

Financing Low-Carbon and Climate Resilient Development

Do countries integrate Article 2.1(c) of the Paris Agreement in their long-term strategies?



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Colophon

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Disclaimer

The views expressed are those of the authors based on independent research and do not necessarily reflect those of the German Federal Ministry of Economic Cooperation and Development (BMZ).

Any mistakes remaining are those of the authors.

Abbreviations

ASEAN	-	Association of Southeast Asian Nations
COP	-	Conference of the Parties
EU	-	European Union
ESG	-	Environment, Social and Governance
ETS	-	Emission Trading System
GHG	-	Greenhouse Gas
LDCs	-	Least Developed Countries
LT-LEDS	-	Long-term low-emissions development strategies
LTS	-	Long-Term Strategy
M&E	-	Monitoring and Evaluation
MRV	-	Measurement, Reporting and Verification
NDC	-	Nationally Determined Contribution
NGO	-	Non-Governmental Organisation
R&D	-	Research and development
SDGs	-	Sustainable Development Goals
SIDS	-	Small Island Developing States
TCFD	-	Task Force on Climate-related Financial Disclosures
UNFCCC	-	United Nations Framework Convention on Climate Change
USA	-	United States of America

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1 Introduction

The Paris Agreement enshrined a global commitment to limit the global temperature rise to well below 2°C above pre-industrial levels and to pursue efforts to limit this temperature increase to 1.5°C (United Nations Framework Convention on Climate Change (UNFCCC), 2015, Article 2.1(a)). Limiting global warming to these levels is still possible, but it requires hard emission cuts through a reduction of energy and resource intensity, decarbonisation and potentially removing carbon dioxide from the atmosphere (Masson-Delmotte et al., 2018). The average annual investment needs that are necessary to limit global warming to 1.5°C above pre-industrial levels exceeds US\$ 6 trillion between 2015 and 2035 (de Coninck et al., 2018). Unless countries determine and plan long-term emission reduction pathways, it will be impossible to make the necessary Herculean emission cuts required to limit global warming to 1.5°C above pre-industrial levels.

Through Nationally Determined Contributions (NDCs) countries communicate their short- to medium term strategy to address climate change. NDCs were key to reaching the Paris Agreement and will be instrumental in implementing it (W P Pauw et al., 2018). However, assessments of countries first NDCs demonstrate that these are clearly insufficient to limit global warming to 2°C above pre-industrial levels, let alone 1.5°C (Rogelj et al., 2016; Höhne et al., 2016; UNFCCC, 2021). The probability that large emitters meet their current NDC target until 2030 is low (Liu & Raftery, 2021). Furthermore, most developing countries make their mitigation target conditional upon international support, but the pledged support is insufficient for the implementation of all these conditional mitigation targets (W. P. Pauw et al., 2020). Because of these shortcomings, we argue that the ambitions and effectiveness of future NDCs need to be guided by longer-term targets and strategies (see Bodansky et al. (2017)).

Article 4.19 of the Paris Agreement states that all parties should strive to formulate and communicate their 'long-term low-emissions development strategies' (LT-LEDS, or LTS for short) that are 'mindful' of Article 2 (UNFCCC, 2015). Long-term strategies (LTS) are an important tool for understanding possible pathways towards long-term emissions goals and their implications for cutting emissions. The scale of systemic change, low-carbon investment, technological innovation, sustainability transitions and societal transformations necessary for decarbonising economies, makes it a complex process. High-quality LTS can guide decision-making in policy, investment and society, and provide a comprehensive foundation of evidence for broader public debate (Jotzo et al., 2021).

Key to a successful strategy is finance. The Paris Agreement identifies two types of finance to implement mitigation actions. First, developed countries have pledged to support developing countries with mitigation and adaptation in a balanced way. A goal of US\$ 100 billion per year was set for this purpose, and it was agreed that prior to 2025 a new collective quantified goal from a floor of US\$ 100 billion per year shall be set (UNFCCC, 2015). Second, and more importantly, in the context of the enormous investments needed to limit global warming to 1.5°C above industrial levels, the aim is '[m]aking finance flows consistent with a pathway towards low greenhouse gas (GHG) emissions and climate-resilient development' (UNFCCC, 2015). This is agreed in Article 2.1(c) of the Paris Agreement, meaning LTS need to be 'mindful' of this financial aim.

In contrast to climate finance provision to developing countries (the US\$ 100 billion target and Article 9 in the Paris Agreement), the climate consistency of finance flows of Art. 2.1(c) represents a purpose that relies on support and action to transform the global financial system. It is not only about mobilising more green finance, for example for renewable energy generation or increasing resilience; it is also

about shifting finance away from brown investments, e.g. coal or oil sector. Implementation of Art. 2.1(c) requires engagement by governments and non-state actors, including the financial sector (Zamarioli et al., 2021). Such engagement includes, but is not limited, to financial policies and regulation; fiscal policy; public finance; and information instruments (see Whitley et al., 2018).

LTS can be an important tool and steering document for decision makers to ensure the needed systemic change towards climate-consistent economies. This report analyses all 32 LTS that have been submitted to the UNFCCC up to August 2021 (see **Annex I**) on the aspect of finance. It particularly analyses the extent to which finance is an integral part of countries' LTS and whether Art. 2.1(c) is addressed.

This report is structured as follows: Section 2 provides an overview of the LTS in the UNFCCC negotiations and academic literature. Section 3 describes the methodology used for the analysis (for a detailed description, see **Annex II**). Section 4 presents our analysis on the extent to which finance and Article 2.1(c) are integrated in LTS that have been submitted so far. Section 0 concludes and provides recommendations to countries that are in the process of developing their LTS.

2 Background on long-term strategies

2.1. Introduction

Through LTS, countries can align climate policy and economic development beyond current legislation periods. Well-defined strategies provide the necessary continuity and signals to the private sector for long-term investments. The need for longer term strategies was recognised well before the Paris Agreement. Several initiatives have been launched to formulate Low Emission Development Strategies (LEDS), Long-Term Low Emission Development Strategies and Long-Term Strategies, concepts that are often used interchangeably in the literature and in official documents¹. All the concepts refer to long-term, low-GHG emission development strategies and typically extend to the year 2050. This section first provides an overview of how these LTS evolved during the UN climate negotiations. After that, it summarises analyses in literature of LTS under the Paris Agreement.

2.2. Long-term strategies in the UN climate negotiations

In 2008, the term LEDS first emerged under the UNFCCC. Although a formally agreed definition does not exist, it generally referred to low-emission national economic development plans.

During the Copenhagen Conference of the Parties (COP) 15 in 2009, LEDS have been discussed more broadly in negotiating texts and appear in paragraph 3 of the Copenhagen Accord (Clapp et al., 2010). The Cancun Agreements (2010) encouraged developing countries to prepare LEDS in order to identify sustainable pathways for decoupling economic growth from GHG emissions.

It was soon recognised that developing countries would need support to develop LEDS. In 2011, the Low Emissions Development Strategies Global Partnership was launched to support its member countries in the development and implementation of low emission development strategies through coordination, information exchange and cooperation. The partnership brings together more than 300 institutions across government agencies, technical institutes, international agencies and Non-Governmental Organisations (NGOs). In the same year, the Low Emission Capacity Building Programme was founded by the European Commission, the German government and the United Nations Development Programme to strengthen institutional and technical capacities in developing countries to formulate LEDS.

During the UNFCCC negotiation process that ultimately led to the Paris Agreement in 2015, multiple parties to the UNFCCC highlighted the importance of LT-LEDS and LTS were part of the negotiations for the Paris Agreement early on. On February 25th, 2015 the negotiation draft ('Geneva Text') highlighted in a bracketed paragraph the need for developing countries to *prepare, communicate and implement [...] in the context of sustainable development [...] low-emission development plans and strategies* (Geneva Text, 2015), supported by developed countries building on Article 3² of the UNFCCC. During the negotiations in Paris, the text changed into all Parties *should voluntarily [...]* (09 December 2015) and, more ambitious, *All Parties should strive to formulate LTS*. This does not make it legally binding to communicate and provide an LTS (Wegener, 2020), but it puts LTS more in line with NDCs, which shall be prepared, communicated and maintained by *all* countries (emphasis added) (UNFCCC, 2015; Art. 4.2). The negotiation text of 10 December 2015 also added that LTS should be *[...] mindful of Article 2*. The final text on LTS that was later adopted as part of the Paris Agreement (Art. 4, §19) on 12 December

¹ If not further defined, this assessment uses the term climate neutrality.

² Article 3: PRINCIPLES: 1. [...] developed country Parties should take the lead in combating climate change. 2. [...] specific needs and special circumstances of developing country Parties, [...] that would have to bear a disproportionate or abnormal burden [...].

