through fiscal and economic policy. Peer learning and knowledge exchange play a strong part in the Coalition's success.

This report ("Report") is a first step in the Coalition's work to helping its member countries to design their long-term strategies. Such strategies are currently being developed. This is a very challenging task, requiring competencies, commitments, tools and governance structures to manage horizontal requirements of the work. Finance ministers are becoming more and more involved in the preparation of such strategies as economic implications of climate change and policy actions become visible. This Report approaches the topic through countries experiences, drawing from practical challenges and ways to overcome them.

The Report will provide a useful overview to the Coalition members and institutional partners working on transition aspects. It will also provide the basis for future work priorities of the Coalition, and especially on areas to deepen the analysis and broaden it to new country cases.

Strategic relevance and Mandate

Helsinki Principles set out the strategic objectives for the Coalition. Helsinki Principles recognize climate change as an opportunity, and that taking action can generate substantial benefits for our societies by stimulating technological innovation, improving human well-being, and accelerating economic growth. Helsinki Principles state that finance ministers are in a unique position to help accelerate a just transition to a low-carbon and climate-resilient economy through their economic policy tools. Finance ministers have a common purpose and can benefit from sharing experiences and facilitating the adoption of best practices and policies for low-carbon and climate-resilient growth. The Principles also acknowledge that such policies and actions will support global collective action on climate change under the Paris Agreement.

The Helsinki Principle 1 sets out the strategic basis of Coalition's objectives for aligning our policies and practices with the Paris Agreement commitments; Helsinki Principle 2 states that the Coalition Members Share experience and expertise with each other in order to provide mutual encouragement and promote collective understanding of policies and practices for climate action.

The Santiago Action Plan agreed by finance ministers on 9 December 2019 states that

achieving low carbon and climate resilient economies by mid-century requires structural economic changes. Finance Ministries wield fiscal, economic, financial and planning instruments to facilitate a smooth trajectory of transition and are well positioned to play a lead role in the development of long-term transition strategies. Ministers agree that key actions and deliverables under Helsinki Principle 1 include:

- Reviewing the existing body of long-term transition strategies in selected countries, providing comparative analysis of related challenges and opportunities, and delivering country case studies.

- Examining transition implications more broadly to cover the economic impacts and opportunities on citizens, businesses, and economies in order to help inform policy actions. The effort will benefit from ongoing work of institutional partners in mapping out the various policy instruments for decarbonization and adaptation that are relevant to Ministries of Finance.

Execution

This Report draws together the experience of a selection of Coalition's member countries implementing long-term climate strategies. It has been prepared on the basis of Coalition's Action Plan and benefited from feedback of the Coalition members and the institutional partners in the Sherpa meetings. Sitra has compiled the Report with support of the World Bank acting also as the secretariat for the Coalition.

Status

The Report describes the long-term strategies and draws general lessons on the review of approaches, identifies bottlenecks and challenges, identified policy instruments utilized to meet the objectives, management of the practical work and process of preparations of the long-term strategies.

This Report is a working document of the Coalition. Opinions and point of views expressed in this Report are those of the authors and do not necessarily reflect the views of the Coalition or its members. The main findings of the Report will be presented to Finance Ministers. It serves as contribution to the further policy considerations and planning of the Coalition's further work.

Audience

The primary audience for this report is policy makers at the Ministries of Finance and Economy that are typically responsible for cross-sector economic coordination, public finance, and fiscal policy, all of which are needed in formulating long-term strategies. This Report is intended to complement existing body of work that provide step-by-step methodologies for preparing low emission plans for the long-term.

The Report should benefit other ministries, institutions and academia involved in the work on long-tern strategies, and especially those in the lead-roles at national and international levels. In the on-going work of the Coalition this Report is intended as background paper on ministerial level discussions.

Pekka Morén Lorena Palomo

Co-Chairs of Sherpas,

Coalition of Finance Ministers for Climate Action

Introduction

The Coalition of Finance Ministers for Climate Action is a country-driven initiative to engage Ministries of Finance in efforts to address climate change. There is a growing recognition that many of the key policy instruments that will be critical in both mitigation and adaptation, as well as the critical ramifications of climate change, are centered in Ministries of Finance. Under the Coalition's first aspirational principle (Helsinki Principle 1), member countries aspire to **align their policies and practices with Paris Agreement commitments**. As part of its work plan, the Coalition decided to review the existing body of long-term transition strategies in selected countries, provide a comparative analysis of related challenges and opportunities, and compile them into country studies. The Finnish Innovation Fund Sitra and the World Bank were requested to conduct this initial work, in collaboration with member countries Ethiopia, Fiji, Finland, Spain, Netherlands, Uganda, and United Kingdom.

The **Paris commitments** have wide-ranging and structural implications for the economy. They consist of several interlinked parts: collectively holding the increase in global average temperature to well below 2°C; adapting to the adverse impacts of climate change and fostering climate resilience; developing national actions known as Nationally Determined Contributions (NDCs); and making finance flows consistent with these goals. Being "Paris aligned" will mean embarking on a course of economic restructuring to achieve these targets. In many cases the necessary economic retooling for a low-carbon economy will need long-term planning frameworks. The transformation can create new opportunities and economic growth, but there can also be economic costs – and some workers and households will be more affected than others. Measures will be needed to preserve equity in society and to ensure a *just transition to a low-carbon society*. As climate change is already in play, simultaneous plans for adaptation and resilience are also needed in many countries.

Finance and economy ministries are looked upon to play a key role in these long-term transition strategies. They have a coordinating role for economic policy across ministries and sectors, including the financial sector. They wield powerful fiscal and economic levers to alter incentives and determine public spending priorities, all of which can create lasting change to the economy.

This Guidance Note provides an overview of selected long-term climate strategies across a broad spectrum of countries. It serves as input for discussion by Coalition members on further work that could be undertaken to support Coalition countries to align policies and practices with the Paris Agreement. The case studies cover a range of countries with economies that are industrialized and energy intensive (such as the UK, the Netherlands, Spain and Finland) as well as developing economies highly reliant on agriculture or vulnerable to weather conditions (such as Ethiopia, Uganda and Fiji). By documenting country practices and analyzing trends at a high-level, it aims to provide a resource and a reference point for countries wishing to embark or improve on their own transition planning. The purpose is not to rank countries or assign merit to national policies or their technical underpinnings. In the spirit of the Coalition of Finance Ministers for Climate Action, member countries participate on a voluntary basis and work within their respective national mandates.

These case studies provide examples of long-term climate strategies, some completed while others are under development. It should be noted that some of the long-term climate strategy reports and processes that were reviewed are not yet official governmental long-term transition strategies (LTSs), and the processes for drafting official LTSs are still underway. They nevertheless provide valuable insights into how countries have started analyzing different pathways for reaching Paris aligned long-term climate targets. In addition, Uganda and Ethiopia have not yet developed a long-term strategy to move toward Paris objectives but have begun the process of incorporating climate change issues into their long-term economic development and green growth plans. Their strategies and plans were reviewed using the same LTS framework. All the case studies presented here are based on a desk review of related strategy documents and interviews with relevant civil servants and academic representatives. In addition, examples from Germany and Costa Rica on specific aspects of the long-term strategies were provided by the country representatives. These are presented in Box 1 and 2.

Main findings

Developing a transition strategy towards a climate neutral society is a complex task involving several steps. Its complexity comes from the cross-sectoral nature of the issue and the fact that climate change impacts nearly everything in society. The framework for transition planning, however, should not be overly complicated. It needs to ensure that all relevant issues are covered in a logical order. To do this the framework should answer the key questions: Where are we? What is important? Where are we going? What is standing in our way? How can we reach our goals? How can we make sure we're on the right path and moving forward? Who's in charge?

The **following simple 7-step framework (see Table 1) for transition planning** developed by Sitra is one tool for answering these questions. To analyze how countries have in practice drafted their long-term climate strategies, Table 1 compares the steps taken by countries with respect to this general framework. As it shows, most countries have included all these steps in their strategy considerations. In addition, Spain has done very detailed plans and assessments on Just Transition related issues, and the Netherlands on cross-cutting issues affecting many sectors (such as labor market and educational needs, and issues related to spatial planning). In addition to having specific emissions reduction targets, many countries have other objectives for their long-term climate strategies. These may relate to inclusive and just transition and protection of vulnerable social groups, to economic growth and maintenance of competitiveness and jobs, to protection of the environment in general, and to resilience and adaptation to climate change.

Table 1: What steps do the long-term climate strategies follow?

Steps of the framework	**In which country studies can you find these steps:**
1. Assess the current state of greenhouse gas emissions and climate trends based on existing policy measures	UK, NL, FI, ES, UG, ET
2. Identify other national objectives for a long-term climate strategy in addition to emission reductions. What are these?	- Inclusive and just transition and protection of vulnerable social groups: UK, NL, FI, ES, UG, Fiji - Economic growth and maintenance of competitiveness and jobs: UK, NL, FI, ES, UG, ET, Fiji - Protection of the environment: FI, ES, UG, Fiji - Resilience and adaptation: UG; ET, Fiji, FI, ES
3. Set long-term emission target and interim targets. For which years are these set?	UK: net zero emissions by 2050, interim carbon budgets every five years NL: -49% by 2030 (compared to 1990) and -95% by 2050 FI: net zero emissions by 2035 ES: carbon neutral by 2050, 20% emission reduction by 2030 compared to 1990 UG: 22% below BAU development in 2030 ET: keep emissions at 2010 level by 2030 Fiji: net zero carbon emissions by 2050

4. Identify key challenges and bottlenecks	All countries have analysed these. More information below.
5. Assess and decide on policy instruments to deliver the stated goals	More information below.
6. Monitor, report and verify (MRV)	All countries have some kind of an MRV framework in place.
7. Develop clear governance arrangements	All countries have some kind of governance framework in place.
8. Other steps included in the strategy?	NL: Analysis of cross-cutting issues important for various sectors (such as labour market and educational needs, information campaigns and issues related to spatial planning) ES: Detailed analysis of Just Transition issues

UK=United Kingdom, NL=the Netherlands, FI=Finland, ES=Spain, UG=Uganda, ET=Ethiopia

The rest of this section highlights the main challenges that countries encountered in developing climate strategies. It also covers the range of policy instruments adopted for tackling them, given the Coalition's particular interest in these. A more complete overview of each country's long-term climate strategies, including links to source documents, can be found from page 14 onwards.

The case study countries have their own characteristics in terms of geography and environment, the technical solutions viable and available to them, and their economic and social structures. Yet **the challenges and possibilities they face in climate change mitigation and adaptation are relatively similar**, especially within the group of developed countries and in the group of less developed countries. For developed countries, the main challenges were the distributional impacts, the required behavioral changes by households (for home heating technology, mobility and diet), and availability of new technologies. For less developed countries, adaptation and limiting emissions while maintaining economic growth, and poverty reduction seem among the main issues. Table 2 describes the main challenges for each country.

Table 2: Key challenges and bottlenecks to climate action identified by the countries

Country	Main challenges
United Kingdom	The main challenges include: hard-to-abate sectors (such as agriculture and aviation) where new technologies might not be available in time, distributional effects of climate measures and how to inform people about them, hydrogen technology, individual house heating, and Heavy Goods Vehicles (HGVs). Key uncertainties for future emissions include economic factors, changes in society and behaviours, the rates at which technologies become available, their costs and emissions reduction potential, and potential carbon leakage from the increased costs in industry.
The Netherlands	The major discussions and difficulties seemed to relate to social and competitiveness impacts of the climate policies. The stakeholders involved in drafting the Climate Agreement did not want overall tax burden to increase significantly. Industrial emission reduction policies should cut a lot of

Country	Main challenges
	emissions but with minimal competitiveness impacts. Also, reducing emissions in the building sector is seen as difficult because of the prevalence of individual gas boilers and the need for households to undergo energy renovations.
Finland	Main challenges relate to: attitudes and behavioural changes needed especially related to mobility, change towards more plant based diet and consumption patterns in general; role of political governance; aging population and subsequent change in population structure; the development of Finnish forests (and soil) and their role as carbon sinks; technological development and their availability; uncertainties related to (bio-)CCS technologies; economic structural changes; agricultural sector; peat lands and peat energy use; and new district heating sources.
Spain	The Spanish National Energy and Climate Plan, NECP, lists key challenges along the key dimensions of the Plan: renewable energies; energy efficiency; energy security; the internal market for energy; and research, innovation and competitiveness. For example, the large-scale deployment of renewable energy could depress the wholesale electricity prices, lead to greater despatches during times of high renewable generation and increase social opposition in dependent regions. To tackle the latter, the Plan promotes cooperation between public authorities and economic and social agents to identify and address the obstacles towards a viable and efficient deployment of renewable energies across the territory. Spain has also identified the management of the social impacts of the transition as a key challenge. The Just Transition Strategy was drafted to tackle this issue.
Uganda	Adaptation to climate change is the number one challenge in Uganda. The most pressing needs in climate policy, both in adaptation and in mitigation, are capacity building, technology transfer and finance. Regarding adaptation, 11 sectors have been identified in the National Climate Change Policy as vulnerable to climate change and in need of sector-specific policy responses. For example, agriculture and livestock, water, and fisheries and aquaculture are three key sectors in adaptation policy. Disaster risk management and vulnerable groups also receive attention.

Country	Main challenges
Ethiopia	Adaptation is a major issue. The National Adaptation Plan identified agriculture, forestry, health, transport, power, industry, water and urban/housing as the most vulnerable sectors. Food and water security as well as other agricultural issues dominate the adaptation options listed in the plan. For mitigation, key challenges relate to how to achieve middle-income status while keeping GHG emissions from growing, lack of data and obtaining enough (international) financing for mitigation actions.
Fiji	With regards to adaptation the major issues are: 1) Information, knowledge and technology barriers; 2) Governance and institutional barriers; 3) Financial barriers; 4) Economic barriers; 5) Natural and biological adaptation barriers and limits. Additionally, the importance of evidence-based decision making and well-managed public finances have been identified as key areas in need of special attention in order to successfully implement necessary adaptation measures.