2015 is provided in **Box 1**. By decision 1/CP 21, paragraph 35, Parties are invited to communicate their LTS by 2020.

All Parties should strive to formulate and communicate long-term low greenhouse gas emission development strategies, mindful of Article 2 taking into account their common but differentiated responsibilities and respective capabilities, in the light of different national circumstances (UNFCCC, 2015).

Box 1: Article 4, paragraph 19 of the Paris Agreement on long-term low GHG emission development strategies, the basis for LTS.

Multiple initiatives have been launched to support and guide countries in developing their LTS. For example, the 2050 Pathways Platform, launched at COP 22 in Marrakesh in 2016, supports countries, states, regions and companies to develop a zero-GHG emission pathway by bringing the attention back to the long-term objectives and strategies (Williams & Waisman, 2017). During the One Planet Summit hosted in 2017, sixteen developed and emerging countries declared the Carbon Neutrality Coalition by announcing to develop long-term low GHG emission climate-resilient development strategies ahead of 2020. And at COP 23 in 2017, some Parties put forward the idea to link Article 6 of the Paris Agreement to LTS (Warnecke et al., 2018). Warnecke et al (2018) also highlight that LTS can inherit a crucial role concerning key GHG emitting sectors for domestic action and international support through i.e. Article 6.

The UN Climate Action Summit held in 2019 had the key objective to secure the implementation of LTS with solid steps and targets towards achieving net zero emissions by 2050. As a result, 75 countries pledged to deliver a 2050 net zero emissions strategy by 2020, while 47 Least Developed Countries (LDCs) set a vision to reach net zero GHG emissions by 2050. During the summit, initiatives in twelve critical areas such as “Plans for a carbon neutral world”, “Climate finance” and “Towards a resilient future” were launched to create a foundation for going forward to reduce emissions. The Small Island Developing States (SIDS) 2020 Ambition Leadership Coalition is one of the initiatives launched during the summit to prepare long-term low GHG emissions development strategies in consistency with IPCC and the Paris Agreement (UN, 2019).

Despite all these initiatives and the decision of the Paris Agreement to invite Parties to submit their LTS in 2020, only 33 LTS have been submitted to the UNFCCC up to October 2021 (see **Annex I**). This demonstrates that setting a target is much easier than developing a strategy to reach this target. The importance of these strategies can be boiled down to consistency, helping nations foregoing investments that are not consistent with achieving low carbon, thought-out investments, and improved financial flows, elevating private sectors by promoting innovations and institutional improvement (Duarte, 2018).

2.3. Finance in literature on LTS

The guidance by the UNFCCC (see **Box 1**) on LTS formulation neither prescribes elements nor processes. Earlier analyses of LTS demonstrate that LTS therefore vary in scope, level of detail and length, and finance is not necessarily included.

Such analyses also stress the importance for countries to consider costs and financing aspects in their LTS. For example, Hans et al. (2020) include the mobilisation of finance as one of eight key aspects for consideration by policymakers, arguing that an LTS can be used to evaluate how much external

financing support a developing country needs in addition to their domestic resources. In this regard, an LTS could also help developing countries to send out signals to donor countries and thus attract climate finance (Rocha and Falduto, 2019; Jotzo et al, 2021). Swaby et al. (2018) argue that multilateral development banks can identify short-term infrastructure investments through LTS that are difficult to finance domestically and therefore need external support. Rocha and Falduto (2019) state that the transformation to a low-carbon economy can be facilitated to a large extent by including a financial and investment vision in a country's LTS.

A few studies explicitly assess finance needs indications in LTS. Rocha and Falduto (2019) discuss potential elements to be included in a LTS and review the funding plans on how to resource the strategies. According to the authors, a few countries, among others Portugal and the UK, have included estimates of the financial resources necessary to put their strategies into practice. Portugal also identified to which extent the investments needed were already covered by planned and ongoing political measures. Roser et al. (2019) analyse 13 LTS on the inclusion of financing needs. They find that the majority mention their financing needs either quantitatively or qualitatively, with only two countries not explicitly considering them (Republic of the Marshall Islands and Ukraine). Similar to the assessment of Roser et al. (2019), a review of LTS by The Coalition of Finance Ministers for Climate Action (2020) analyses to what extent investment needs and financing options are mentioned. Finally, Kampel et al. (2018) assess LTS by EU countries only and conclude that these neither systematically nor consistently address information on financing aspects in their LTS. Some EU Member States report on funds, others on investments or expenditures or economic effects.

The literature above does consider finance essentials in order to achieve countries' LTS. However, it discusses finance in LTS mostly in terms of needs and mobilising more finance for green investments. The actual *shifting* of finance flows away from brown investments (e.g. fossil fuels) and towards green investments (e.g. renewable energy) has so far hardly been addressed in LTS analyses. To the best of our knowledge, we are the first to systematically analyse the consideration of Art. 2.1(c), and financing strategies more broadly, in the LTS of countries under the UNFCCC.

Somewhat more related to our assessment of the consideration of Art. 2.1(c) in the countries' LTS is the study by Ross and Fransen (2017). The authors review six LTS and examine, among others, the aspect of finance flows. In a study specifically on Art. 2.1(c), Whitley et al. (2018) also briefly looked at LTS and conclude that finance is discussed in different ways in the strategies, including subsidy reforms, market signals to investors, consideration of climate in public and private investments as well as finance provision, efforts to grow green financing and the need for funding.

3. Method

Our approach differs from the previously undertaken studies as most of them have focused on financing needs in the countries' LTS. We therefore contribute to the literature by analysing the inclusion of strategies to align finance flows with the goals of the Paris Agreement and the consideration of Art. 2.1(c) in the LTS. For this purpose we have developed a framework for a systematic text analysis on whether countries integrated Art. 2.1(c) and finance strategies in general in their LTS. The framework is based on a three-sided assessment across key categories and recommendations.

3.1. Identified domains for this analysis

First, we looked at finance in very general term (Section 4.1.1- 4.1.2). We assessed whether, and to what extent LTS identify **Finance Needs and Gaps** (Costs, investments, and information needs and gaps in the preparation process and implementation of the goals), and to what extent LTS explicitly mention and reflect on **Article 2.1(c)**. In doing so, we focused on the term Art. 2.1(c) as well as explicit descriptions of aligned finance flows, such as: structure, implementation and avoiding harmful activities. The motivation for this is grounded by the work from Ross and Fransen, (2017), Rocha and Falduto (2019), Levin et al. (2018), Roser et al. (2019) and Duarte, (2018).

Second, we applied the framework by Whitley et al. (2018) on government tools to shift and mobilise finance (Section 4.2.1-4.2.4). These tools are:

- **Financial policy and regulation** influence behaviour through binding laws and regulations and enforcement. Examples include standards, accounting systems, guidelines, disclosure requirements, or mandates of supervisory authorities to steer behaviour of economic actors to (re-)direct financial flows.
- **Fiscal policy** influences behaviour through price signals that reflect the polluter-pays principle. Examples include: carbon pricing mechanism such as emission trading systems and carbon taxes, levies, tariff schemes, and other forms of subsidies and taxes, as well as public procurement.
- **Public Finance** can shift financial risks and thereby influence behaviour that leads to redirecting investments by the financial sector. Examples of instruments include grants, debt, equity, insurance and guarantees.
- **Information Instruments** increase the sensitivity towards reaching carbon neutrality and the role of the financial sector therein, for example by providing public campaigns, workshops, summits, awareness-raising education trainings and informative tools to the members of academia, business, civil society and the public sector.

Third, based on Jotzo et al. (2021) we considered LTS formulation, as well as monitoring and evaluation, to track design and proceedings (Section 4.3.1-4.3.4). The first is further differentiated into **cooperation and consultation** (stakeholder and key expert involvement in the preparation process) as a fundamental step in the formulation of LTS, as well as synergies with **existing strategies / regulatory frameworks**. The latter is differentiated into **monitoring and revisions** (methodologies in monitoring, evaluation process and frequency to update the goals set in LTS) and **LTS alignment** (the alignment of the LTS and NDC as Governments and policy makers aligning LTS with NDC targets to maintain the difference between short-term and long-term goals in these strategies).

Initially, we reviewed each LTS in order to shape the design of this study. The domains of interest (hereafter: (sub-) categories) in **Table 1** represent the operational objectives.

Table 1: Domains of interest

Category	Finance		Government Tools			Development Process and Implementation			
Sub-Category	Finance Needs/Gaps	Article 2.1(c)	Financial Policies & Reg.	Fiscal Policy	Public Finance	Information Instruments	Formulation	Monitoring / Revisions	
Content	Cost estimates / general gaps	Explicit description of aligned finance flows	Current assessment of tools being implemented and instruments and strategies to be developed.			Coop. / Consultation	Existing long-term strategy	MRV (frequency updates + structure of monitoring)	LTS alignment including revision cycle
Literature	§	§§	Whitley et al. (2018)			Jotzo et al. (2021)			
Section	Section 4.1.1		Section 4.2.1			Section 4.3.1			

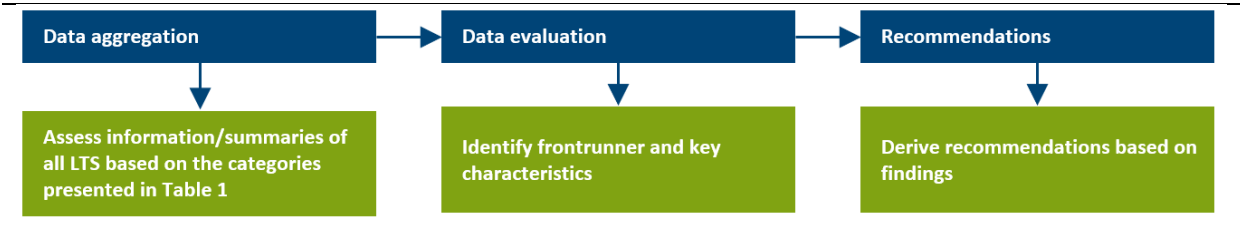
Note: § Hans et al, (2020), Rocha and Falduto, (2019); §§ Ross and Fransen, (2017), Whitley et al. (2018). See **Annex II** for a full table including descriptions.

3.2. Research process

Our methodology, built on qualitative research approaches, presents a new framework that is not only extendable for studies on the integration of Art. 2.1(c) in future LTS, but also for studies on such integration in other climate policy documents such as NDCs and National Adaptation Plans. **Figure 1** represents the methodological approach used in our analysis.

Overall, we have assessed in a first step all LTS among the listed (sub-)categories in qualitative LTS summaries, resulting in a 330 cell-summary grid (33 LTS and 10 (sub-)categories). In the second step we systematically derived frontrunners and key characteristics. Finally, we incorporated role model characteristics per category with those identified in the literature and worked out key recommendations for upcoming LTS. The full methodological process and description of the analysed LTS can be found in **Annex II**.

Figure 1: Methodological approach



Note: Full description see **Annex II**.

4. Finance in LTS

This section provides the results of our LTS analysis. In line with Article 4, paragraph 19, which states that the formulation and communication of LTS should take ‘into account their common but differentiated responsibilities and respective capabilities, in the light of different national circumstances’ (see **Box 1**), we distinguish between developed and developing countries in our assessments, and if appropriate, add additional information on LDCs and SIDS (in line with the subtle differentiation towards these country groups in the Paris Agreement as identified by (Pauw et al., 2019)).

4.1. Finance

Finance has been identified in the literature as an essential part in achieving the set goals in the LTS (see Section 2.3). In this sub-section, we first assess countries formulation of **Finance Needs and Gaps**³. Second, we examine to what extent LTS explicitly mention and reflect on **Article 2.1(c)**. We focus on the term Article 2.1(c) as well as explicit descriptions of aligned ‘finance flows’.

4.1.1. Finance Needs and Gaps

Financing needs assessments are an indicator for near-to-mid-term investment needs for public and private investors. They can be expressed in qualitative (i.e. lack of investment environment) as well as quantitative terms (i.e. top-down vs bottom-up estimates or full vs. incremental cost estimates).

While some of the developed countries do not include any information on costs in their LTS, all developing countries include such information except Guatemala, Mexico and Ukraine. Both developed and developing countries need large investments to implement their NDC. For example, France requires around € 20 billion of public support for energy transition of buildings; Singapore requires total of s\$19 billion (€ 11.9 billion)⁴ in research and development (R&D) to develop a knowledge-based and innovation driven economy; and Costa Rica requires US\$3.5 billion in the transport sector to reduce negative externalities and carbon emissions.

Table 2 highlights noteworthy example countries that provide estimates of financial needs and gaps across different sectors in their respective LTS.

Table 2: Selection of LTS highlights: Finance needs and gaps

Country	Characteristics / Highlights
Fiji	<ul style="list-style-type: none">Cost breakdown associated with sectors to reduce GHG emissions and achieve carbon neutralityOverall cost estimation of € 2.5 billion required to fulfil the NDC targets
Portugal	<ul style="list-style-type: none">Provide insights of total investment required by each sectorHighlights the need for specific information on the destination of funding raised from sovereign green bondsAnnual reporting of capital use and impact of investments is required to present to investors
Singapore	<ul style="list-style-type: none">Concrete cost estimations for coastal protectionTotal cost estimation of SGD 11.9 billion (€11.9 billion) required for the development of knowledge-based, innovation-driven economy and society investments in R&D

³ Such as costs, investments, and information needs and gaps in the preparation process and implementation of the goals.

⁴ Converted based on the exchange rate of 05 August 2021, via <https://www1.oanda.com/currency/converter/>

- South Africa
 - Total cost of US\$ 30 billion (€ 25 billion⁵) per annum is required to adapt to climate change between 2021 and 2030
 - The financial estimations are based on peer reviewed research articles

Country insight: Latvia

In Latvia, the total cost for reaching carbon neutrality in the target scenario is estimated to be € 13.5 billion in the time period 2020-2050. High investment is required for innovations in sectors that play an important role in ensuring low carbon development and the implementation of the strategy. The LTS highlights the lack of required types of loans. For example, focusing on the creation of a national energy efficiency fund will provide long-term and low-interest loans and ensure special insurance in case of failure to fulfill loan obligations.

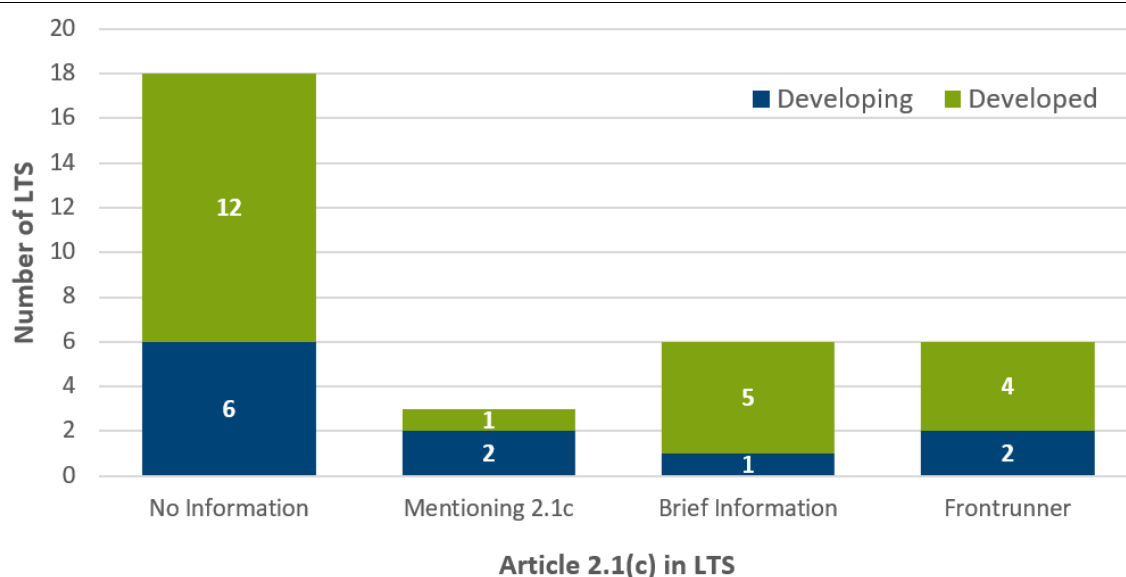


Note: The country examples and highlights are only illustrative, not exhaustive. LTS in alphabetical order. Map created with mapchart.net.

4.1.2. Article 2.1(c)

This section outlines to what extent LTS explicitly mention and reflect on Art. 2.1(c) and related wording. Any activities that may support the implementation of Art. 2.1(c) without explicitly mentioning this article are excluded here and elaborated on in Section 4.2.

Figure 2: Number of countries with Article 2.1(c) in their LTS



Note: Aggregation based on qualitative LTS evaluation. Subject to change when new LTS are submitted or existing LTS are updated. Detailed description on the definition and differentiation of the pillars in **Annex II**.

In contrast to the large number of countries that mention finance needs, gaps and sources, Art. 2.1(c) is not integrated throughout LTS. As illustrated in **Figure 2**, eighteen (six developing countries and 12 developed countries) out of 33 LTS do not explicitly mention Art. 2.1(c). Less than half of the LTS mention or refer to Art. 2.1(c). Three LTS only emphasise that Art. 2.1(c) is one of the key objectives of the Paris Agreement, but provide no further plans on how to achieve the goals of the objective. Eleven

⁵ Converted based on the exchange rate of 05.08.2021, via: <https://www1.oanda.com/currency/converter/>

LTS provide respective content. To a limited extent, these countries discuss the importance of redirecting financial flows towards low-carbon development.