The analysis found that required policy changes can vary between countries. However some lessons on the choice of policy instruments could still be gleaned from reports and interviews and are presented here.

How have countries assessed or plan to assess the best policy instruments to deliver the goals?

- In general, **technologies and their cost-effectiveness have developed very fast in recent years**. Therefore, it can be difficult to estimate the most cost-efficient pathway to carbon reductions in the long-term and strategies should be reviewed on a regular basis.

- Many countries have assessed the mitigation measures with **"bottom-up" cost-effectiveness analysis** based on individual technology/measure level analysis (e.g. with integrated energy system models).

- The level of detail for the policy interventions differ. For the shorter run (e.g. up to 2025 or 2030) many countries have rather detailed policy interventions planned (e.g. the Dutch and Spanish case studies). For long-term up to 2050, the policies tend to be at more general level in order to leave space for dynamic adjustments (e.g. the UK Net Zero Report).

- **Impact assessments** of the expected emission reductions, economic and social impacts are important and Spain, the Netherlands, Finland and the UK have good examples on these. Similarly, investment needs must be considered, and many countries have good examples on how to do this (see Ethiopia, the Netherlands, and Spain).

- Netherlands and Spain have also assessed the impacts of the short-term climate policies on public accounts in detail, but these are only available in Dutch and Spanish respectively.

- The **large variety of policy options** ranging from regulations to taxes and subsidies, and the linkages between the different economic sectors **complicate the impact assessments** and the

selection of best policy instruments. In selecting the best policy measures, **political support** is crucial.

- In the Dutch and Spanish strategies various cross-cutting issues and policies affecting multiple sectors were assessed in addition to the sector specific policies. Spain emphasized in particular Just Transition plans while in the Netherlands for example, systems integration, spatial planning and labour market and training-related measures were assessed.

- Many countries have done separate **policy assessments for different sectors**. For example, in Uganda the National Climate Change Policy sets out a policy framework that guides action against climate change with sector-specific priorities in adaptation and mitigation. These sector-specific priorities define the policy responses and specific strategies that each sector will follow, which informs the selection of policy instruments. The exact policy instruments are often decided at a local level to ensure that local features are acknowledged and respected.

- **Good data collection** is essential for reaching the emissions targets and for doing good impact assessments. For example, in Ethiopia the lack of sectoral data made it difficult to set sectoral targets after the overall 2030 target was set. Individual actors in each sector did not know how much mitigation was expected from them.

How have countries managed the practical process of drafting long-term climate strategies?

- ***Good cooperation and inclusion of the various stakeholders*** (e.g. technical experts, academics, private sector, industry representatives, NGOs, public officials and policy makers) in the process of drafting the LTS's is stressed by many countries. For example, the Netherlands drafted the Climate Agreement with over one hundred stakeholders gathered around five main sectoral tables to discuss the policy measures. These sectoral discussion groups came up with ideas and proposals on how to reach emissions reduction in the respective sectors. The proposals were assessed by independent research organisations and amendments on the plans and policy instruments were done based on the research findings. This process improved the overall acceptance of the climate measures.

- **Many countries started the process by gathering technical information.** This includes information on the possible emission reduction options and the most likely path of emissions without additional interventions. See for example the case study of the UK.

- Ministries of Finance play an important role in drafting long-term climate strategies, but **in most countries another ministry or organisation is leading the strategy process**. For example, in Ethiopia the green growth strategy was formed under the leadership of the Prime Minister's Office, the Environmental Protection Authority, and the Ethiopian Development Research Institute. In Finland the Ministry of Economic Affairs and Employment oversees the development of the long-term transition strategy and a network of senior officials from sectoral ministries and Prime Minister's office make sure there is no overlap between the work done for it by different ministries.

- **Clearly defined and separate roles for the different stakeholders** involved in the strategy process is considered important, together with good management of the whole process and alignment of possible sectoral strategies with each other and the overall targets.

Other interesting lessons learned and examples from the case studies:

1. Climate policy is as much politics as economics. ***Political buy-in*** is important for genuinely impactful plans to be drafted and accepted. Detailed and extensive ***impact assessments*** can be critical in securing political support. The most cost-effective policy measures might not always be selected if their distributional impacts are considered unacceptable.

2. ***Having long-term plans is key to avoiding lock-in problems***, even if detailed policies for long term plans can only be identified for just the next few years. ***As technology is changing very fast***, strategies need to include scheduled updates and reviews of plans to take account of new developments. For example, in Finland continuous monitoring and adjustment of the policies has elevated electric vehicles into one of the main technologies in the transport sector, while just 5 years ago they were more costly compared to other options.

3. **Just Transition plans** and protection of vulnerable groups is important for social stability and political buy-in. For example, in the Spanish Just Transition Strategy and Just Transition Agreements, the key objective is to minimize the adverse impacts of climate policies in the affected regions (such as on employment and economic activity) and to maximize the opportunities that the policies might bring. Just Transition Agreements will play a key role in delivering this objective. These agreements involve representatives from central, regional and local government and social agencies as well as other key players such as the private sector and civil society. The agreements communicate an action plan targeted to generate regional development projects through financial and technical support. The agreements will also define the roles and responsibilities of the key participants and include a roadmap with agreed time schedule going forward. Germany also offers an example of how targeted regional support schemes for future growth and employment can help cope with structural change triggered by the coal phaseout.

4. **Good integration of general development strategies and different sectoral policies** is important. For example, in Fiji the National Adaptation Plan represents a strategic, high-level action plan for climate change adaptation that builds upon the existing policy and development plan landscape. Instead of being a separate and parallel dimension, the Fijian government sees adaptation as ‘climate-resilient development’ – an integral part of the country’s general development strategy. In Fiji, the National Climate Change Policy acts as the main policy for climate change issues and is closely linked with other cross-government/ministerial policies. These interlinkages guide and support different policy plans, while also allowing for a more effective implementation and monitoring of the planned adaptation and mitigation effort.

5. **Monitoring of the progress and clear governance** of the widespread policy requirements is essential to reaching emission targets. In the UK, the Climate Change Act 2008 governs and legislates the implementation of climate policies. The emission reduction target is set in law for the long-term and five-year carbon budgets are set in line to meet the long-run target. The UK

Government is required to bring forward policies to meet the target and the independent Committee on Climate Change (CCC) is set to monitor progress and suggest required changes.

6. **Resilience and adaptation efforts are crucial**, especially for less developed countries. While climate change is a global issue, its impacts are not evenly spread out and certain countries are more vulnerable to climate change. Fiji is as an example of a country that has successfully integrated adaptation and resilience dimensions to their national climate change policy framework, while also developing specific policy recommendations to combat issues related to them. Fiji's Climate Vulnerability Assessment (CVA) is an example of how countries, and SIDS (Small Island Developing States) in particular, can develop an adaptation and resilience plan drawing on extensive data and analysis of risks and threats. The CVA informs development planning and investment decisions in Fiji based on an assessment of climate and disaster vulnerability, and adaptation and risk management plans and strategies. The analysis identifies threats that could jeopardize Fiji's development needs and opportunities as described in their 5-year and 20-year National Development Plan, and outlines five main intervention areas that could minimize these threats.

Box 1: Navigating the energy transition

Germany's Climate Action Programme 2030 (information as of February 2020)

Background. To contribute to the Paris Agreement, the European Union has pledged to reduce its emissions of greenhouse gases by 40% by 2030 compared to 1990 levels. The EU Emissions Trading System (EU-ETS) provides for a joint achievement of EU reduction targets for large-scale emitters in power generation and the manufacturing industry, as well as in intra-EU aviation. For other sectors like transport, buildings, small-scale industry, agriculture and waste (non-ETS sectors), Germany has committed in the EU-context to reducing greenhouse gas emissions by 38% by 2030 compared to 2005 levels under EU Regulation 2018/842. Moreover, in 2016 the Federal Government translated the national emission reduction target (of at least 55% reduction in 2030 compared to 1990) into sectoral targets. To ensure that these targets are met, in March 2019 the German Government set up a dedicated Cabinet Committee on climate action, the Climate Cabinet. It consists of the Chancellor and the ministers for the environment, the economy, transport, building, agriculture, and the finance minister. The Committee's decisions of September 20—the Climate Action Programme 2030—constitute a paradigm shift in German climate policy, and they are very much in line with the "Helsinki principles" of the Coalition.

Components. The Climate Action Programme 2030 comprises four components targeting the behaviour of citizens and firms. The first component includes support programmes and incentives for reducing greenhouse gas emissions. Examples are a reduction of the VAT for train tickets, subsidies and tax cuts for e-mobility, or an upgrade premium for heating systems that aims at increasing the rate at which oil heaters are replaced. The second component is a national carbon pricing system in the sectors of transport and heat generation in buildings and in energy and industrial plants outside the EU ETS. The national emissions trading system will start with a fixed price of 25 €/tCO2 in 2021, gradually increasing to 55 €/tCO2 in 2025. In 2026, allowances will be auctioned off in a price corridor between a minimum price of 55 €/tCO2 and a maximum price of 65 €/tCO2, and a decision will be made to what extent minimum and maximum prices will be appropriate and necessary from 2027 onwards. Explicitly, all extra revenues will be reinvested in measures promoting climate action or, and this is the third component, will be returned to citizens by easing the burden in other areas. This includes reductions of the surcharge under the Renewable Energy Sources Act, leading to a fall in electricity prices, and increases in housing benefits and in the commuter tax allowance. The fourth component is regulatory measures that will come into play more strongly by 2030 at the latest. For instance, the programme includes a ban for the installation of the aforementioned oil heaters, taking effect in 2026.

The Climate Action Programme 2030 sends a clear signal: investments into climate friendly technologies and goods pay off for everyone and citizens with a low income receive support for the transformation. Therefore, there are attractive support programmes at the start to foster the crucial reorientation and behavioural change of citizens and businesses. This financial support from the state will decline in the second half of this decade when regulation and price incentives will take a larger role. Now and over the next few years is the best time to switch to climate-friendly options. At the same time, the Climate Action Programme 2030 will help Germany build on its role as an innovative leading provider of and market for climate-friendly technologies, thus having a positive impact on growth and prosperity. In total, this programme has a planned volume of more than €55 billion over the years 2020-2023, where the largest shares of the financing side are the revenues from national carbon pricing and the EU ETS.

Legal implementation of the Climate Action Programme and monitoring. Recently adopted legislation for implementation of the Climate Action Programme entails sector specific reduction targets. The Climate Cabinet will be permanent and is tasked with annually reviewing the effectiveness, efficiency and expediency of the measures introduced. An external council of experts will support the German Government by reviewing the results to ensure objectivity on climate target achievement. If a sector does not meet its legally prescribed annual reduction targets, the responsible Cabinet Minister must submit an immediate action programme with corrective measures within three months.

Coal Phase-Out. In addition to the Climate Action Programme's policy, and in the context of the goal that electricity from renewable sources should cover 65 % of gross electricity consumption by 2030 and the German nuclear phase-out, the use of coal in electricity production will be phased out. In 2018, the Federal Government set up the Commission on Growth, Structural Change and Employment, bringing together policymakers, scientists, environmental organizations, and stakeholders like employer and union representatives and civil society groups. In January 2019, the Commission presented its report with recommendations on how the phase-out of coal-fired power generation can be implemented and financed in a socially sound way. It recommends a significant reduction of coal-power capacity by 2030 and a reduction to zero by the end of 2038 at the latest. It also recommends an adjustment allowance for older workers in coal plants in order to avoid social hardship, and it suggests a mechanism for electricity price compensation. Based on these recommendations, the Federal Government, the governments of the affected "Bundesländer" (federal states) and the affected utility companies recently agreed on an implementation plan for the phase-out process. Moreover, the Federal Government agreed on a support scheme for affected regions providing up to 40 billion € over 20 years to ease structural change.

Sustainable Finance. In addition, sustainable finance (i.e. the aim that financial market participants take into consideration sustainability aspects, including but not limited to climate) is part of the Climate Action Programme 2030. The Federal Government will develop a sustainable finance strategy with the support of its sustainable finance advisory committee consisting of representatives of the financial industry, the real economy, civil society and science. The government will take into account sustainability aspects when it manages government-related funds. It will issue Green Sovereign Bonds, and the German state-owned promotional bank KfW will further support the transformation of the real economy towards a greenhouse gas neutral future.

Box 2: Greening the transport sector

Costa Rica's National Decarbonization Plan (information as of May 2020)

A comprehensive vision for a net zero emissions economy by 2050, complete with a policy road map. In 2019 President Carlos Alvarado announced Costa Rica's National Decarbonization Plan 2018-2050, which was submitted to UNFCCC as the country's long-term low greenhouse gas emission development strategies (LTS). The plan maps the transition to net-zero emissions by 2050 with phased-in targets in all sectors and an actionable policy roadmap. **The plan contains targets for the short (2018-2022), mid (2023-2030) and long (2031-2050) terms.** The plan aims for example, to have 85% of public transport operating on zero emission technologies by 2050, and for 30% of public buses to be electric and an electric train system by 2035. It also calls for electricity generation to maintain its current grid emission at zero, and to achieve 10% sustainably harvested wood and bamboo usage in building materials by 2025, 100% sewage treatment by 2040, and low-carbon practices in 60% of the areas dedicated to livestock by 2030. The plan identifies actions to be avoided that go against the objectives of decarbonizing the economy. For example, in the transportation sector, transitional technologies will be excluded if they nominally reduce emissions in the short term but create barriers for full system decarbonization in the medium to long-term. To put the country on track for meeting the medium and long-term goals, more than 50 policy actions will be implemented by 2022.

The decarbonization plan serves as a starting point for the long-term "Strategic Plan Costa Rica 2050" under the Ministry of National Planning and Economic Policy (Mideplan). The Strategic Plan will incorporate the targets of the Decarbonization Plan into the economic development model of Costa Rica. Mideplan is currently evaluating productive opportunities and public investment priorities for the country to promote the modernization of the Costa Rican economy, generate jobs, reduce poverty and boost its growth in a decarbonize futured, using the decarbonization plan as a key input.

The Ministry of Finance and Mideplan are coordinating the implementation of the plan through a high-level coordination body that also includes the Ministry of Energy and Environment, and the Office of the Presidency. This body has the responsibility to review, align and prioritize the public development processes, and provide complementary guidance to government structures that need to integrate the objectives of decarbonization across all sectors.

Work directly under the realm of Ministry of Finance and Mideplan that contribute to the implementation of the National Decarbonization Plan include:

- The Ministry of Finance is identifying strategies to manage fiscal impacts, with detailed analysis on the impact of electromobility and expanded public transport on the tax system for fuel and vehicle importation and ownership, which currently represent 20% of total annual receipts.

- The Ministry of Finance is developing a budget tagging system to track public spending on climate change and biodiversity. This will improve transparency and decision-making on budget allocation to maximize the impact of public spending.

- Mideplan is developing guidelines and tools to prioritize projects registered under the National System of Public Investment if they are aligned with the Decarbonization Plan.

The plan also calls for understanding costs and benefits, impacts on the labor market and the best practices to ensure a just transition. For example cost-benefit analysis has been undertaken for the transport sector. The analysis shows that decarbonizing the sector will bring net benefits of about USD 20 billion to the country by 2050, with lower operational costs, time saved in congestion, reduced health impacts and reduced accidents compensating for the initially higher cost of electric vehicles.

The Plan serves as a backbone for the mobilization of financing, including international financing through the Ministry of Finance. The ministry, in charge of coordinating international finance, is maintaining dialogue with multilateral and bilateral entities to identify work priorities, and the plan naturally serves as a framework to channeling support. In particular, the short-term policy actions defined in the plan formed the basis for policy-based loans from development institutions. In addition, the plan allows the Ministry of Finance and the rest of the government to coordinate technical assistance from international donors, as it establishes a list of priority issues for which the government is requesting support.

Ethiopia

Reports reviewed (in February 2020)	
• Document 1: Ethiopia's Climate-Resilient Green Economy (CRGE) - Green Economy Strategy (2011); This report summarizes the findings of the CRGE initiative to support the country's vision of achieving middle income status by 2025 through a green and sustainable economy. The plan includes four areas for fast track implementation: hydropower development, advanced rural cooking technologies, efficiency in the livestock value chain, and Reducing Emissions from Deforestation and Forest Degradation (REDD). • Document 2: Ethiopia's Climate Resilient Green Economy - National Adaptation Plan (2019); This covers the Ethiopian government's plans to advance climate change adaptation within its CRGE and national development policy framework. The plan includes building adaptive capacity, sectoral climate resilience strategies, and integrating climate change adaptation into development policies and strategies, including macroeconomic and sectoral policies and strategies at the national sub-national levels. • Document 3: Nationally Determined Contribution (NDC) of Ethiopia The NDC lists goals and policies for adaptation and mitigation in Ethiopia, including achieving carbon neutrality in the long term. Ethiopia is in the process of developing its long-term transition strategy.	
Do the plans include the following types of analysis?	
1. Assessment of current state of GHG emissions (and their trend with current measures)?	Ethiopia's official documents offer statistics of GHG emission from the year 2010 and a Business-as-Usual scenario for the development of emissions up to 2030. Agriculture and forestry totaled almost 90% of Ethiopia's emissions in 2010. Ethiopia's contribution to GHG emissions is very low on a global scale. But according to the Green Economy Strategy (Document 1), the projected environmental impact of conventional economic development in Ethiopia is likely to follow the pattern observed around the globe. If current practices prevail, GHG emissions in Ethiopia will more than double from 150 Mt CO2e to 400 Mt CO2e in 2030. Based on the NDC (Document 3), the total GHG emissions of Ethiopia in 2010 were 150 Mt CO2e. The emissions breakdown by sector, as per the NDC, is: Livestock 65 Mt CO2e, i.e. 42% of the total; Crop cultivation 12 Mt CO2e, i.e. 9%; Deforestation and forest degradation 55 Mt CO2e, i.e. 37%; Electric power generation 5 Mt CO2e, i.e.3%; Transport sector 5 MtCO2e, i.e. 3%; Industrial sector 4 Mt CO2e, i.e. 3%; Building sector 5 Mt CO2e, i.e. 3%. The methodology applied to forecast the BAU scenario was based on two steps. The first step was to forecast Ethiopia's economic development. The second step was to compute the associated emissions using the economic development targets (2010---2015), past performance and the ambition to reach middle---income status before 2025. The projected economic growth was translated into the BAU development of GHG emissions (NDC, page 3).
2. Defining key parameters of the	The CRGE initiative has three objectives (Green Economy Strategy, document 1, page 19): 1) Fostering economic development and growth,

strategy (in addition to emission reductions)? What are these?	2) Ensuring abatement and avoidance of future emissions, i.e., transition to a green economy, 3) Improving resilience to climate change. This is to be pursued while achieving middle-income status by 2025. Economic development is central to all activities in Ethiopia, including climate change mitigation and adaptation. To meet the middle-income target, certain rates for growth have been set for GDP, exports, and domestic savings rate (Green Economy Strategy, page 9).
3. Setting the target and interim targets, for which years?	The emission reduction targets in Ethiopia are set compared to BAU development, not compared to current emission levels. The target is set for 2030 and stands at -64% compared to BAU in 2030. In other words, the target is to keep emissions at the 2010 level. The Green Economy Strategy (Document 1) sets out that in 2030 Ethiopia aims to maintain GHG emissions at its 2010 level of 150 Mt CO2e, which will be 255 Mt CO2e less than estimated under a conventional development path. Based on the NDC (Document 3), the emissions reduction consists of 90 Mt CO2e from agriculture; 130 Mt CO2e from forestry; 20 Mt CO2e from industry; 10 Mt CO2e from transport; and 5 Mt CO2e from buildings, amounting to a total of 255 MtCO2e in reduction or 64% compared to 'business--as--usual' (BAU) emissions in 2030. For economic parameters, the strategy sets growth rates for the period 2010-25.
4. Identifying key challenges and bottlenecks? If so, what are these and how were they identified?	As stated in the Green Economy Strategy (Document 1), the main challenge is tied to Ethiopia's rapid economic development and population growth: how to achieve middle-income status while keeping the GHG emissions from growing. Close to 90% of Ethiopia's emissions in 2010 came from agriculture and forestry. The emissions here are likely to increase in relation to population and GDP growth. Other challenges mentioned in the report are unsustainable use of natural resources, lock-in of outdated technologies and the loss of ever-increasing share of GDP to fuel imports. Another key challenge that emerged after setting the 2030 target was the lack of sectoral data on emissions and, hence, the lack of sectoral targets. Different actors did not know how much they needed to contribute to the mitigation. The third key challenge is finance, specifically the challenge of obtaining enough (international) financing for mitigation actions. Also, it was a challenge to allocate financing when sectoral contributions to mitigation are not clearly defined. Challenges related to funding receive special attention in the Green Economy Strategy. Even under the conventional development scenario, there is a huge need for funding. Ethiopia's savings-investment gap is large - a large inflow of international capital is needed. Finance mobilization is identified as one of the major constraints on economic development and as an immediate threat to sustainable growth, especially in transport and power supply infrastructure. The anticipated challenges of carrying out long term adaptation actions were spelled out in the NAP implementation guidance principles (NAP,

	document 2, page 50): 1) Participation 2) Coherent interventions 3) Stakeholder empowerment 4) Gender sensitivity 5) Equitable implementation 6) Principle of partnership.
5. Assessing and deciding on policy instruments to deliver the goals? How are these policies identified (what kind of methods, process, etc.)?	The Green Economy Strategy (Document 1) applies a largely sectoral approach, identifying and prioritizing more than 60 initiatives to achieve the development goals while limiting 2030 GHG emissions to 2010 level. The process for selecting the initiatives was: (1) identification of relevant sectors based on importance for the economy and GHG emissions; (2) BAU scenario for each sector's economic development and related emissions; (3) selecting green economy initiatives by first identifying all potential ones, and then selecting priority initiatives based on criteria that considers abatement potential, abatement cost, suitability to a short-term growth plan, and feasibility. An Abatement Cost Curve was developed to compare available options for reducing emissions. For details of process, see Green Economy Strategy, page 61. There were notably few economy wide or cross sectoral measures. The National Adaptation Plan (Document 2) similarly identified 18 adaptation options across different sectors (page 55).
6. Monitoring, reporting and verification framework and methods for dynamically assessing the development of the situation?	According to the Green Economy Strategy (Document 1), the Environmental Protection Authority (EPA) has MRV related responsibilities such as organizing and conducting independent measurement, review and verification of emissions. EPA will also provide relevant methodological guidance on determining geographical and sectoral boundaries, on setting baselines for the quantification of carbon credits and on measuring GHG emissions. The NAP monitoring and evaluation structure includes biannual evaluations by a Parliamentary committee, inter-ministerial steering group to set directions and oversee implementation, and spot checks and reviews by the National Planning Commission. Details are found in NAP, page 90. The tracked indicators include output measures such as length of resilient roads, and outcome measures such as share of community adopting resilience practices. (NAP, document 2, Annex 2)
7. Governance of the LTS? What kind of structure is developed for this? Who is in charge of different aspects?	Overall responsibility and oversight of the CRGE lies with Ethiopia's Environmental Council, which is chaired by the Prime Minister and comprises members drawn from Federal Ministries, Presidents of National Regional States, and representatives of non-governmental bodies, the private sector, and trade unions. The main responsibilities are under the EPA and the Ministry of Finance and Economic Development (MoFED). The EPA supervises and regulates implementation of the technical components. The MoFED will solicit financial support from international sources and channel the available funds in the form of advance support or ex-post payment. At the federal level, ministries and other sectoral agencies will participate and encourage the participation of other entities in their respective sectors in the formulation and implementation of the components of the green economy. National regional states – in collaboration with the relevant federal level institutions– are responsible for implementing the majority of the initiatives outlined in the CRGE strategy (document 1). The same

	CRGE governance structure is used for adaptation actions. See NAP, Document 2, page 68.
8. What kind of other possible steps are included?	No information
9. What kind of a process was applied to develop the long-term strategy?	The development of the CRGE initiative was led by the Prime Minister's Office, the EPA, and the Ethiopian Development Research Institute, and included seven sectoral teams involving over 50 experts from over 20 government institutions. The process of developing the CRGE involved an assessment of the country's economic and growth targets and, then, focusing the analytic work on initiatives that contribute to reducing emissions. This work was carried out by the Sub-Technical Committees (STCs) and it followed a four-step process: 1) develop a BAU 2) identify and analyze initiatives 3) evaluate and prioritize the initiatives, and 4) document and summarize the findings (Green Economy Strategy, document 1, page 61). The evaluation criteria include abatement potential, abatement cost, suitability to a short-term growth plan, and feasibility.
10. Which sectors are covered in the long-term strategies?	The CRGE strategy (Document 1) focuses on four pillars: agriculture, forestry, power, and transport. The mitigation efforts in the NDC are grouped under the sectors of agriculture, forestry, transport, buildings, and industry. For the NAP (Document 2), sectors identified as the most vulnerable are agriculture, forestry, health, transport, power, industry, water and urban.
Do the strategy reports mention or assess the following?	
Fiscal impacts of the strategy?	Not explicitly mentioned in the documents reviewed.
Social impacts of the strategy (such as employment and distributional impacts)? If yes, what aspects?	Not explicitly mentioned in the documents reviewed.
Economic or sectoral competitiveness impacts of the strategy? If yes, what aspects?	As indicated in the Green Economy Strategy (Document 1), the sub-technical committees (STCs) conducted a qualitative multiple criteria assessment of the initiatives against the Growth and Transformation Plan objectives. Each element of the suitability to GTP was rated according to whether the initiative increases the chances of achieving the GTP objectives, decreases them, or is neutral. The GTP targets were: poverty, food security, GDP, domestic capital, exports, public finance, and employment.
Emission reduction paths? If so, how	Not explicitly mentioned in the documents reviewed.

many different options?	
Adaptation needs and policies to address them?	The NAP (Document 2) has a 15-year implementation horizon and aims to strengthen holistic integration of climate change adaptation in Ethiopia's long-term development pathway, supported by effective institutions and governance structures, finance for implementation and capacity development and strengthened systems for disaster risk management and integration among different sectors. (Details found in NAP, page 55).
Investment needs and their financing options? For mitigation and for adaptation?	The Green Economy Strategy (Document 1) covers the overall expenditure and financing options. Estimated expenditure was around USD 150 billion for the 20 years after the finalization of the strategy at 2011 – of which USD 80 billion is capital investment and the remaining operating expenses. Not all of this is additional - a large part would occur in a conventional growth scenario. In order to analyze the required type of financing for the respective initiatives, the expenditures were categorized into: Category A: Initiatives that have positive return and only require short-term financing. Category B: Initiatives that have a positive return but require long-term financing. Category C: Initiatives that do not yield a positive (financial) return, hence they require grants or performance payments for GHG abatement. Financing of USD 20 billion per year is to be obtained from various climate finance sources, including: (a) Bi-/multilateral grants primarily for project setup, capacity building, technology development, and dissemination; and (b) Bi-/multilateral pay-for-performance deals, i.e., payments linked to verified GHG abatement, and (c) market-based emissions trading e.g. CDMs or voluntary carbon markets. The National Adaptation Plan (Document 2) implementation period is from 2016- 2030 and it will require close to USD 6 Billion per annum (USD 90 billion total). Finance will be mobilized from domestic (public and private sources) and global adaptation related climate finance. The calculation of adaptation cost estimates is yet to be refined. As costs are updated, attention will be paid to the requirements of financiers (e.g., the Green Climate Fund) and their methodologies for determining adaptation costs.
Alignment of the LTS with the NDC?	The NDC is aligned with the national development plan and anchored on the Climate Resilient Green Economy (CRGE) Vision and Strategy of Ethiopia.
Legal status of the LTS? What happens if e.g. emission cuts don't meet the targets?	Not explicitly mentioned in the documents reviewed.