Among the developed countries, 12 countries do not refer to Art. 2.1c at all. One developed country mentions Article 2.1c and five other developed countries (Denmark, Finland⁶, Germany, Japan, Portugal) briefly discuss the importance of redirecting financial flows towards low-carbon and climate-resilient development. Finally, only four out of 22 developed country LTS highlights the importance of Art. 2.1(c) as being a key aspect of the Paris Agreement (Austria, France, Hungary and Switzerland). These countries define a clear pathway on how to implement Article 2.1.c in their LTS. These frontrunners share information on how the government aims to implement measures; create initiatives and coalitions; and propose appropriate funding instruments and/or mechanisms for easily redirecting private and public financial flows to companies, technologies and innovations. All four countries mention the importance of developing new business models and financing strategies which are based on both public budget and sustainable finance flows of corporates.

Among the developing countries, more than half of all LTS do not mention Article 2.1c. Two developing country LTS mention Article 2.1c (Republic of Marshall Islands and Ukraine), and the Republic of Korea provides brief information on Art. 2.1(c), for example by planning to attract more green foreign direct investments (FDI) and to establish country-wide “Green Taxonomies” in order to redirect financial flows. Among the developing countries, South Africa and Singapore are identified as frontrunners that stand out with elaborated plans. Singapore aims to align finance flows by increasing and redirecting climate-consistent investments through a Green Finance Action Plan. It wants to develop an Asian financial hub of green finance (e.g. financial solutions and markets). South Africa presents extensive ambitions to develop a climate finance strategy along the value-chain. Both countries are planning to create action plans and strategies to better analyse the impact of financial flows and to analyse and monitor results on a regular basis.

Table 3: Selection of LTS highlights: Article 2.1(c)

Country	Characteristics / Highlights
Austria	<ul style="list-style-type: none"> Top priority for all public and private investments to avoid harmful investments and to prevent the use of technologies which lack in fossil fuels over the long-term Mobilise private capital and re-direct finance flows is key to achieve net zero by 2050
France	<ul style="list-style-type: none"> Art. 2.1(c) is discussed within the strategy section of Economic Policy chapter Provides several ideas for better implementation of Art. 2.1(c) such as: Sectoral policies that promote finance transition, and carbon price signals that increase low-carbon investment profitability Plans to avoid “failed” investments in assets by providing long-term view of climate policies to economic players
Singapore	<ul style="list-style-type: none"> Plans and aims to be green finance hub and redirect financial flows towards low-carbon sectors Established “Green Finance Action Plan (2019)” to build risk resilient financial system and green finance solutions and markets
Hungary	<ul style="list-style-type: none"> Aims to transform economic policy for a climate neutral transition, incl. allocation (e.g. green criteria), redistribution (e.g. reform taxing system), regulation (e.g. growth-friendly environment for clean technologies) Climate friendly budget planning, incl. tools for labelling, environment impact assessment, ecosystem valuation (e.g. pricing of externalities), green performance requirements Clearly describes needs and plans for green domestic financial markets and introduces various capital market instruments such as green mortgage bonds, energy efficiency

⁶ Finland also established the Coalition of Finance Minister for Climate Action together with Chile with the purpose to direct both national and international investment and finance flows.

obligation scheme, municipal green loan program, and domestic voluntary carbon offsetting.

Country insight: Switzerland

Switzerland postulates the financial sector to make its financial flows consistent with low-carbon and climate-resilient development by 2050. Switzerland recognizes and reflects on the difficulties of simply “internalizing pragmatic political terms”. The time-window for the establishment of a climate-compatible real economy which is served by the financial sector with climate-consistent flows remains too short. Therefore, the financial sector itself must play a proactive role in the transition to a climate-compatible economy. Switzerland presents three approaches to achieve the climate goals. First, the CO₂ Act is a core element for achieving net-zero target. Concretely, it will lead to a 50% reduction in GHG emissions by 2030. Second, based on voluntary stress tests (climate compatibility tests conducted in 2017 and 2020) the country assesses the needs for more regulation (e.g. transparency, fiduciary obligations, risk). Third, the government aims to collaborate with industry agreements and with financial market actors.



Note: The country examples and highlights are only illustrative, not exhaustive. LTS in alphabetical order. Map created with mapchart.net.

4.2. Government tools to shift finance

This section analyses LTS based on a four key set of tools to redirect financial flows as identified by Whitley et al. (2018): financial policies and regulation; fiscal policy; public finance; and information instruments. These tools can be used by governments in particular to redirect financial flows towards low GHG and climate-resilient development – and therefore to implement Art. 2.1(c). In addition, the tools can also be used by the private sector and civil society for the mobilisation of finance.

4.2.1. Financial policies and regulation

Financial policies and regulations allows governments to change behaviour through the rule of law. More specifically, governments can implement standards, accounting systems, guidelines, disclosure requirements, and mandates of supervisory authorities, among others.

Some developed countries mentioned that they have already implemented financial policies and regulations. Most of the developed countries also mention initiatives, coalitions and roadmaps to mobilise institutional investors internationally to increase their investment in green transition; to have a solid structure for the green financial ecosystem; to strengthen the role of financial actors in managing risk; to analyse and point ways towards profitable and suitable financial sector; and to deploy solutions by bringing together public and private financial actors. More in detail, Norway and Japan support and plan to implement measures in line with the Task Force on Climate-related Financial Disclosures (TCFD). Japan also reports on existing collaboration activities with the private sector to create a framework which eases the transition and helps to better allocate grants/loans to companies both within the country and abroad as well as in relation to general financial markets. Slovakia and Finland have predictions and analyses based on the WEM (With Existing Measures) and WAM (With Additional Measures) scenarios to achieve climate neutrality. The UK, Austria, Spain, and Portugal mention their aim to become a green centre, for example by setting up regulatory frameworks, and to ensure the mobilisation of public and private financial flows. Six developed countries (the United States of America (USA), Czech Republic, Latvia, Belgium, the Netherlands and Sweden) do not mention any information on financial policies.

In contrast, there is only a limited amount of information regarding financial policies and regulation in the LTS of developing countries. South Africa and Republic of Korea plan to implement the recommendations by the TCFD as a mandate to drive a system-wide shift. The Republic of Korea also plans to build a taxonomy for green finance to inform investors whether the investment is environmentally-friendly and to prevent greenwashing. Indonesia plans to optimise the implementation of the National Strategy for Financial Inclusion to increase financing for the agricultural sector. Costa Rica emphasises the incorporation of Environmental, Social, and Governance (ESG) risk criteria in the financial sector. Further actions in some countries consist of regulatory components of a cap-and-trade system (Mexico) and the harmonisation of legislative and regulatory acts with EU legislation (Ukraine).

Regulatory measures in LDC/SIDS focus especially on the transport sector especially as SIDS, domestic ocean-based transport and air transport play a big role. Singapore also developed Environmental Risk Management guidelines which will set governance standards, risk management and disclosure and encourage right-pricing of loans and investments to promote new green investments. **Table 4** provides a selection of countries that implement specific financial frameworks and mechanisms to shift and mobilise finance.

Table 4: Selection of LTS highlights: Financial policies and regulations

Country	Characteristics / Highlights
Indonesia	<ul style="list-style-type: none"> LTS mentions the optimisation of the implementation of the National Strategy for Financial Inclusion to increase financing for the agricultural sector Need for the revision of the existing international regulatory and political framework for trade and investment is mentioned
Norway	<ul style="list-style-type: none"> Norwegian National Transport Plan 2018-2029 sets out a financial framework for central government investments in the transport sector Roadmap for Green Competitiveness in the financial sector analyses and points the way towards a profitable and sustainable financial sector in 2030
Mexico	<ul style="list-style-type: none"> Regulatory components of a cap and trade system is under way New financial mechanisms are encouraged to incentivise mitigation actions
Republic of Korea	<ul style="list-style-type: none"> Government pursues mandatory implementation of TCFD recommendations Government plans to build a taxonomy for green finance

Country insight: France

France has implemented laws and launched several initiatives to support the green transition while lowering GHG emissions. For example, France's PACTE Law (Action Plan for Business Growth and Transformation) is an important law for the greening of finance as it requires insurers to offer units of accounts dedicated to sustainable finance. Furthermore, the "Finance for Tomorrow" initiative was instigated by the parties of the Paris Stock Exchange as a solid structure for a green financial system and to disclose French sustainable financing internationally. Moreover, the "France Transition Ecologique" initiative was launched with the aim to bring public and private finance actors together and deploy operational solutions in favor of ecological transition on a large scale. The Central Bank of France, together with seven other central banks and supervisors launched the Network for Greening the Financial system to strengthen the role of financial sector in managing risks and capital mobilisation for green and low-carbon investments.



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4.2.2. Fiscal policy

Fiscal policy can shift private investment decisions and consumer behaviour towards low-carbon, climate-resilient activities (rule of price). It influences prices and thereby reduces the cost of capital for investment in sustainable activities relative to the cost of capital for investment in unsustainable ones (Whitley et al., 2018). Fiscal policy levers such as taxes, levies and carbon pricing can also raise public revenues to support public investment. Whitley et al. (2018) notes that governments often feel a temptation to focus on developing new instruments. In line with Art. 2.1(c), however, governments should also redirect (and in some cases phase out) existing incentives and subsidies – for example through fossil fuel subsidy reform or by addressing incentives for deforestation (including agricultural incentives) or infrastructure construction on flood plains. Most countries plan to use their tax system, for example through carbon pricing, to implement the polluter-pays-principle in different sectors.

Most of the developed countries mention that they have carbon markets in place in high GHG emission sectors such as cement, glass, ceramics, paper, chemical, building, transport and/or industry. Some of the countries such as Canada, Latvia and the UK plan to implement or re-evaluate the carbon-pricing framework and tax system, and use instruments such as subsidies, reliefs, tax refunds and levies to achieve carbon neutrality by 2050. More specifically, Canada and Japan also mention feed-in-tariff incentive programs for solar PV and renewable energy. Switzerland plans to redistribute revenues received from its aviation levy to the population and the economy. Slovakia plans to build a financial support mechanism to finance the renovation of public buildings in accordance with green public procurement principles. Only two developed countries, Spain and Czech Republic, do not mention any information regarding the fiscal policy and instruments used.

Developing countries also extensively refer to fiscal policy levers. Nine out of eleven developing countries that have submitted their LTS either already have fiscal policies in place to reduce emissions or plan to implement them. For example, Republic of Korea already has a cap and trade system for carbon emissions in place and Mexico and South Africa plan to develop such a system. Costa Rica, South Africa and Ukraine also mention a green tariff systems to support the purchase of electricity from renewable energy sources. Most of the developing countries furthermore plan to change taxes and targeted subsidies to eliminate products that rely on fossil energy.

Out of these developing countries, the four LDC/SIDS that submitted an LTS also have fiscal policies already in place or plan to develop them. For example, Fiji and the Republic of the Marshall Islands mention tax reductions for electric vehicles and tax rises for fossil-fuel based vehicles. The countries also discuss novel and dynamic tariff structures for charging of electric vehicles and for waste disposal and collection. Further instruments mentioned in the Fijian strategy include subsidies for the development of a public charging infrastructure and levies on the domestic maritime sector (see **Table 5**).

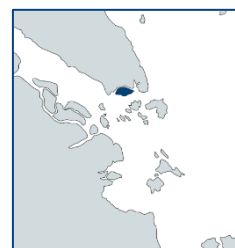
Table 5: Selection of LTS highlights: Fiscal policy levers

Country	Characteristics / Highlights
Costa Rica	<ul style="list-style-type: none"> ▪ Taxing negative externalities with a Green Tax Reform, thereby starting the process of setting a carbon price ▪ Design a tariff scheme appropriate to the use of new technology in public transport ▪ Eliminate fossil fuel subsidies
Fiji	<ul style="list-style-type: none"> ▪ Measures to decarbonise transport include subsidies, reduced taxes on Electric Vehicles and Hybrid Electric Vehicles, increasing taxes on fossil vehicles and subsidising the development of public charging infrastructure

	<ul style="list-style-type: none"> ▪ Impose carbon penalties such as taxes and levies on the domestic maritime sector ▪ Intention to introduce tax exemptions to make recycling a lucrative business model
Norway	<ul style="list-style-type: none"> ▪ CO₂ tax implemented, removed reduced tax rates and exemptions from the carbon tax ▪ Emission pricing based on polluter-pays principle ▪ Pollution Control Act supplements economic instruments as taxes and emission trading
South Africa	<ul style="list-style-type: none"> ▪ Grid feed-in tariffs in electricity sector is implemented by municipalities ▪ Several tax incentives for green project development ▪ Carbon Tax Act in relation to polluter pays principle aims to price carbon
United Kingdom	<ul style="list-style-type: none"> ▪ UK Carbon Price Support (CPS) serves as national support of EU ETS to put a price on carbon ▪ GBP 1 billion (€ 1.2 billion⁷) spent on subsidies for electric vehicles ▪ Tax measures: Landfill tax has helped to reduce the amount of taxable waste, reduced VAT rate for solar panel installations

Country insight: Singapore

Singapore was the first country in Southeast Asia to implement a carbon pricing scheme. As it applies uniformly to all sectors, Singapore notes that it has the highest carbon tax coverage globally. The government implemented a Fixed-Price Credit Based (FPCB) tax mechanism for companies to pay their carbon tax by surrendering non-tradeable, fixed-price carbon credits purchased from the government. Additionally, the Carbon and Emission Recording Tool was developed to help businesses to record, monitor and reduce their emission footprints and save operational costs. Furthermore, the government plans to spend the revenues collected from tax to help companies invest in energy-and-carbon efficient technologies.



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4.2.3. Public finance

Public finance such as grants, debt, equity, guarantees and insurances provided by public institutions can shift financial risks for investors (Whitley et al. (2018); see **Annex III**) and thereby alter investment decisions. The tool can be used by international, national or sectoral institutions, financial intermediaries, as well as so-called green investments banks. All play a role in the allocation of public finance towards derisking low-carbon and climate-resilient investments. Public finance levers mentioned above are supportive tools in achieving and financing the main goals of LTS such as decarbonisation of the economy. Public finance is used widely by both developed and developing countries, predominantly to stimulate more green and sustainable investments.

Examples in LTS by developed countries include the provision of investment grants and tax reliefs for the renovation of buildings (Austria) and plans to limit risks of investments in climate-friendly agricultural techniques by providing guarantees and grants (Belgium). Latvia contributed funding from the state budget and the EU for studies on the commercialisation of low-carbon technological solutions and on scientific development. The UK supports the development of innovative energy technologies through an interest-free loan scheme and capital grants. Slovakia and Latvia plan to increase the usage of innovative financial mechanisms such as green loans, sustainable investment funds, and green debentures, while Denmark has established Investment Funds and Agencies to provide loans, guarantees and equity financing to green entrepreneurs, growth companies, exporters, private companies and social housing organisations to promote the green transition. Hungary identifies

⁷ Converted based on the exchange rate of 05 August 2021, via: <https://www1.oanda.com/currency/converter/>

various public financing schemes for climate friendly budget planning (see also 4.1.2). France goes beyond individual instruments. Its Green Budget approach aims to increase the environmental impact of all tax expenditure and establishes transparency on the environmental impact of expenditure, both negative and positive. The government plans to continue the implementation of this approach in its expenditure and revenue and extend it within the communities as well. Only two developed countries, Spain and Czech Republic, provide very little information regarding public finance.

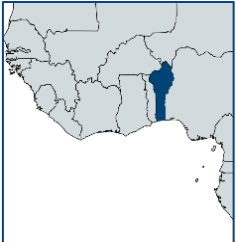
Among the developing countries, most of the LTS mention the use of public funds for different forms of green projects, such as leasing programs for solar panels (Guatemala) and a fund for local small renewable energy projects (South Africa). Costa Rica and Republic of Korea provide detailed information on the use of public finance for specific sectors. The former explores the financial feasibility of creating a public fund to improve the transition to electric public transport, while the latter aims to fund its Green New Deal through public investments, specifically in sectors such as smart urban planning, renewable energy and mobility. Mexico plans to mobilise private investments through credit guarantees. SIDS such as Fiji and the Republic of the Marshall Islands state to rely on access to international funding in order to support the agricultural and energy sectors. As indicated in Table 6, Benin plans to commence a financing mechanism to correct the inadequacy of the financial system of the agricultural sector subject to climate hazards. Singapore mentions the provision of grants to help the industry sector to review their facilities and to install energy and resource efficiency measures.