Additional perspectives: *(From informal interviews with members of the strategy development team)*

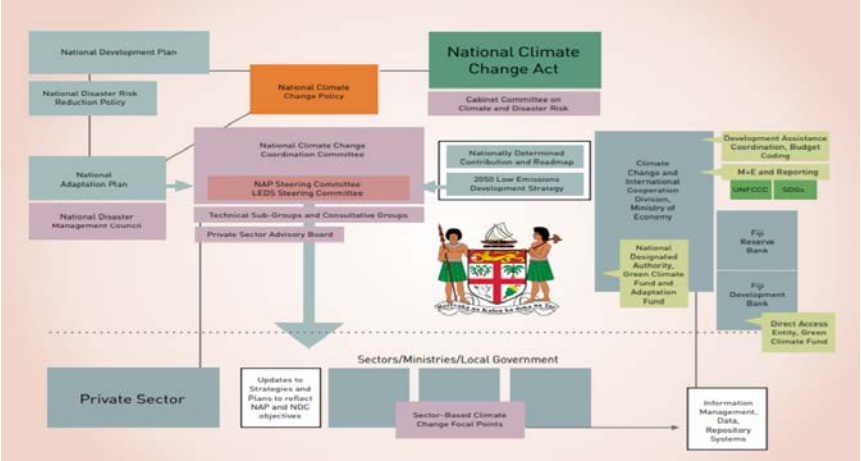
- Importance of strong political buy-in.
- The major technical challenges in implementation are the lack of sectoral targets and the financing need.
- Importance of clarifying roles and responsibilities: especially for the provision of finance and target setting for local administrations, which are responsible for implementation across all sectors.
- Climate action should be mainstreamed to all policy work and to all development plans. Isolated sector-specific policies are not sustainable. Sectoral planning has its limitations for incorporating green growth objectives, and landscape-based planning is needed.
- Setting a clear emissions baseline is important. Mitigation approaches were mainly project-based, with federal level sector ministries responsible for implementation. This has not proven efficient or well-coordinated.

Fiji

Reports reviewed (in February 2020)	
• Document 1: Fiji Low Emission Development Strategy 2018 - 2050; The document (LEDS) identifies a strategic high-ambition net zero vision for 2050 as established in the NDP. The Fiji LEDS is structured to progress from the domestic and international context to sector-specific low emission scenarios, then to linkages with adaptation, social, environmental, and economic considerations, and finally to governance and monitoring and evaluation (M&E) for the LEDS. • Document 2: Republic of Fiji National Adaptation Plan (2018); The National Adaptation Plan (NAP) communicates adaptation efforts across multiple government entities together under one document. The NAP influences and accelerates the national development pathway towards climate-resilient development. • Document 3: Climate Vulnerability Assessment - Making Fiji Climate Resilient (2017); The CVA seeks to inform development planning and investment decisions in Fiji by quantifying and enhancing the understanding of the threat that natural hazards and climate change pose to the country's Development Plan and objectives. • Document 4: Republic of Fiji National Climate Change Policy 2018-2030;The NCCP sets out Fiji's priorities in reducing present and future climate risks, while maximizing long-term development.	
Do the plans include the following types of analysis?	
1. Assessment of current state of GHG emissions (and their trend with current measures)?	The LEDS (Document 1) contains an assessment of current GHG emissions for all major emitting sectors, including source breakdown and emissions baseline for LEDS projections. While Fiji's NDC reference year is 2013, the base year used for long range emissions projections and scenarios (the core of LEDS) differed by sector depending on whether reliable data was available to support long range modeling. The base year for projections are: 2013 (electricity, air transport, coastal wetlands, and waste sector), 2014 (land transport), 2015 (agriculture) and 2016 (forestry, maritime transport). The NDC (2015) is clearly referenced in the LEDS as a starting point for Fiji to extend its mitigation efforts. (LEDS, page 20).
2. Defining key parameters of the strategy (in addition to emission reductions)? What are these?	Yes. Besides raising ambition and climate action, the other LEDS (Document 1) goals are: ensuring inclusive and equal transition, biodiversity conservation, green jobs and employment, focusing on education, awareness raising and capacity building. Climate resilience is given substantial coverage in the LEDS, as a factor in development planning and investment decision making, and that infrastructure and systems wide resilience will safeguard mitigation efforts (LEDS, Chapter 5). For this reason, the Climate Vulnerability Assessment (CVA, Document 3) is strongly referenced in the LEDS and is reviewed alongside.

3. Setting the target and interim targets, for which years?	Yes. The LEDs target is net zero carbon emissions by 2050 across all sectors of the economy (Document 1).
4. Identifying key challenges and bottlenecks? If so, what are these and how were they identified?	The LEDS (Document 1) mentions implementation challenges for certain sectors although not in depth. Challenges include the absence of enabling policies for agriculture, technology adoption and expertise barriers for the maritime transport and waste management sectors. Notably, the LEDS contains substantial discussion of long term climate vulnerabilities and risks as a threat to mitigation, and hence the need for mainstreaming climate resilience in Fiji across all sectors. The needs include: closing the data gap and conducting a comprehensive assessment of climate change impacts and actions to adapt to and mitigate climate change. Barriers to adaptation are a strong message in the NAP (Document 2) and they include: 1) Information, knowledge and technology barriers; 2) Governance and institutional barriers; 3) Financial barriers; 4) Economic barriers; 5) Natural and biological adaptation barriers and limits (NAP, pages 29-33). The CVA (document 3) identifies the importance of evidence-based decision making and well-managed public finances as key areas that need special attention in order to successfully implement the necessary adaptation interventions.
5. Assessing and deciding on policy instruments to deliver the goals? How are these policies identified (what kind of methods, process, etc.)?	**Mitigation**: Although a formal methodology was not laid out, the LEDS describes a process of identifying and prioritizing policies and implementation options (LEDS, Document 1, page 23). LEDS development was driven by the Ministry of Economy, a research institution as technical lead, other government agencies and international experts. Annex A contains a non-exhaustive list of prioritized actions with high-level costing and timelines, which is subject to further study. **Adaptation:** The Climate Change Division within Fiji's Ministry of Economy directed a multi-sector task force that brought together expertise from across Fiji's Government to integrate adaptation and risk management in carrying out the CVA (Document 3). The approach combines a cross-sectoral climate vulnerability assessment with preparation of integrated adaptation and disaster risk management plans. The methodology combines sectoral analysis considering multiple dimensions of climate vulnerability—including infrastructure, governance and financing, socioeconomic aspects and population characteristics, and the environment. When possible, sector-level studies were integrated into a national-level assessment, with risks measured in monetary terms and through their impact on poverty. Analysis at the sector level contributed to the identification of priorities for action within each sector, enabling the

	creation of a resilience and adaptation plan that has been assessed in terms of investment needs and recurrent expenditures. The CVA is a key input in the definition and prioritization of measures in the National Adaptation Plan (NAP).
6. Monitoring, reporting and verification framework and methods for dynamically assessing the development of the situation?	The LEDS (Document 1) includes a framework for monitoring and evaluation (M&E) with the following four monitoring dimensions: 1) Tracking specific policies and actions implemented from the LEDS; 2) tracking emissions reductions achieved through the implemented measures; 3) assessing co-benefits in terms of green jobs, gender inclusion, SDGs and others; 4) tracking the means of implementation and support, such as capacity building, technical assistance and finance. The M&E framework aims to give transparency, accuracy, and comparability of information on GHG emissions for each of the five-year periods leading towards 2050. This will also strengthen national and sectoral data collection and methodologies. In terms of adaptation, the Ministry of Economy has a monitoring and evaluation role in NAP implementation, for both quantity and quality of progress. A NAP Steering Committee comprised of relevant sector leads will be formed periodically to guide the review of progress, consider relevant changes to the current climate risk context, and guide the development of future NAPs according to its 5-year life cycle.
7. Governance of the LTS? What kind of structure is developed for this? Who is in charge of different aspects?	The institutional arrangements and governance for implementing LEDS flow from the National Climate Change Policy (NCCP) of 2018 and are aligned with those of other national climate change related strategies, such as NAP. Governance details contained in the NCCP (Document 4, page 77) are: Accountability statement - The Fijian Government is committed to inter-governmental and society-wide accountability and responsibility for environmental protection and climate risk management. Legislation - The National Climate Change Act will provide a legal anchor and further formalize the governance and oversight of the National Climate Change Plan's objectives. National Climate Change Coordination Committee - Has oversight for (a) National Adaptation Plan Steering Committee; (b) Low Emissions Development Strategy Steering Committee; (c) Cabinet Committee on Climate and Disaster Risk; (d) Private Sector Advisory Board. Coordination – (a) Sector and Ministry Based Climate Change Focal Points; (b) Climate Change and International Cooperation Division of the Ministry of Economy; (c) Local and Subnational Government. Following the NCCP structure, high level oversight for LEDS will come under the National Climate Change Coordination Committee which comprises Permanent Secretaries and nominated representatives from government ministries, departments, and

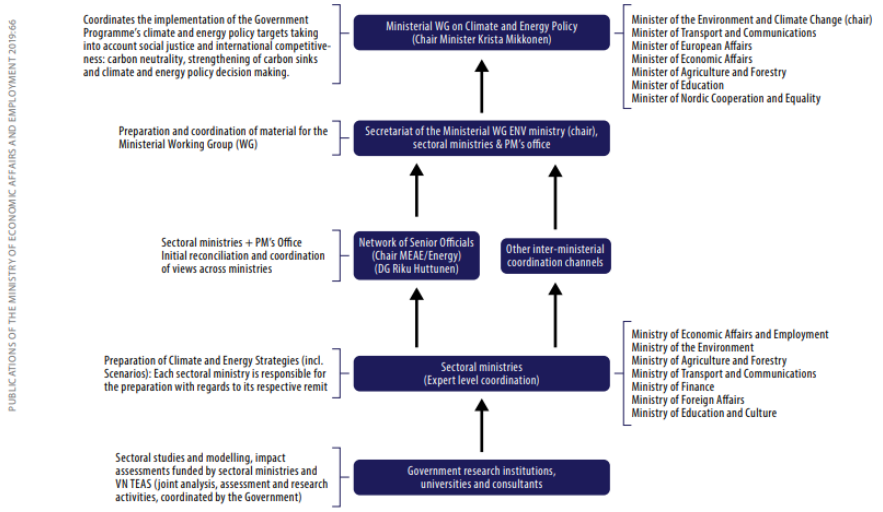
	agencies. The Ministry of Economy holds the main coordination role for LEDS implementation. 
8. What other steps are included?	Not applicable
9. What kind of a process was applied to develop the long-term strategy?	Development of the LEDS was led by the Climate Change and International Cooperation Division (CCICD) at the Ministry of Economy with support from the Global Green Growth Institute (GGGI). CCICD convened and chaired a LEDS Steering Committee composed of government ministries and major public utilities representing all relevant sectors in Fiji. CCICD then engaged members of the Steering Committee as well as numerous national and international experts and stakeholders from private sector, academia, and civil society through a participatory process to develop the LEDS. (LEDS, Document 1, pages 22-24).
10. Which sectors are covered in the long-term strategies?	Energy generation and use, land transport, domestic maritime transport, domestic air transport, AFOLU, wetlands, and waste (Document 1).
Do the strategy reports mention or assess the following?	
Fiscal impacts of the strategy?	No information
Social impacts of the strategy (such as employment and distributional impacts)? If yes, what aspects?	Yes. The LEDS includes discussion of the social, economic and environmental dimensions (Document 1, chapter 6), covering effects on employment, particularly future green jobs in Fiji, as well as gender and equity.
Economic or sectoral competitiveness impacts of the strategy? If yes, what aspects?	No information

Emission reduction paths? If so, how many different options?	Four different pathways outlined in the LEDS (Document 1): Business-as-Usual (BAU) Unconditional and BAU Conditional scenarios that are based on NDC actions, and the High Ambition and Very High Ambition scenarios that aim for net zero carbon by mid-century.
Adaptation needs and policies to address them?	Adaptation needs and policies to address them are covered in detail in the NAP (Document 2), which lists 160 adaptation measures across sectors and systems-wide measures to improve the enabling environment for investment flows and climate-resilient development. Sectoral adaptations represent components and actions especially relevant to both society and the economy and which are vulnerable to the impacts of climate change. Chapter 5 of the LEDS (Document 1) describes synergies between adaptation and mitigation planning, covering resilient Infrastructure, Agriculture and Food Security, Biodiversity, and Tourism.
Investment needs and their financing options? For mitigation and for adaptation?	Individual initiatives in the LEDS have undergone high level costing are tabulated in Annex A. As the four LEDS scenarios involve different combinations of initiatives, there is no published figure for the overall cost of LEDS. For adaptation, the CVA (Document 3) lists sectoral investment needs for strengthening Fiji's climate resilience over the next 10 years, totaling up to almost F$9.3b (CVA, Table ES.2). Of this amount, F$4.2 billion are already planned investments, which would have been fairly costed out, and F$5.1 billion for new projects. Investments amount to F$4.5 billion for the short term (1–5 years) and F$4.8 million for the medium term (5–10 years).
Alignment of the LTS with the NDC?	Yes. The NDC (2015) is clearly referenced in the LEDS as a starting point for Fiji to extend its mitigation efforts. (LEDS, Document 1, page 20). The LEDS provides detailed midcentury targets and associated emission reduction pathways that can guide the formulation of new or revised NDCs. The LEDS was described as “a benchmark against which short- and medium-term planning can be measured, including national development planning, and new or revised NDCs to be submitted to the UNFCCC”. (LEDS, page 21)
Legal status of the LTS? What happens if e.g. emission cuts don't meet the targets?	The National Climate Change Act provides the legal anchor and formalizes the governance and oversight of the National Climate Change Plan's objectives, under which the LEDS is one.