Table 6: Selection of LTS highlights: Public finance

Country	Characteristics / Highlights
Costa Rica	<ul style="list-style-type: none"> Explores the financial feasibility of creating a public fund to improve the conditions of the transition to electric public transport Government encourages the supply of green credits Analyses the feasibility of developing an Energy Transition Fund to replace and renew buildings
Germany	<ul style="list-style-type: none"> € 2.6 billion budget for R&D in the transport sector Plans to allocate a greater proportion of research funds to areas such as renewable energy technologies, grids, storage systems and others Further developments of the Forest Climate Fund
Republic of Korea	<ul style="list-style-type: none"> Green New Deal is funded through public investments Various policy options considered, such as providing grants for interest expenses for the investments made to retrofit buildings Funding support to vulnerable populations is planned
Switzerland	<ul style="list-style-type: none"> Guarantees for investments in climate-friendly building improvements A technology fund guarantees loans to innovative companies A Climate Fund with a capacity of up to CHF 450 million (€ 419 million⁸) will be set up to finance climate protection measures

Country insight: Benin

Benin's government intends to introduce a program to install financial mechanisms such as crop insurance, agricultural credit and venture capital in order to address the inadequate financial system around the its agricultural sector. In this context, Benin also plans to establish an Agriculture Bank and a National Fund for Agricultural Development. The necessary financial resources will come from three sources. First, the investments funds will be mobilised from the national budget to finance sub-programs that structure the national economy. Second, loans, grants and subsidies will be requested from the government, UN specialised



⁸ Converted based on the exchange rate of 05 August 2021, via: <https://www1.oanda.com/currency/converter/>

agencies (e.g. FAO, IFAD), multilateral and bilateral international partners, and from the financing mechanisms dedicated to the fight against climate change. Third, private investments will be mobilised within the framework of the development of energy production for renewable energies.

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4.2.4. Information instruments

Information instruments comprise generally of soft tools that can be implemented by governments to shift financial flows (Whitley et al., 2018). Governments, businesses and civil society play a key role in outlining climate change benefits and threats in a straightforward manner by raising awareness, and having clear plans, strategies and standards. Particular instruments include transparency initiatives, awareness campaigns, corporate strategies, certification and labelling. Information instruments are widely used and planned by both developed and developing countries (see **Table 7**).

The majority of the developed countries provide sectoral education and online tools to educate about a greener economy in general. However, only five developed countries (Austria, France, Germany, Japan and Portugal) use information instruments to directly emphasise the importance of financial training and the implementation of education and awareness- raising projects on green finance. For example, Japan has formulated specific Green Bond Guidelines and the government enhances ESG finance literacy by developing a platform for environmental information disclosure. France has launched different labels such as the “Low carbon label” to redirect funding towards emission reduction projects and to guarantee additionality of recognised carbon credits.

Similarly, most of the developing countries deploy awareness raising and training programs, but not all of these relate to or include finance aspects. The Republic of Korea for instance tries to increase awareness by implementing incentive-based programs in which households earn monetary rewards in proportion of saved resources. Other measures include a Measurement, Reporting and Verification (MRV) system to increase transparency about carbon emissions or the disclosure of information on GHG emissions on the enterprise level (Ukraine). All of the four LDC and SIDS include information instruments to influence behaviour in the population through awareness-raising and transparency. Fiji will prepare a country-wide awareness campaign to inform banks and others about mitigation actions for a more energy efficient transport sector. Singapore also worked with other Association of Southeast Asian Nations (ASEAN) countries to develop an ASEAN Green Bond Standard to increase transparency for green investments.

Table 7: Selection of LTS highlights: Information instruments

Country	Characteristics / Highlights
Canada	<ul style="list-style-type: none"> ▪ Companies, including 822 investors with CAD 95 trillion (€ 63 trillion⁹) in assets have chosen to disclose climate-related information through the Carbon Disclosure Project or the Montréal Carbon Pledge, an initiative welcomed by the state ▪ Financial Stability Board’s Task Force on Climate-related financial disclosure is working to develop voluntary, consistent financial risk disclosures standards
France	<ul style="list-style-type: none"> ▪ Several tools for funding and labelling to attract more investment, including the ‘Low Carbon Label’

⁹ Converted based on the exchange rate of 05 August 2021, via: <https://www1.oanda.com/currency/converter/>

	<ul style="list-style-type: none"> ▪ Sovereign Green Bond launched with the aim to set a high standards in the green bond market ▪ Plan to set up National Carbon Certificate to attract private investment in the forest sector
Japan	<ul style="list-style-type: none"> ▪ Enhancing ESG finance literacy by developing a platform for environmental information disclosure as well as through an ESG High-Level panel with commitment from the top management of the financial sector ▪ Green bonds will be launched to raise awareness of institutional investors on environmental finance ▪ Effective dialogues on environmental information will be encouraged through the development of an ESG Dialogue Platform
Portugal	<ul style="list-style-type: none"> ▪ Letter of Commitment to Sustainable Financing was subscribed by the large majority of the Portuguese financial sector ▪ National Financial Education Plan includes training of corporate decision makers and employees in financial institutions to adopt sustainable production

Country insight: Republic of Korea

The government of the Republic of Korea tries to increase awareness by implementing incentive-based programs such as the Carbon Point program, in which households earn monetary rewards in proportion of saved resources. In a similar fashion, the Green Card program provides cardholders with discounts for using public transportation and for buying eco-friendly products. Furthermore, the government plans to build a publicly accessible climate information platform to increase people’s knowledge about climate change. On an educational level, the Whole Institution Approach plans to provide new opportunities to institutions to set a model of environmental education. In that manner, the country plans to train experts who will meet the future needs of businesses in their climate risk management.



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4.3. Formulation, implementation and revision

In this section, we analyse LTS based on recommendations by Jotzo et al. (2021). In particular, we analyse four sub-categories: the level of stakeholder engagement; the synergies of LTS with existing strategies or frameworks; monitoring and evaluation; and the alignment of LTS with countries’ NDCs. Jotzo et al. (2021) identified these areas of action are crucial for a successful formulation, development and implementation of an LTS.

4.3.1. Stakeholder engagement

Stakeholder engagement from federal and regional governments, institutions and industry as well as academia and civil society are crucial for developing a robust LTS (Jotzo et al., 2021). Although almost all countries have in some form involved national and international stakeholders in the formulation process of their LTS, financial sector actors are not specifically always part of this engagement.

Among the developed countries, only Czech Republic, the EU and Spain do not include information on the consultation of stakeholders in the preparation process of their LTS. While Japan, the Netherlands and Norway also do not provide information on stakeholder involvement in the LTS formulation process, these countries do plan to widely disseminate information and engage stakeholders in the further development and revision process of their LTS. Other developed countries mention that during the preparation of their LTS various series of stakeholder listening sessions are conducted; working groups with representatives from academia, ministries and civil society are formed; and/or

recommendations from public and private experts are taken into consideration. Apart from a few exceptions, there is only limited information on the extent to which degree stakeholders from the broader financial sector have been consulted. For instance, the United Kingdom set up a Green Finance Taskforce to help develop the long-term strategy, while Hungary organized an online event series called “Climate Breakfasts” which involved stakeholders from private sector and financial institutions to contribute on the national climate neutrality target and to identify its opportunities, challenges and needs.

All developing countries have consulted stakeholders in the process of developing the LTS. However, the degree of stakeholder participation varies across countries. Most countries, including Guatemala, Mexico and South Africa, have received input from experts from civil society, academia and the private sector. With respect to financial actors, such as central banks, finance ministries or other parts of the financial system, not much information are available. As illustrated in **Table 8**, the Republic of Korea can be seen as a role model since the country set up a Low-Carbon Vision Forum consisting of experts from academia as well as the public (15 Ministries) and private sector who closely examined suggested targets. Moreover, online surveys, expert consultations and public hearings were held to engage industry, civil society and the youth.

All LDC and SIDS undertook strong efforts to consult stakeholders in the LTS formulation process. For example, with support from the French Development Agency (AFD) as well as from the AFRICA 4 CLIMATE program, Benin consulted local actors and developed six sectorial groups. Singapore and the Republic of the Marshall Islands have consulted stakeholders from the government, the private and public sector as well as academia and civil society through technology roadmaps and surveys. Fiji consulted numerous stakeholders through a participatory process in three National Stakeholder Workshops with about 100 key stakeholders to inform the about the LTS formulation process and to solicit feedback. Again, however, it is not clear to what extent the financial sector was engaged in the LTS formulation processes.

Table 8: Selection of LTS highlights: Stakeholder engagement

Country	Characteristics / Highlights
Austria	<ul style="list-style-type: none"> Expert inputs from the various fields including economics has been taken into consideration in the formulation phase. In future updates more engagement with citizens (esp. business and labour force) are mentioned
Fiji	<ul style="list-style-type: none"> Numerous stakeholders from private sector, academia and civil society were engaged through a participatory process in the LTS development An LEDS Steering Committee was formed to develop the LTS, and continues to convene at least every two years Three National Stakeholder Workshops with about 100 key stakeholders were held to inform about the LTS progress and to solicit feedback
Portugal	<ul style="list-style-type: none"> LTS preparations included a broad process of sectoral involvement and mobilisation of society through different stages and different objectives Macroeconomic scenarios went through iterative phases and gathered contributions from national institutions and experts Cycle of technical workshops were held with the aim to understand the role of circular economy and inform the emissions modelling work through stakeholders’ perceptions. Preliminary results were published for a period of 3 month for public consultation. It started with presentation in Lisbon which received 80 contributions during the event.
Republic of Korea	<ul style="list-style-type: none"> Government established a Low-Carbon Vision Forum, which included experts from academia, industry, and civil society, who closely examined Korea’s vision and targets.

- The Forum drafted a proposal which was used for national consultations to collect opinions from various stakeholder
- Representatives of 15 ministries conducted online surveys, expert consultations, public discussions and hearings

Country insight: Finland

The government of Finland organised public consultation on the LTS towards carbon neutrality via the central government's "otakantaa.fi" service. The service is provided by the Ministry of Justice to promote and bring together citizens, NGOs and public authorities. During a two-week period, consultation was open to all citizens and stakeholders. Participants answered several questions and made suggestions on emissions reduction by observing scenario calculations. Although these aspects could not be taken into account in the drafting process of the LTS, they will be addressed as part of Finland's Climate and Energy Strategy and the Medium-term Climate Change Policy Plan.



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4.3.2. Synergies with existing strategies and regulatory frameworks

Jotzo et al. (2021) recommend that in the formulation process of their LTS, countries should consider synergies with existing strategies and regulatory frameworks. This can include previously submitted LTS by other countries or existing national or international institutional, legislative or governance frameworks. A large majority of the countries indeed built their LTS on existing LTS or other strategies or regulatory frameworks, including international strategies (see the highlights in **Table 9**).

Among the developed countries, two LTS (Czech Republic and the EU) do not provide information on existing strategies and regulatory frameworks. All other developed countries build their LTS on regulatory frameworks, specific environmental laws or national climate strategies, but not specifically on a financial regulatory framework. For example, Portugal has formulated its LTS parallel with the National Energy and Climate Plan (PNEC) for 2021-2030. Spain mentions the EU package "Clean Energy for all Europeans" as a basis for its LTS. With regard to financial regulatory frameworks, the scope of the French LTS is prepared in accordance to the French Environmental and Energy Code. It emphasizes the amount of financial support for public projects will systematically include criteria for reducing GHG emissions.

Six of the seven developing countries (excluding LDC and SIDS) include information on how their LTS is built on existing strategies. South Africa's LTS, for instance, is built on the National Development Plan, the National Climate Change Response Policy and the Climate Change Bill. The LTS of the Republic of Korea is based on the Korean New Deal. Mexico presents its LTS together with Canada and the USA. These countries have identified areas of commonality in their LTS and they represent an essential part of the North American Climate and Clean Energy Partnership.

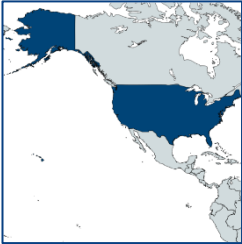
Among the LDC and SIDS, three out of four provide information on the consideration of existing LTS in their development process. Fiji's LTS is underpinned by similar visions contained in national development frameworks. The Republic of the Marshall Islands mentions the consideration of international policy frameworks such as the UK's Climate Change Act. Singapore's LTS builds on the Climate Action Plan and the National Climate Change Strategy while Benin does not provide any information on that end.

Table 9: Selection of LTS highlights: Synergies with existing strategies and regulatory frameworks

Country	Characteristics / Highlights
France	<ul style="list-style-type: none"> LTS is prepared according to the French Environmental Code,(Article L.222-1 B) French Energy Code (Article L.100-1A) Scope builds on the Environmental Code, which also emphasizes the amount of financial support for public projects will systematically include criteria for reducing GHG emissions
Indonesia	<ul style="list-style-type: none"> LTS in line with national plans, including the National Forestry Plan and the Road Map of Industrial Wood LTS aims to optimize the implementation of the National Strategy for Financial Inclusion by actively involving the financial services industry (e.g. banks) and non-banking financial institutions to increase financing especially in the agricultural sector
Mexico	<ul style="list-style-type: none"> Actions developed in the LTS aim to align with national climate change policies and instruments, such as the General Law on Climate Change, National Strategy on Climate Change 10-20-40 Vision, the Special Program on Climate Change 2014-2018 as well as the State Programs on Climate Change
Portugal	<ul style="list-style-type: none"> LTS was created in parallel with the preparatory work for the National Energy and Climate Plan (PNEC) which is the main energy and climate policy instrument for the decade 2021-2030, setting new national targets for the reduction of GHG emissions, renewable energy and energy efficiency in line with the objective of carbon neutrality

Country insight: United States of America

The USA draws on an ongoing collaboration with Canada, Mexico and other nations that are developing mid-century strategies. As a result, Mexico, Canada and the USA declared the three countries’ common vision with the North American Climate and Clean Energy Partnership which included the alignment of their LTS as an important area of cooperation. Beyond that, the USA state in their LTS that the country has a series of technical exchanges on mid-century strategies with China.



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4.3.3. Monitoring and evaluation

Monitoring is critical to track progress of goals set in LTS in order to provide transparency and certainty to the stakeholders (Rocha and Falduto, 2019), while clearly outlining the arrangements assigning national and international agencies or groups with responsibilities (Aguilar Jaber et al., 2020). Evaluation methods and revision cycles can help countries to ensure that they are on track with implementing the LTS, and if necessary to adjust implementation pathways. Most of the submitted LTS include specific monitoring methods and evaluation processes, and specify a timeframe for updating the strategy.

Almost all developed countries have plans to revise or update their LTS every five to ten years. For example, the governments of Czech Republic, Germany and Sweden prepare special reports and programs, set up national expert groups and plan to have regular and/or periodic evaluations to analyse whether the set goals are being achieved. Countries such as France, Japan and Portugal have outlined specific processes. For example, France has specific methods for MRV: monitoring is done according to particular indicators, evaluation is done in two different ways and the LTS revision process includes four pre-defined steps. Only a few LTS by developed countries, including Canada, Finland, the Netherlands, Norway and the EU, do not mention specific measurements to be implemented for the monitoring and revision process of their LTS.

Most of the developing countries (here excluding LDC and SIDS) also indicate that their LTS will be reviewed on a regular basis. Some countries indicate that changes in economic growth, national and sectoral plans as well as major global events, may have an impact on the implementation process of the LTS. Some countries (e.g. South Africa and Ukraine) mention that their LTS will be reviewed at least every five years, whereas Costa Rica and the Republic of Korea do not provide a specific timeframe. Mexico plans to develop transparent MRV methodologies and Monitoring and Evaluation (M&E) instruments and update their mitigation policies every 10 years, their adaptation policies every 6 years.

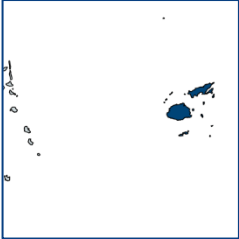
Three out of four LDS and SIDS provide detailed information about monitoring and review plans while Singapore’s LTS does not mention anything in specific. Fiji’s comprehensive monitoring and evaluation system covers four different areas: progress in implementation of the specific measures and policies; tracking emissions reductions achieved through the measures; assessing co-benefits of green jobs, gender inclusion, sustainable development goals (SDGs); and tracking means of implementation and support (see **Table 10**). Benin and the Republic of the Marshall Islands established a committee to manage the monitoring and evaluation process.

Table 10: Selection of LTS highlights: Monitoring and evaluation

Country	Characteristics / Highlights
France	<ul style="list-style-type: none"> Monitoring of the LTS is based on indicators that evolve with future revisions of the LTS. Update based on different sectors, but also by e.g. carbon footprint and economic policy. Evaluation of the LTS is on retrospective (e.g. every 5 years, allows for the identification of possible deviations from the target course and objectives) and prospective (e.g. during the revision, future objectives and commitments are explored).
Mexico	<ul style="list-style-type: none"> Monitoring of the LTS is based on plans to develop MRV for mitigation and adaptation measures and M&E for public policies. Highlights plans to establish mechanisms and transparent methodologies to consider recommendations (e.g. measure financial, human, and ecological risks, as well as mitigation actions). Evaluation and resubmission of the LTS is based on updates of relevant legal grounds such as the General Law on Climate Change, or the National Climate Change Strategy.
Portugal	<ul style="list-style-type: none"> Monitoring plans highlight the framework and approach for M&E plans and MRV system as well as specific principles to be used in designing indicators for M&E. Specifies responsible entities for delivering aspects of the LEDS. Review of the LTS to be updated every 10 years.

Country insight: Fiji

The Fijian National Climate Change Coordination Committee functions on behalf of the Fijian government. It oversees the monitoring process of implementation which is done by the LEDS Steering Committee every four years. The Steering Committee thereby calls upon relevant technical experts to support committee meetings and forms technical working groups as needed to inform decision-making. Fiji explains the four elements of monitoring and evaluation system in a dedicated section in its LTS: Progress in implementation of the specific measures and policies; tracking emissions reductions achieved through the measures; assessing co-benefits of green jobs, gender inclusion and SDGs; and tracking the means of implementation and support.