Finland

Reports reviewed (in February 2020)	
• Document 1: Long-term Transition Strategy: The LTS is based on scenario analysis undertaken by an independent "PITKO" research project. The project examined possible pathways for long-run greenhouse gas emission reduction until 2050 and pathways to carbon neutrality by 2035. They identified key actions within different sectors, various packages that will lead to the targets and the economic costs of these packages. The LTS does not include detailed policy assessments or policy instruments, as those will be included in the medium-term climate & energy policy strategy. In addition to environmental and economic impact assessments, the LTS considered financing needs. The underlying PITKO research assessments of the possible long-term emissions scenarios are presented in detail in two separate reports (available only in Finnish): the main report on how to reach carbon neutrality by 2035 and an earlier assessment of emission reduction pathways to 2050 without carbon neutrality by 2035. • Document 2: The Governmental Programme of Prime Minister Sanna Marin's Government: Inclusive and competent Finland – a socially, economically and ecologically sustainable society. The programme sets many targets for Finland's climate and development strategies over the short and long-term. • Document 3: The Climate Change Act was introduced in 2015. It is a framework Act that puts obligations on the authorities which then choose to enact legislation and other measures as needed. The Act sets an emissions reduction target for 2050 and lays down a climate policy planning system for Finland. Finland is currently renewing the Climate Change Act to better support climate actions and the 2035 carbon neutrality target. Amendments are expected by 2021. • Document 4: Finland's Integrated Energy and Climate Plan; The plan contains Finland's national targets and the related policy measures to achieve the EU's 2030 energy and climate targets. The Energy and Climate Plan addresses all five dimensions of the EU Energy Union: decarbonization, energy efficiency, energy security, internal energy markets and research, innovation and competitiveness. • Document 5: The Finnish Climate Change Panel – Path towards Climate Neutral Finland (available only in Finnish); The independent research report by the Finnish Climate Change Committee analyzes possible pathway towards a carbon neutral Finland by 2035 and its challenges. It covers detailed analysis for energy industry, construction and other industrial energy use emissions, domestic transport, other energy use, industrial processes and F-gases (flourinated gases), agriculture, waste and LULUCF (land use, land-use change and forestry).	
Do the plans include the following types of analysis?	
1. Assessment of current state of GHG emissions (and their trend with current measures)?	Yes. The LTS (Document 1) includes a baseline scenario on the Finnish emissions trajectory with existing measures (WEM). It includes a sectoral division of the trajectories and historical developments.
2. Defining key parameters of the strategy (in addition to emission reductions)? What are these?	The Governmental programme (Document 2) defines that in addition to reaching climate neutrality by 2035, other targets include to halt the decline of biodiversity, ensure a fair and inclusive transition for all sectors of society, strengthen Finland's role as a leader in circular economy and to make Finland the world's first fossil-free welfare society. Economic cost-

	effectiveness of emission reductions is also mentioned in various documents.
3. Setting the target and interim targets, for which years?	The LTS (Document 1) and the Government programme (Document 2) define the targets of being carbon neutral by 2035 and of reaching 87-90% reduction of GHG emissions by 2050.
4. Identifying key challenges and bottlenecks? If so, what are these and how were they identified?	The LTS (Document 1) and the detailed research assessments behind it highlight especially challenges related to: attitudes and behavioral changes needed especially related to mobility, diet and general consumption; role of political governance; aging population and subsequent change in population structure; the development of Finnish forests (and soil) and their role as carbon sinks; technological development and their availability; uncertainties related to bio-CCS (carbon capture and storage) technologies; and economic structural changes. In addition, agricultural sector, peat lands, peat energy use, and new district heating sources are mentioned as challenges in the interviews. In addition, the government programme (document 2) identifies the need to evaluate different solutions based on their efficiency, cost-effectiveness and impacts on employment. The importance of a “just and fair transition” is also emphasized in it.
5. Assessing and deciding on policy instruments to deliver the goals? How are these policies identified (what kind of methods, process, etc.)?	The official LTS is more focused on different possible scenarios for emission reductions, not on concrete policy instruments. Medium-term climate change plan and National climate and energy strategy focus more on the concrete policy instruments. Based on the Climate Change Act (Document 3), The Government shall approve a medium-term plan for climate change policy once per electoral term. The previous one is from 2017 and it needs to be updated to be in line with the new, increased emission target. The Integrated Energy and Climate Plan (IECP, Document 4) and the Government Programme (Document 2) include some more detailed policy instruments, but the full set of measures that would be needed to reach the target of carbon neutrality by 2035 is still under review. Table 2 (page 18) of the IECP contains an overview of existing policy measures with some additional measures included in the WAM (With Additional Measures) projections. Chapter 3 (page 82 ->) contains more detailed discussion on different policy measures relating to the five dimensions of the Energy Union. Research inputs and large consultations have been used to form them. The policy instruments included in the Governmental Programme were decided in the government negotiations. In addition, the research assessments made for the LTS (Document 1) identify some policy instruments that could be used to reach the long-term target. These include subsidies, increased R&D investments (particularly in CCS/bioenergy CCS technology), increased investments in renewable energy (wind & solar) and research, carbon pricing and tax on non-renewable resources. These policy instruments and suggested actions were mapped out in workshops.

6. Monitoring, reporting and verification framework and methods for dynamically assessing the development of the situation?	The Climate Change Act (Document 3) lays down the general framework for the planning of climate change policy in Finland and the monitoring of its implementation. It requires annual monitoring of national GHG emissions and how they relate to the estimates regarding the development of emissions. The Government should "sufficiently" monitor the progress of the long- and medium- term climate strategies as well as the adaptation strategy. The Government provides an annual report to the Finnish Parliament regarding the development of emissions and the realization of the targets set in the medium-term climate strategy. The annual report should also include an assessment of the sufficiency of the adaptation measures that are set in the national adaptation strategy. Research institutes are also monitoring the progress and research assessments for the climate neutrality target (Documents 1 and 5) and analyzing changes in the technological options to reduce emissions and their cost-effectiveness. For example, electric vehicles are one of the most cost-effective measures today compared to research findings 5 years ago.
7. Governance of the LTS? What kind of structure is developed for this? Who is in charge of different aspects?	The Climate Change Act (Document 3) defines which ministry is responsible for each climate strategy report (long/medium term, adaptation strategy, annual report). The IECP (Document 4, Figure 1) describes the administrative structure for implementing national energy and climate policies, which is attached below. The Government Programme (Document 2) established a ministerial working group on climate and energy issues, which will oversee all climate policy preparations, as well as a round table on climate policy in connection with the sustainable development committee. The Government will assist local and regional authorities in preparing their own carbon neutrality plans and implementing climate actions and will strengthen the role of the Finnish Climate Panel as an independent, scientific expert body and allocate sufficient resources for it. **Figure 1. Administrative framework of drafting energy and climate policy.** 

8. What other analysis or steps are included in the strategy?	Not applicable.
9. What kind of a process was applied to develop the long-term strategy?	Research inputs were provided by an independent research consortium (Document 1). Based on the results different ministries assess matters from their field independently and Ministry of Economic Affairs and Employment oversees the work and compiles the LTS together after public consultations. A network of senior officials from sectoral ministries and Prime Minister's office make sure that there is no overlap between the work done by different ministries.
10. Which sectors are covered in the long-term strategies?	The LTS (Document 1) includes the following sectors: energy supply, industry, transport, agriculture, LULUCF, and waste management.
Do the strategy reports mention or assess the following?	
Fiscal impacts of the strategy?	Yes. Draft assessments are included e.g. in the Governmental Plan (Document 2).
Social impacts of the strategy (such as employment and distributional impacts)? If yes, what aspects?	Yes. The research assessments done for the LTS (Document 1) identify impacts on employment and income inequality. They also analyze impacts of urbanization on e.g. mobility, housing, infrastructure and services. The IECP (Document 4) contains a discussion on the impact assessment of planned policies and measures, including social impacts and just transition aspects (Chapter 5.2, page 166).
Economic or sectoral competitiveness impacts of the strategy? If yes, what aspects?	Yes. The LTS (Document 1) discusses for example growth contributions of different GDP components for each transition pathway, as well as sectoral shares of the GDP in 2050 for each pathway. The IECP (Document 4, Table 24, p. 169) contains an overview of the impacts of the WAM (With Additional Measures) scenario on the national economy in 2030, compared to the WEM (With Existing Measures) projection.
Emission reduction paths? If so, how many different options?	Yes. Research analysis done for the LTS (Document 1) include in total 4+2 different long-term emission pathways and additional analysis by the Climate Change Panel (Document 5) one additional pathway.
Adaptation needs and policies to address them?	Yes. Adaptation issues are references in the LTS and IECP (Document 1 and 4) and they are based on the National Climate Change Adaptation Plan 2022, published by the Ministry of Agriculture and Forestry in 2014. The National Adaptation Plan is part of the climate change policy planning system complying with the Climate Change Act. As an example, the electricity distribution network has been already made resilient against extreme weather conditions after heavy storm damages in 2012.

Investment needs and their financing options? For mitigation and for adaptation?	Yes. The LTS (Document 1) includes a chapter on investment needs, particularly related to industrial investments, energy renovations, removal of peat from the district heating system, R&D and innovation investments. It does not include detailed suggestions for financing options. Additionally, the Government Programme (Document 2, Annex 2) includes the content of the Government's future-oriented investment programme, which consists of investments that support the attainment of the Government Programme's objectives, including the target of a carbon neutral Finland by 2035. The IEP (Document 4) assess that the transition to a low-carbon economy will require additional investments, particularly in bioeconomy, the circular economy, clean energy solutions, energy efficiency, emissions-free forms of energy production, energy storage solutions, carbon recovery and energy utilization, along with research, development and innovation activities and measures to bring these solutions to market. Investment needs are discussed in detail in Chapter 5.3 (page 171).
Alignment of the LTS with the NDC?	Finland does not have its own individual NDC, but it takes part in the EU's commitment to the Paris Agreement.
Legal status of the LTS? What happens if e.g. emission cuts don't meet the targets?	Yes. Under the Climate Change Act (Document 3) the Government is obligated to change the climate strategies accordingly and introduce additional measures if emissions do not meet the targets set in the long or medium term climate strategies.

Additional perspectives: *(From informal interviews with civil servants and academia involved in the Finnish climate policy)*

- Clear and separate roles for government officials and politicians should be defined and cooperation between the different ministries and stakeholders is crucial.
- Persistence and long-term thinking is key.
- Technologies (e.g. in the energy sector) are changing extremely fast so international cooperation is needed, and plans should be periodically reviewed and adjusted as cost of new technology changes.
- Collaboration and especially international cooperation is very important, and its role should be emphasized.

The Netherlands

Reports reviewed (in February 2020)	
• Document 1: Climate Agreement (2019) The Climate Agreement includes the results of broad consultations with more than 100 parties on how to achieve a carbon reduction target of 49% by 2030 in the Netherlands. It outlines the goals and targets under the Climate Agreement and sets out the principles for monitoring and governance. The document also includes detailed commitments made in five sector platforms and for various cross-cutting issues affecting multiple sectors. • Document 2: Long Term Strategy on Climate Mitigation (2019) This document extends beyond the 2030 targets with an overview of current policies that aid in the long term transition, and discusses the policies and instruments needed to continue the transition into 2050 and serves as the guiding document for updating climate plans required by legislation (see Document 3). • Document 3: Climate Act (2019) The Climate Law, in effect from the beginning of 2020, includes emission reduction targets for 2030 and 2050, and the monitoring and governance structure for climate policies. • Document 4: Het klimaatakkoord: effecten en aandachtspunten, PBL This research document of the Netherlands Environmental Assessment Agency (PBL) analyzes the GHG effects from the Climate agreement and its direct investment and capex costs. • Document 5: Doorrekening Klimaatakkoord, CPB This research document of the Bureau for Economic Policy Analysis (CPB) analyzes the fiscal, economic and social effects of the Climate Agreement, in particular the income effects to different types of households. • Document 6: Kosten Energie- en Klimaattransitie in 2030 - Update 2018, PBL This research assessment of PBL analysis the GHG reduction potential and emission reduction costs of different emission reduction options. It was done at the beginning of the Dutch Climate Agreement process.	
Do the plans include the following types of analysis?	
1. Assessment of current state of GHG emissions (and their trend with current measures)?	Yes. The two PBL reports analyze the current situation of Dutch emissions and on the potential additional effects of the Climate Agreement and different emission reduction options.
2. Defining key parameters of the strategy (in addition to emission reductions)? What are these?	According to the Climate Agreement, the Dutch government's priority is to ".. achieve the 49% reduction target in a way that is feasible and affordable for everyone. This means ensuring the lowest possible impact on the household budget and a fair distribution of burdens between households and businesses, while maintaining a level playing field for our business sector."
3. Setting the target and interim targets, for which years?	Yes. GHG reduction targets of 49% by 2030 (compared to 1990) and 95% by 2050 are laid out in the Long Term Strategy (Document 2) and set out in the Climate Act.
4. Identifying key challenges and bottlenecks? If so, what are these and how were they identified?	The main discussion and challenges in these reports relate to social and competitiveness impacts of the climate policies. The main concerns included expectations to avoid a large increase in tax burden on society, while cutting industrial emissions with minimal competitiveness impacts. The building (home heating) sector was considered another challenge due to the predominance of individual

	gas boilers and the need for households to undergo energy renovations.
5. Assessing and deciding on policy instruments to deliver the goals? How are these policies identified (what kind of methods, process, etc.)?	The Netherlands used a bottom-up methodology together with extensive multi-stakeholder sectoral tables as input for discussion on potential policy measures for five sectors. After the measures were discussed and selected, they were again assessed as packages for the main emission, economic, fiscal, and social impacts. In the final phase, government selected its own final package of policy measures, which was also assessed. The bottom-up approach is based on PBL's assessment of cost-effective measures for different sectors. The multi-stakeholder sectoral platforms under the Climate Agreement process produced sectoral policy packages, and specific multi-sectoral working groups came up with packages for cross sectoral issues. These sectoral packages were assessed by PBL and CPB (for fiscal and income distribution impacts), which together with discussions in the political arena were the basis for the cabinet to come up with the final agreement. PBL conducted emissions impact analysis using technology oriented modeling, and also analyzed carbon leakage. CPB used microdata (household) to model fiscal and distributional impacts.
6. Monitoring, reporting and verification framework and methods for dynamically assessing the development of the situation?	Yes. The Climate Act includes a detailed monitoring structure of targets with annual reporting. The Climate Act prescribes governance that is specifically geared toward safeguarding the targets, for which the Minister of Economic Affairs and Climate Policy bears ultimate responsibility. The Act sets out the following aspects: • Climate Plan: contains the key points of the government policy to be implemented in the next ten years. The first Climate Plan will be based on the Climate Agreement. The Climate Plan is issued in 2019, can be amendable in 2021, and be revised and readopted every five years; • Climate and Energy Report (KEV): published by PBL and will provide a report of actual and forecast CO2 emissions in the Netherlands (and broader energy management). The KEV will be published each year starting 2019; • Climate Memorandum: contains a review of progress made on various measures, a Government Appraisal of the targets, and any additional policy intentions to achieve those targets. The memorandum will be issued starting in 2020 and is produced annually to complement the Climate and Energy Report.
7. Governance of the LTS? What kind of structure is developed for this? Who is in charge of different aspects?	Yes. The Climate Act includes a detailed governance structure for the implementation and adjustment of climate policies. Minister of Economic Affairs and Climate Policy is in charge of overall climate mitigation policy, and responsible for the transition in the electricity sector and industry. Minister of Interior Affairs is responsible for the transition in the built environment, Minister of Agriculture for the agricultural sector, and the State Secretary for Infrastructure and Water is responsible for the transport sector.

8. What other analysis are included in the strategy?	The Climate Agreement also analyzes cross-cutting issues related to climate action, e.g., spatial planning, labor markets and training needs, information campaigns and other strategies for building support among citizens.
9. What kind of a process was applied to develop the long-term strategy?	The Climate Agreement is based on bottom-up analysis of different emission reduction options and their costs, followed by extensive multi-stakeholder discussions around five broad sectors. Proposals for reaching emission targets were assessed by independent research organizations (PBL and CPB) and amendments were made to plans and policy instruments. The Government presented the agreement to Parliament and the main impacts for the final form of the agreement were reassessed (presented in the PBL and CPB documents that were reviewed here). Cross-cutting issues affecting multiple sectors were also assessed. A separate Long-Term Strategy summarizing the main strategic issues that are relevant for the long term (>2030) and require extra attention in the years to come were also passed alongside the national Climate Agreement which contains targets for 2030.
10. Which sectors are covered in the long-term strategies?	The analysis were done for five major sectors and for various cross-cutting issues. The sectors are: built environment, mobility, industry, agriculture and land-use, and electricity. The cross-cutting themes are: system integration, biomass, integrated innovation and knowledge agenda, labor market & training, creating support in society, spatial planning, regional energy strategy, financial markets, expansion of subsidy schemes, and the exemplary role of the national government.
Do the strategy reports mention or assess the following?	
Fiscal impacts of the strategy?	Yes. By PBL and CPB (reports cited above).
Social impacts of the strategy (such as employment and distributional impacts)? If yes, what aspects?	Yes, By PBL and CPB and also in a separate working group on social impacts under the Climate Agreement process.
Economic or sectoral competitiveness impacts of the strategy? If yes, what aspects?	Yes. By PBL and CPB
Emission reduction paths? If so, how many different options?	Partially. No comprehensive paths, but various options and their emission reduction potential were analyzed by PBL (see 2018 report).
Adaptation needs and policies to address them?	No. Adaptation is treated as a separate policy area.

Investment needs and their financing options? For mitigation and for adaptation?	Yes. The Agreement includes details on how the financial sector will contribute to the implementation of the Paris Agreement and the Climate Agreement
Alignment of the LTS with the NDC?	No. The Netherlands has no individual NDC but comes under the EU NDC.
Legal status of the LTS? What happens if e.g. emission cuts don't meet the targets?	The Climate Act includes targets for emission reductions and empowers the Dutch Parliament to hold government to account.

Additional perspectives: *(From informal interviews with members of the strategy development team)*

- Multi-stakeholder process was useful for gaining broad support for the policy measures, spread information to the public and discussing issues and potential measures. The process helped advance the measures politically.
- Independent assessments of proposed measures at various stages of the process were essential for fine-tuning the policies and for obtaining a good sense of their potential emission, economic, fiscal and social impacts. Some policy measures were amended after the first round of assessments after it showed that the likely impacts would not have been acceptable to stakeholders. One consideration for future assessments is to compare unilateral policies versus multilateral policies, given the integrated EU energy market.
- The experience has highlighted the importance of monitoring issues that are relevant in the long term and require timely policy interventions. The long-run emission pathways should be assessed at the same time as short/medium-term pathways to avoid actions that could hinder long-run emission reductions or make them more costly.

Spain

Reports reviewed (in February 2020)	
• Document 1: National Energy and Climate Plan National Energy and Climate Plans (NECP) are part of the EU Energy Union Governance, whereby member states articulate their plans to comply with the Energy Union objectives. The Spanish NECP is divided into two large blocks: The first provides details about the process, national objectives, policies and existing measures, and measures that are necessary for achieving the objectives of the Plan, as well as analysis of the impact in terms of the economy, employment, distribution and health benefits. The second block comprises the analytical part, which provides details about the projections, both of the Baseline Scenario and the Target Scenario, as well as descriptions of the different models that have made the prospective analysis possible and that give robustness to the results. • Document 2: Impacto económico, de empleo, social y sobre la salud pública del Borrador del Plan Nacional Integrado de Energía y Clima 2021-2030. This report (Impact Assessment) provides a detailed economic impact assessment of the Spanish draft NECP undertaken by the research organization Basque Centre for Climate Change. • Document 3: European Commission: Assessment of the draft Energy and Climate Plan of Spain This is the European Commission's assessment (EC Assessment) of the Spanish NECP against guidelines for developing the NECP. • Document 4: Draft Just Transition Strategy. The Just Transition Strategy (JTS) is a state-level strategy that aims to take advantage and maximize the opportunities in terms of jobs and economic activity associated with the transition to a low carbon economy and to identify and adopt measures that guarantee a fair treatment of workers and territories affected by the transition. • Document 5: Draft climate change law. The draft climate change law (Draft Law) presents the emissions reduction targets for 2030 and the objective to achieve climate neutrality by 2050. The law also presents some sectoral objectives and the role of climate change adaptation.	
Do the plans include the following types of analysis?	
1. Assessment of current state of GHG emissions (and their trend with current measures)?	Yes. The NECP (Document 1) includes a baseline scenario which projects an increase in emissions by 2030.
2. Defining key parameters of the strategy (in addition to emission reductions)? What are these?	The strategy parameters are reflected in the key objectives of the Draft Law (Document 5), which are: compliance with the objectives of the Paris Agreement, facilitate the full decarbonization of the Spanish economy, to guarantee rational and fair use of the resources, and the implementation of sustainable development model which generates decent employment. The other principles of the Draft Law include: Protection of the environment, and application of the principle "polluters pay"; Social and territorial cohesion; Health protection; Protection of vulnerable groups, special consideration given to children; Equality between women and men; Improving the competitiveness of the productive sectors; Caution, and No regression.

3. Setting the target and interim targets, for which years?	Yes. The NECP (Document 1) aims for a 20% emission reduction by 2030 compared to 1990 levels. In addition, the long-term objective is to achieve carbon neutrality by 2050.
4. Identifying key challenges and bottlenecks? If so, what are these and how were they identified?	The NECP (Document 1) identifies the challenges in each of the dimensions of the plan: renewable energies; energy efficiency; energy security; the internal market for energy; and research, innovation and competitiveness. For example, the large-scale deployment of renewable energy could depress the wholesale electricity prices and increase social opposition. To tackle the latter, the NECP includes measures to promote knowledge sharing and awareness raising. Spain has also identified the management of the social impacts of the transition as a key challenge. The Just Transition Strategy was drafted to tackle this issue.
5. Assessing and deciding on policy instruments to deliver the goals? How are these policies identified (what kind of methods, process, etc.)?	Yes. The NECP (Document 1) proposes twenty measures which seek to decarbonize the economy. The measures for the energy sector were identified and chosen according to the cost-effectiveness using detailed modelling. Of these ten aim to specifically promote a renewable technology; three measures take a cross-cutting approach to all renewable sources, technologies and uses; three measures target non-energy non-ETS sectors; and two measures relate to the land-use, land-use change and forestry (LULUCF) sector. Finally, one measure relates to the application of the emissions trading system and another to taxation. Each measure includes the following information: a) description, b) objectives addressed, c) mechanisms, d) responsible bodies, e) public funding if applicable f) expected GHG impact if applicable.
6. Monitoring, reporting and verification framework and methods for dynamically assessing the development of the situation?	As an EU member state, Spain is subject to the EU governance regulations which include a mechanism for monitoring and reporting GHG emissions and other information. No further details are given in the NECP. More generally, the Ministry of Ecological Transition is responsible for the submission of the National Inventory Report (NIR) to the UNFCCC.
7. Governance of the LTS? What kind of structure is developed for this? Who is in charge of different aspects?	Spain has created an Inter-ministerial Committee on Climate Change for oversight and governance of the development of the NECP. It is also a requirement under EU governance regulations that EU member states to produce integrated energy plans and long-term emissions strategy, with progress reports to the EU every two years.
8. What other analysis or steps are included in the strategy?	Aspects of Just Transition are also addressed in the draft Climate Law and a separate Just Transition Strategy (JTS) was produced. The JTS seeks to minimize the adverse impacts of climate policies in the affected regions (such as on employment and economic activity) and maximize the opportunities that the policies might bring. Just Transition Agreements will pay a key role in delivering

	this objective. These agreements involve representatives from central, regional and local government as wells as other key players such as the private sector, civil society. The agreements aim to promote new economic activity and employment in affected regions, and are developed through a participatory process. It include measures such as guaranteeing access to key infrastructure after the closure of mines and power plants; energy policies such as organization of renewable energy tenders in the affected regions; and priority access to assistance and funds. The agreements also promote the recovery of biodiversity.
9. What kind of a process was applied to develop the long-term strategy?	The basis for the development of the NECP is to achieve alignment with the Paris Agreement. This, together with the obligations of Member States under the European Union, provide for the establishment of medium term (2030) and long-term (2050) targets. The Inter-ministerial Commission on Climate Change and Energy is the key coordination mechanism to drive the process and assess the measures and instruments needed to achieve the objectives of the plan. Also consulted are Autonomous Communities, business groups, and civil society.
10. Which sectors are covered in the long-term strategies?	Spain's NECP covers the key sectors of energy, transport, industry, buildings, agriculture, waste. The contribution of the measures to the generation of removals in the LULUCF sector will depend on the forest reference level, which is currently being computed. For this reason, the present draft does not include the quantitative contributions planned for the LULUCF sector, but these will be incorporated into the final INECP 2021-2030 once the forest reference level is defined.
Do the strategy reports mention or assess the following?	
Fiscal impacts of the strategy?	Yes. The Impact Assessment report assesses the economic impacts of the NECP and main findings of the assessment are also summarized in chapter 4 of the NECP. These cover impacts on GDP, employment, investment needs, energy imports, impact on public accounts, and debt/GDP ratio. In essence, the additional investments into low-emissions energy over the base case and the reduction in fossil fuel imports combine to produce a net positive effect on the economy, showing up as a +1.8% growth in GDP in 2030 according to the model. Regarding investments needs, the draft plan quantifies a total of EUR 236 billion, in the period 2021-2030. This is roughly 2% of GDP annually, of which 20% would come from public sources.
Social impacts of the strategy (such as employment and distributional impacts)? If yes, what aspects?	Yes. The Impact Assessment report presents the social impact assessment from NECP scenarios. Employment impacts are assessed by sector and industry. Impact on available income and consumption by income quintile, by different household types, and by rural/urban dimension. The analysis also presents the impacts

	of NECP scenarios on energy poverty, air pollution and public health. (NECP, Chapter 4).
Economic or sectoral competitiveness impacts of the strategy? If yes, what aspects?	Yes. The Impact Assessment report presents indicators such as jobs created and jobs lost by sector and the impact of the target scenario on the economic output per sector compared to the baseline scenario.
Emission reduction paths? If so, how many different options?	The NECP presents the baseline scenario and the target scenario to meet the 2030 target (20% emission reduction from the 1990 levels). Work is underway to develop scenarios to meet the 2050 climate neutrality target, but results are yet to be published.
Adaptation needs and policies to address them?	Yes. The draft Climate Law addresses the expected impacts of climate change and needs for adaptation, covering areas like water resources, infrastructure, biodiversity, and forestry. The draft law does not analyze adaptation policies and measures (this is not within the scope). The main climate change adaptation document is the National Adaptation Strategy. It is expected that the new strategy for the 2050 climate neutrality target will also cover the impacts of climate change and adaptation measures to reduce vulnerability to climate change.
Investment needs and their financing options? For mitigation and for adaptation?	Yes. Investment needs are given in the NECP and Impact Assessment reports for mitigation actions. The total investments to achieve the objectives of the NECP will reach EUR 236.1 billion between 2021 and 2030. Of this amount, EUR 195.3 billion are additional investments compared to the Baseline Scenario. The breakdown is: • Investments in energy savings and efficiency: 37% (86.4 billion); • Renewables: 42 % (101.6 billion); • Networks and electrification of the economy: 18% (41.8 billion); • Non-energy non-ETS and other electricity: 3% (6.1 billion). According to the NECP, 80% of the investment will be made by the private sector.
Alignment of the LTS with the NDC?	As an EU Member State, Spain contributes to the EU NDC. Spain's 2030 target is aligned with the EU NDC, and involves deeper cuts than is required under the effort sharing requested by EU. Spain has adopted the same target for 2050 as the EU, by aiming to achieve climate neutrality.
Legal status of the LTS? What happens if e.g. emission cuts don't meet the targets?	The draft Climate Law includes the 2030 and 2050 targets. The 2030 target is set under the EU Energy Union Governance regulations. The Energy Union Governance regulation requests periodic reviews on the progress, and an update of the national

	NECP is needed if a Member State is not on track in meeting its targets.

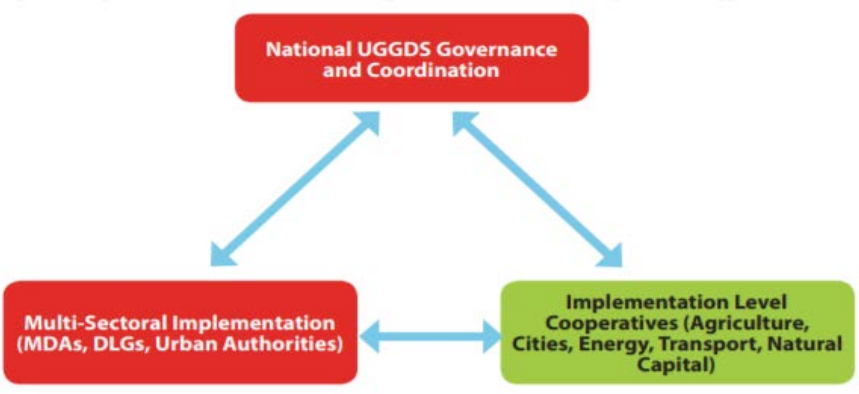
Additional perspectives: *(From informal interviews with members of the strategy development team)*

- Economic modelling tools are only useful if the results can be clearly communicated to policy makers. The economic impact modelling conducted for the NECP required extensive effort.
- Reflecting on the process of NECP development, the following aspects are thought to be critical for success: applying technically sound assessment of the measures; relaying key information to policy makers; managing information, strong leadership and oversight.
- The key challenges for climate action appear to be: management of the social transition, and scaling up and allocation of finance.
- Importance of having an expert group established to identify and recommend policy instruments. Modelling results were critical in policy deliberations and decisions.

Uganda

Reports reviewed (in February 2020)	
Like several other countries, Uganda does not have a self-contained long-term transition strategy document but has a series of related plans. The primary documents reviewed are the most forward looking strategies incorporating national climate change and economic goals, which are the National Climate Change Policy and the Green Growth Development Strategy. Also, cross reference to other official reports namely the Nationally Determined Contribution and Biennial Update Report provided a clearer definition of Uganda's adaptation and mitigation plans. • Document 1: National Climate Change Policy (2015). The policy document provides a clearly defined pathway for dealing with the challenges of climate change within the socio-economic context of Uganda, and looks ahead to the opportunities and benefits of a green economy. • Document 2: Green Growth Development Strategy 2017/18-2030/31. The green growth development strategy aims to operationalize green growth principles and accelerate the implementation of global development goals, Uganda Vision 2040 and the National Development Plans. • Document 3: Nationally Determined Contribution (2015). Uganda's first NDC includes mitigation goals for the energy supply, forestry and wetland sectors by 2030, and adaptation priorities in agriculture and livestock, forestry, infrastructure (with emphasis on human settlements, social infrastructure and transport), water, energy, health and disaster risk management. • Document 4: First Biennial Update Report 2019. This report to the UNFCCC provides information on Uganda's National Circumstances; National Greenhouse Gas Inventory (covering energy, industrial process and product use), agriculture, forest and other land use, waste sectors; mitigation actions and their effects; measurement, reporting and verification; constraints and gaps; and support received and needed.	
Do the plans include the following types of analysis?	
1. Assessment of current state of GHG emissions (and their trend with current measures)?	Yes. The current GHG emissions are contained in the First Biennial Update Report (Document 4) under the National Greenhouse Gas Inventory covering the period 2005 to 2015.
2. Defining key parameters of the strategy (in addition to emission reductions)? What are these?	The Green Growth Strategy (Document 2) articulates its objectives as economic, social, and low carbon goals: i. Accelerate economic growth and raise per capita income through targeted investments in priority sectors with the highest green growth multiplier effects; ii. Achieve inclusive economic growth along with poverty reduction, improved human welfare and employment creation; iii. Ensure that the social and economic transition is achieved through a low carbon development pathway that safeguards the integrity of the environment and natural resources. In line with other East African countries, Uganda's National Climate Change Policy (NCCP, document 1) emphasizes adaptation as its main priority followed by mitigation. Both are considered equally important (NCCP, page viii) in cases of: 1) Interaction between population dynamics, climate change and development; 2) Information sharing and

	research regarding climate change impacts; 3) education and awareness raising; 4) technology research and development; 5) gender issues; and 6) international cooperation.
3. Setting the target and interim targets, for which years?	As per Uganda's NDC (Document 3), the GHG reduction target is 22% below the Business-as-Usual (BAU) scenario by year 2030. The projected BAU emissions in 2030, including Land Use, Land Use Change and Forestry, is 77.3 Mt CO2e per year. Total emissions in 2000 were 36.5 MtCO2e/yr. (NDC, page 11). Based on research results presented in the Green Growth Strategy (Document 2), even somewhat higher target of 28% reduction relative to BAU might be possible for Uganda.
4. Identifying key challenges and bottlenecks? If so, what are these and how were they identified?	The main challenges for climate resilient growth are most clearly articulated in the NCCP and NDCs (Document 1 and 3). In both of these documents, adaptation is mentioned as the main challenge. Issues that relate to both adaptation and mitigation are capacity building, technology transfer and finance. The NCCP lists eight Key Policy Principles that represent high-level challenges: 1) Mainstreaming and Coordinated Response to Climate Change; 2. Communicating Effectively and Promoting Participatory Approaches; 3. Promoting Community-Based Approaches to Adaptation; 4. Devoting Adequate Attention to Capacity Development and Institutional Set-Ups; 5. Devoting Adequate Attention to Technology Needs, Development and Transfer; 6. Identifying, Developing and Influencing Financing Mechanisms; 7. Providing a Credible Delivery Structure; 8. Addressing Cross-Cutting Issues. Sector-specific challenges to both adaptation and mitigation are also present. The actions identified in the NDC are: 1. Access to and diffusion of appropriate clean technologies; 2. Promotion of renewable energies and energy efficiency, including the involvement of the private sector; 3. Research into climate smart and sustainable agricultural practices, including dissemination of good practices; 4. Scaling up Climate Smart Agriculture; 5. Improving national policies and legislation; enhancing climate change education, training and public awareness; 6. Building of climate information systems; 7. Setting up of public-private partnerships; 8. Mainstreaming gender into development policies, plans and strategies as well as observance of human rights in all climate change adaptation and mitigation actions.
5. Assessing and deciding on policy instruments to deliver the goals? How are these policies identified (what kind of methods, process, etc.)?	The green growth strategic framework catalyzes economic growth through efficient use of the country's natural, human, and physical capital in an inclusive manner along low emissions development pathway (Green Growth Strategy, document 2, page 44). Through this broad approach five priority areas of green growth are: sustainable agriculture and value chains; natural capital management and development; green cities; sustainable transport; and energy for green growth. A diagnostic process is undertaken that examined the status of implementation of the green economy, with several best practices identified to be scaled up and/or integrated within existing practices and inefficient practices.

	The NCCP (document 1) sets out a policy framework that guides action against climate change with sector-specific priorities in adaptation and mitigation. These priorities define the policy response and specific strategies that each sector follows when deciding on the policy instruments. The exact policy instruments are informed by knowledge of local conditions and are hence decided at the local government level.
6. Monitoring, reporting and verification framework and methods for dynamically assessing the development of the situation?	Both the NCCP and the Green Growth Strategy include a clearly defined framework for monitoring, reporting and verification (MRV). The monitoring and evaluation framework for green growth defines the indicators, means of measure, data sources, implementation timelines, and the lead agency for each of the strategies. (Green Growth Strategy, Document 2, page 65). Monitoring and evaluation of the NCCP (Document 1) focuses on: 1) *Effective use of resources* - to ensure that resources for sustainable development are well spent; 2) *Climatic changes and their impacts* - to plan targeted adaptation interventions and track their appropriateness and cost effectiveness; 3) *An MRV system for Uganda's REDD+ activities* - to enable the country to access larger scale international support for its contributions to tackle climate change. As the current MRV system for mitigation provides GHG inventories and baselines for the National Mitigation Action plans and REDD+ actions in an ad hoc manner, a new and more robust MRV system is being planned. This is scheduled to be operational by 2024.
7. Governance of the LTS? What kind of structure is developed for this? Who is in charge of different aspects?	The Green Growth Strategy adopts the same governance framework as the National Development Plans, in which the National Planning Authority and Ministry of Finance, Planning and Economic Development (MFPED) leads the overall implementation and monitoring, together with other lead agencies and civil society. Responsibility for the results, outcomes and annual reporting on the performance is held at the multi-sectoral implementation level. District and Local Governments (DLGs) play a key role given the urban and rural landscapes approach. (Green Growth Strategy, Document 2, page 57)  The coordination of climate change policy falls under the Climate Change Department in the Ministry of Water and Environment. MFPED aligns the financing and budgeting for climate action and oversees the macroeconomic aspects.

8. What kind of other possible steps are included?	Not applicable
9. What kind of a process was applied to develop the long-term strategy?	There is no unifying LTS document but a series of related strategies and plans. The process of developing the Green Growth Strategy is described in section 5 above. The Ministry of Water and Environment is responsible for developing the NCCP through a comprehensive intergovernmental process and wide consultation at the national and local levels.
10. Which sectors are covered in the long-term strategies?	The adaptation policy priorities cover the following sectors: Agriculture and livestock; Water; Fisheries and aquaculture; Transport and works; Forestry; Wetlands; Biodiversity and ecosystem services; Health; Energy; Wildlife and tourism; Human settlements and infrastructure; Disaster risk management. The mitigation policy priorities cover the following sectors: Forestry; LULUC; Reduces emissions from deforestation and forest degradation+ (REDD+); Wetlands; Agriculture; Energy generation; Energy utilization; Transport; Waste management; Industrial sector.
Do the strategy reports mention or assess the following?	
Fiscal impacts of the strategy?	Although no details are given, the Green Growth Strategy envisioned a temporary increase in fiscal deficit which is expected to normalize by 2020/21. The financing strategy involves up to 30 percent of the funding needs to be mobilized from public sector allocation and environmental fiscal reform, with the remaining from external finance. (Green Growth Strategy, Document 2, page 88). The strategy cites environmental fiscal reform as having some potential for revenue mobilization for green growth, focusing on environmental levies and compliance charges, resource rents and fees, subsidy reforms and other non-tax revenue sources (Green Growth Strategy, page 27).
Social impacts of the strategy (such as employment and distributional impacts)? If yes, what aspects?	The Green Growth Strategy (Document 2) acknowledges that structural changes may require new knowledge and skills for government, decision makers, professionals and workers, down to local levels. It notes that the structural employment and institutional changes required will require financial backing to accelerate the transition by organizations and workers, through training and skills development. Distributional analysis was not mentioned. The NCCP notes the negative impact of climate change on agriculture, forestry and fisheries, which in turn leads rural-urban migration and poverty.
Economic or sectoral competitiveness impacts of the	There is no explicit mention of impact on economic and sectoral competitiveness. Rather the Green Growth Strategy (Document 2) highlights the need for green growth to boost Uganda's competitiveness

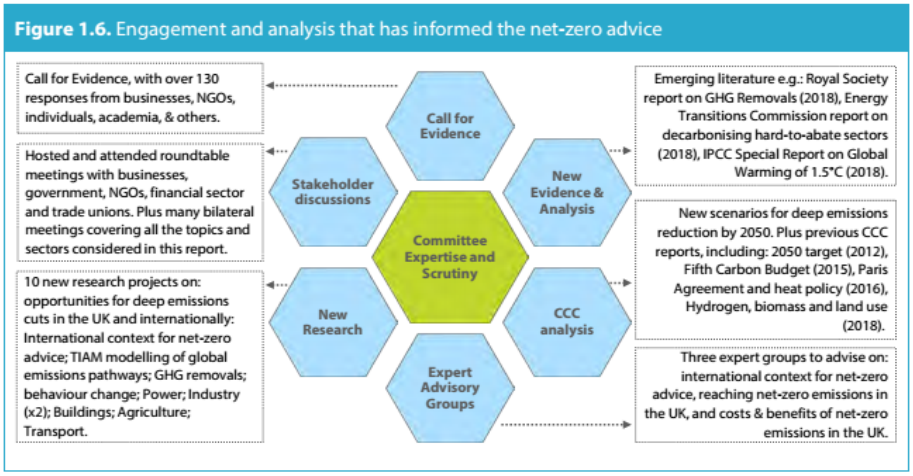
strategy? If yes, what aspects?	through strengthened value chains in the agricultural sector, green cities, and sustainable transport. The NCCP (Document 1) acknowledges that climate change is likely to have an impact on Uganda's macroeconomic stability and socioeconomic development, and that the economy is particularly vulnerable to climate change given its heavy reliance on its natural resource base.
Emission reduction paths? If so, how many different options?	This was not found in the documents reviewed.
Adaptation needs and policies to address them?	Adaptation is the top priority of climate policy in Uganda. The main challenges originate from adaptation needs and the solutions in climate policy try to address the adaptation-related challenges. These issues are covered above in questions 4 and 5 above.
Investment needs and their financing options? For mitigation and for adaptation?	The annual financing level for green growth is US$1.8 billion/year and six financing sources have been identified for it (Green Growth Strategy, document 2, page 59). The funding sources include: mobilization from public sector allocations; environmental fiscal reforms and subsidy reforms; sustainable procurement; certification of sustainable production and trade and inclusive green social enterprises; green energy investments and incentives; green innovation and payments for ecosystem services; and international funding. Notably public sector allocations and environmental fiscal reform is expected to comprise 30 percent of the financing, equivalent to US$540 million/year.
Alignment of the LTS with the NDC?	Based on macroeconomic models, the Green Growth Strategy projects, with full implementation of green growth actions, will lead to an increase in national GDP by 10 percent beyond the business as usual (BAU) target, while delivering an additional 4 million green jobs and reducing GHG emissions by 28% relative to BAU, which is a more ambitious target than the NDC. (Green Growth Strategy, page 17). The strategy cites climate change initiatives such as mitigation actions (NAMAs) and forest interventions (REDD+) as the basis for many of the green growth initiatives). However, it is not clear if these Green Growth Strategy projections are official targets.
Legal status of the LTS? What happens if e.g. emission cuts don't meet the targets?	Not explicitly mentioned in the documents reviewed.
Additional perspectives: *(From informal interviews with members of the strategy development team)* • Importance of consulting with actors from all sectors to have them onboard. • Importance of conducting a stakeholder analysis. • Having political champions of climate policy and green growth ensures fast implementation and continuity over a longer period of time.	

- A technical working group is needed, under guidance of a chair.
- Sectoral management should be respected within the context of governance at the local and federal level. Local government and communities are often important for implementation and there are various stakeholders at these levels. Silos are to be avoided.
- Data is essential and information should be made public.

United Kingdom

Reports reviewed (in February 2020)	
• Document 1: Net Zero - The UK's contribution to stopping global warming (2019) This report is produced by the Committee on Climate Change (CCC), which is an independent, statutory body established under the Climate Change Act 2008. Its purpose is to advise the UK Government and Devolved Administrations on emissions targets and report to Parliament on progress made in reducing greenhouse gas emissions and preparing for climate change. The report provides a Paris Agreement aligned net-zero emissions target by 2050 for the UK, different options for reaching the target in practice and preliminary cost-benefit analysis. It answers the following questions: 1. Is now the right time to set a net-zero target (for UK)? 2. Should the net-zero target be for CO_2 or all GHGs? 3. When should the UK reach net-zero GHGs and what should the long-term targets be for the UK, Scotland and Wales? 4. How can the UK reach net-zero GHGs? 5. What are the expected costs and benefits of a UK net-zero GHG target for 2050? In addition the report provides recommendation to the UK Government for next steps to achieve the net zero 2050 target. The official Climate Change Act targets were set by the UK government taking into account CCC's advice in this Net Zero Report, which is the document reviewed here and for the purpose of this exercise is referred to as 'a' Long Term Strategy. The Net Zero Report is not an official UK governmental Long Term Strategy (LTS). • Document 2: Net Zero – Technical Report (2019) The technical report includes all the analysis that were carried out for each sector of the economy, plus consideration of flourinated gas emissions and greenhouse gas removals. In total it includes detailed analysis of emission reduction options for ten different sectors (see below). For each sector the options are grouped by the level of challenge associated with their delivery. The grouping of emission reduction options were categorized as 'Core', 'Further Ambition' and 'Speculative'. 'Core' options include the most cost-effective options. 'Further Ambition' options are more challenging and more expensive than the Core options, and 'Speculative' options have, e.g., very low levels of technology readiness, very high costs, or significant barriers to public acceptability.	
Do the plans include the following types of analysis?	
1. Assessment of current state of GHG emissions (and their trend with current measures)?	Yes. Analysis on the current state and trends of recent years is included in chapter 5 of the main report
2. Defining key parameters of the strategy (in addition to emission reductions)? What are these?	Equity and fairness of climate measures, how to keep cutting emissions without undermining economic growth (p. 130 of main report), impacts on affordability for consumers, energy security and competitiveness, as well as wider economic benefits. (Also chapters 5 - 7 of main report).
3. Setting the target and interim targets, for which years?	Yes. The main target is to be carbon neutral by 2050 (set in the revised UK Climate Change Act 2019), with five-year interim carbon budgets in line with the long-term target. The official Climate Change Act targets were set by the UK government taking into account the CCC's advice in the Net Zero Report (main report), which is the document that was reviewed here and for the purpose of this exercise is referred to as 'a' Long Term Strategy. The Net Zero Report is not an official UK governmental LTS. The official UK Climate Change Act 2008 (2050

	Target Amendment) Order 2019 can be found at: https://www.legislation.gov.uk/uksi/2019/1056/introduction/made
4. Identifying key challenges and bottlenecks? If so, what are these and how were they identified?	Yes. The key challenges and bottlenecks were identified based on the sectoral emission reduction analysis and comparison of the 'Core' options against the required GHG reductions. The main challenges include: hard-to-abate sectors (such as agriculture and aviation) where new technologies might not be available in time, distributional effects of climate measures and how to inform people about them, hydrogen, individual house heating, and Heavy Goods Vehicles (HGVs). Key uncertainties for future emissions include economic factors, changes in society and behaviors, the rates at which technologies become available, their costs and emissions reduction potential and potential carbon leakage from the increased costs in industry. (See Technical Report and chapter 5 of the main report).
5. Assessing and deciding on policy instruments to deliver the goals? How are these policies identified (what kind of methods, process, etc.)?	Partially. Chapter 6 of the main report includes a transition plan to deliver the net-zero 2050 target and some higher level policy analysis and policy pre-conditions. The analysis are mainly based on the sector level analysis in the Technical Report and on the other evidence created for the report. However, the assessment of specific policy instruments is still in progress. (See chapter 6 of main report and Figure 6.1 for the main transition plans and policy pre-conditions. The report sets out to "assess whether it would be technically feasible to reduce UK greenhouse gas (GHG) emissions to net-zero if there were a well-designed policy framework in place to deliver it. We conclude that it is technically feasible by 2050 but highly challenging.")
6. Monitoring, reporting and verification framework and methods for dynamically assessing the development of the situation?	Yes. Each year the CCC must publish an independent assessment of progress towards the carbon budgets and the 2050 target and of whether the targets are likely to be met. The Secretary of State must respond to the points in these progress reports, and provide a mechanism to get progress back on track if the carbon budget is at risk of being missed.
7. Governance of the LTS? What kind of structure is developed for this? Who is in charge of different aspects?	Yes. The Climate Change Act 2008 governs and legislates the implementation of the LTS. The emission reduction target is set in the law for the long-term (now zero emissions target set to 2050), and five-year carbon budgets are set in line to meet the long run target. The Government is required to bring forward policies to meet the target and the CCC is set to monitor progress and suggest required changes. Main report, chapter 6, includes also recommendations to changes in the governance of climate policies to make them more coherent. (The Net-zero by 2050 target was set to law in June 2019. https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law)
8. What other analysis are included in the strategy?	The impact analysis includes energy security issues.
9. What kind of a process was applied to develop the long-term strategy?	The assessment was made based on a large variety of bottom-up analysis at sector level. An extensive evidence base was collected for the report, including new published sources, responses to a Call for Evidence, input from three expert advisory groups and results from ten new research

	projects commissioned for the report (Figure 1.6 of main report). The work is continued by the UK HM Treasury in terms of additional policy instrument assessments and distributional, fiscal, competitiveness and economic impact analysis.  **Figure 1.6.** Engagement and analysis that has informed the net-zero advice Call for Evidence, with over 130 responses from businesses, NGOs, individuals, academia, & others. Hosted and attended roundtable meetings with businesses, government, NGOs, financial sector and trade unions. Plus many bilateral meetings covering all the topics and sectors considered in this report. 10 new research projects on: opportunities for deep emissions cuts in the UK and internationally: International context for net-zero advice; TIAM modelling of global emissions pathways; GHG removals; behaviour change; Power; Industry (x2); Buildings; Agriculture; Transport. Call for Evidence Stakeholder discussions Committee Expertise and Scrutiny New Research Expert Advisory Groups New Evidence & Analysis CCC analysis Emerging literature e.g.: Royal Society report on GHG Removals (2018), Energy Transitions Commission report on decarbonising hard-to-abate sectors (2018), IPCC Special Report on Global Warming of 1.5°C (2018). New scenarios for deep emissions reduction by 2050. Plus previous CCC reports, including: 2050 target (2012), Fifth Carbon Budget (2015), Paris Agreement and heat policy (2016), Hydrogen, biomass and land use (2018). Three expert groups to advise on: international context for net-zero advice, reaching net-zero emissions in the UK, and costs & benefits of net-zero emissions in the UK.
10. Which sectors are covered in the long-term strategies?	The sector specific analysis cover the following ten sectors: Power and hydrogen production, Buildings, Industry, Transport, Aviation and shipping, Agriculture, LULUCF (Land use, land-use change and forestry), Waste, flourinated-gas emissions and Greenhouse gas removals.
Do the strategy reports mention or assess the following?	
Fiscal impacts of the strategy?	Yes. Detailed analysis are currently underway by HM Treasury. (Main report, p. 243: "The precise split of costs and benefits of decarbonization between households, businesses and the Exchequer will depend on how Government chooses to design and fund policies to achieve a net-zero target. As such, we have not attempted to estimate this split, and recommend that HM Treasury undertake a thorough review of the distribution of costs and benefits of meeting a net-zero target and the appropriate policy levers to achieve an efficient and fair transition.")
Social impacts of the strategy (such as employment and distributional impacts)? If yes, what aspects?	Yes. Detailed analysis are currently underway by HM Treasury. (Main report, p. 243)
Economic or sectoral competitiveness impacts of the strategy? If yes, what aspects?	Yes. Chapter 7 of the main report includes direct resource cost estimates, but not GDP impacts. The costs are also calculated as total social costs, i.e. without taxes or subsidies. Competitiveness aspects and global market potentials are considered though not fully assessed.
Emission reduction paths? If so, how many different options?	Yes. The analysis includes three main scenarios (see p. 159-160 of main report) The three illustrative scenarios to reach net-zero by 2050 include all 'Core' and 'Further Ambition' measures and different options of 'Speculative options'. The scenarios are: 1) Deeper roll-out of Further Ambition options. This includes further changes in demand (e.g. in aviation and in diets), land use (e.g. afforestation and peatland management), higher CO2 capture rates for Carbon Capture and Storage (i.e. across electricity generation, industry, and hydrogen production), and wider and faster

	deployment of hydrogen across buildings, industry, and transport. 2) Engineered removals. The Further Ambition scenario has a level of Bioenergy and Carbon Capture and Storage (BECCS) in line with a fair UK share of sustainable global biomass resource, and limited deployment of Direct Air Carbon Capture and Sequestration (DACCS), i.e. 1 MtCO2e in 2050. There could be potential to deploy both these options to a greater extent, such that up to around 56 MtCO2e further emissions savings could be available. 3) Synthetic fuels. These may be technically possible but will be thermodynamically and economically challenging, requiring considerable energy inputs, and therefore likely to be significantly more expensive than other Speculative options. One pathway to a net-zeros scenario in the UK would involve these challenges being overcome, with synthetic fuels being scaled-up globally to reduce emissions from the remaining fossil fuel combusting sectors to zero.
Adaptation needs and policies to address them?	No, not included in the Net Zero Report.
Investment needs and their financing options? For mitigation and for adaptation?	Yes. Detailed analysis are currently underway by HM Treasury.
Alignment of the LTS with the NDC?	Not clear from the analyzed reports.
Legal status of the LTS? What happens if e.g. emission cuts don't meet the targets?	Yes. The long-term emission reduction target is legislated in the Climate Change Act. The Secretary of State with responsibility for climate change must prepare and publish policies and proposals that enable the carbon budgets and long-term target(s) to be met. Should a budget be missed, the Secretary of State must publish proposals and policies for compensating in future periods.

Additional perspectives *(From informal interviews with members of the strategy development team)*

- Mitigation costs depend on timing. The earlier you start, the cheaper it is.
- Long-term policies are needed to obtain consistency and to give stakeholders a view on potential future policy changes.
- The selection of best policy instruments relates as much to politics as to economics. Carbon pricing is a major issue, and so is the use of the collected (carbon) tax revenue. Package approach is needed to form socially and politically acceptable climate policies.
- Improvement of data and analysis tools for social impact assessments is important.
- For transport, different policies might be needed for urban versus rural areas.
- Improvements in the governance and implementation of climate policies might be needed since the required policy delivery is very fragmented and covers various sectors and horizontal issues.
- Trade policy might be needed to support strong climate policy.

Additional resources related to long-term climate strategies

CAPE for Finance Ministry (Knowledge Center)
World Bank
The CAPE for Finance Ministry program has knowledge resources on climate change and the macroeconomy, fiscal risk assessment, public financial management, and fiscal policy instruments for climate policy, and others.

Partnership for Action on the Green Economy
UN Environment Programme
The PAGE website's resource center contains information on green jobs, industrial policy and trade, green economy indicators, and others.

Getting to Net Zero Emissions: Lessons from Latin America and the Caribbean (2019)
Inter-American Development Bank
This report summarizes findings of the Deep Decarbonization Project in Latin America, including model projections of GDP; examples of long term decarbonization strategies integrated into national development priorities; regulatory changes to support private sector participation in transport and ecological services, etc. The countries featured are Argentina, Colombia, Costa Rica, Ecuador, Mexico, and Peru.

Accelerating Climate Action: Refocusing Policies through a Well-being lens (2019)
Organisation of Economic Co-operation and Development OECD
This report takes a well-being approach to five key sectors responsible for sixty percent of global emissions - electricity, heavy industry, residential, surface transport, and agriculture. By reframing sector goals and their measurement frameworks, the report analyzes the synergies and tradeoffs between climate mitigation and well-being for each sector.

Long-term low emissions development strategies: cross-country experience (2019)
Report of the Working Party on Climate, Investment and Development. OECD.
A forthcoming publication on the development, content and mechanisms for implementing long term low emission development strategies for France, Germany and the UK that assesses policy coherence with sustainable development. It includes discussion on commitment to implementation and governance (For a draft copy: env.contact@oecd.org)

2050 Pathways Platform – Resource Center
The 2050 Pathways website has resources such as the 2050 Pathway Handbook which presents the principles and building blocks for long-term, net zero-GHG and climate-resilient development pathways. it also contains the report Horizon to Horizon, a step-by-step design process for long term strategies catering to climate-vulnerable island economies.

Danish Energy Agency - Technology data on new low-carbon technologies and their costs
This contains detailed information on new technologies and their emission factors, as well as levelized costs. It includes cost projections up to 2050 and the information is regularly updated as technology and cost profiles evolve.