Note: The country examples and highlights are only illustrative, not exhaustive. LTS in alphabetical order. Map created with mapchart.net.

4.3.4. LTS and NDC alignment

In line with Article 4.2 and 4.9 of the Paris Agreement, each Party shall prepare and communicate an increasingly ambitious NDC every five years. NDC revision cycles can create an opportunity for the governments and policy makers to align their LTS with the NDC targets to reduce the risk of not being properly integrated into policy and implementation planning (Hans et al., 2020).

Developed countries connect their LTS with NDCs in various ways. For example, the EU has submitted one NDC for all its member states, and several members states refer to this NDC in their LTS. The LTS of Norway and Sweden are based on the targets set in their climate change acts. Norway also refers to this act in its updated NDC while Sweden has not formulated their own NDC as it is covered by the NDC of the EU. Germany's LTS is to be aligned with the EU's NDC update as the LTS will be updated and reviewed in a five-year cycle too (see **Table 11**). The USA only mentions the importance of its NDC. Belgium and the UK only note that NDC ambitions are insufficient to stay below an average global warming of 2°C as agreed in the Paris Agreement. Canada, Czech Republic, Japan, Spain, Netherlands, Switzerland and others do not make any specific reference to their NDCs.

LTS by developing countries (here excluding LDC/SIDS) also refer to NDCs in various ways. The important relation between the two strategies is emphasised by countries such as Indonesia, Costa Rica and the Republic of Korea. Costa Rica and Mexico note that LTS and NDC alignment is important, because current NDCs are not ambitious enough to reach the long-term goals of the Paris Agreement. Guatemala states that its LTS serves as a framework to help accomplish the goals set by the NDC. South Africa and Ukraine provide only very brief information about LTS-NDC alignment.

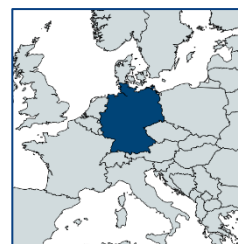
All of the LDCs and SIDS mention the alignment of their NDCs and LTS. Benin and the Republic of the Marshall Islands mention that the goal of their LTS is to reduce GHG emissions at least up to the level of the commitments made under their NDCs. Fiji views its LTS as a fundamental pillar to enhance and raise ambition in their NDC.

Table 11: Selection of LTS highlights: LTS and NDC alignment

Country	Characteristics / Highlights
Costa Rica	<ul style="list-style-type: none"> LTS will contribute to the elaboration of Public Investment Plan, the NDCs, and the preparation of the "Strategic Plan Costa Rica 2050"
Fiji	<ul style="list-style-type: none"> LTS builds on existing adaptation and mitigation actions by the Fijian government and will inform Fiji's future NDCs NDC and LTS are reviewed together by the Steering Committee every four years LTS will be a fundamental pillar to enhancing and raising ambition of NDCs
Indonesia	<ul style="list-style-type: none"> LTS is aligned with NDC targets Pillars of NDC serve as direction for planning adaptation action in LTS Post 2030 targets in Indonesia's (future) NDC shall be in line with the targets set in LTS
Republic of Korea	<ul style="list-style-type: none"> LTS is based on the updated NDC of the Republic of Korea Strategy includes 2050 Vision that will determine the general directions to which climate policy should be headed by 2050

Country insight: Germany

Germany states in its LTS that transparent monitoring of NDCs is important. The German LTS will be reviewed and updated in accordance to the reviewing cycle of the NDC every five years. Germany emphasizes that it is important to keep in mind that NDCs ambitions are insufficient to limit global warming to well below 2°C degrees, which is why all Parties need to go beyond their current NDC targets in their LTS. In order to support the implementation of NDCs especially in developing countries, the German government initiated the NDC Partnership which is supposed to play a central role in orienting climate and development financing to the targets of the Paris Agreement.



Note: The country examples and highlights are only illustrative, not exhaustive. LTS in alphabetical order. Map created with [mapchart.net](https://www.mapchart.net/).

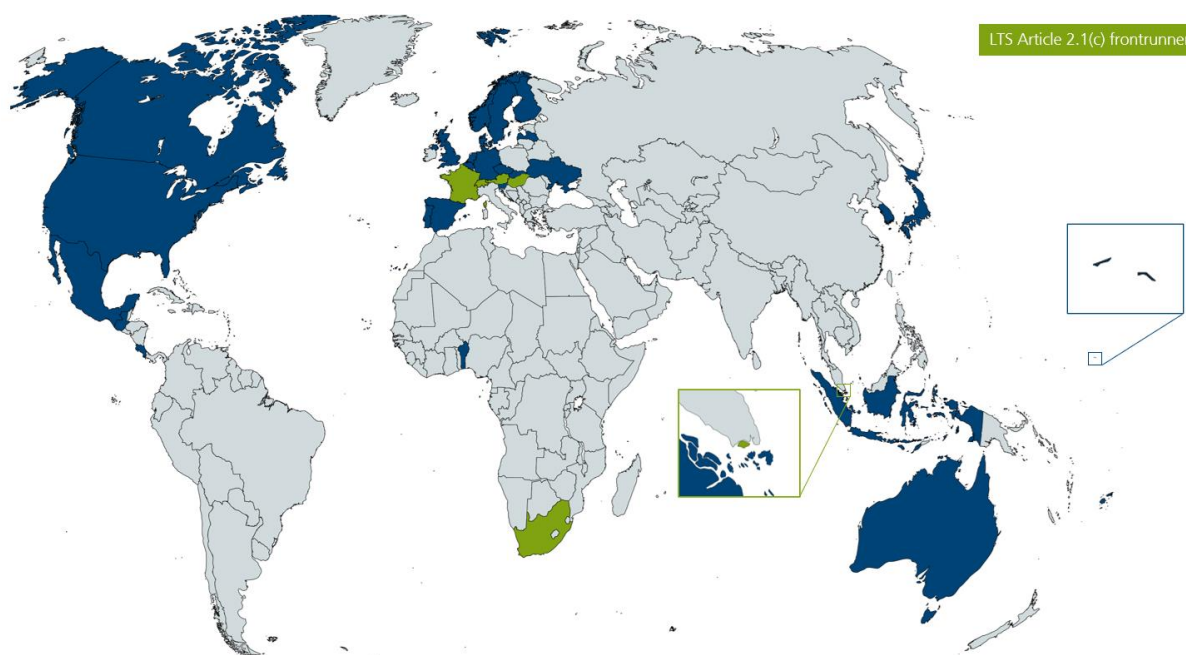
5. Conclusion and recommendations

The herculean emission cuts that are required to limit global warming 1.5°C to 2°C above pre-industrial levels and the related investment needs, require countries to determine and plan long-term emission reduction pathways. Article 4.19 of the Paris Agreement states that all Parties should strive to formulate and communicate ‘long-term low-emissions development strategies’ (LTS). The key to successful strategies is finance.

This report therefore analyses the extent to which finance, and Art. 2.1(c) of the Paris Agreement in particular, are integral parts of the 32 LTS that have been submitted up to October 2021. ‘Making finance flows consistent with a pathway towards low GHG emissions and climate-resilient development’ (UNFCCC, 2015; Art. 2.1(c) presents a new purpose to all countries (Zamarioli et al., 2021). Its implementation requires engagement by governments and non-state actors, including the financial sector.

This report finds that most countries include information on cost estimates, finance needs and finance sources, albeit in very different ways. However, despite its central role in shifting trillions of investments, Art. 2.1(c) is hardly addressed, explicitly into LTS. Seventeen countries - more than half of all analysed LTS - do not mention Art. 2.1(c) at all. Six countries provide limited content on Art. 2.1(c), for example, by discussing the importance of redirecting financial flows towards climate-resilient development or to achieve carbon neutrality by 2050. Only six countries could be identified as frontrunners (see Figure 3): Austria, France, Hungary, South Africa, Singapore and Switzerland. So our first recommendation is for countries to integrate Article 2.1(c) implementation in their LTS, because finance is key for a successful LTS.

Figure 3: Highlights of LTS submitted and Article 2.1(c)



Note: LTS submitted up to October 2021. Countries in green were identified as Art. 2.1(c) frontrunners in this report. Countries in blue represent all other countries that have submitted and communicated LTS to the UNFCCC. Map created with mapchart.net.

5.1. Government tools to shift finance - Recommendations

Many of the countries that do not explicitly mention or integrate Art. 2.1(c) in their LTS, nevertheless use tools that support the implementation of the Article. More in particular, many countries exert financial policies and regulation; fiscal policy; public finance; and information instruments. These tools are crucially relevant for an enabling environment to shape the transition towards a low-carbon and climate-resilient economy.¹⁰ Below we provide recommendations for countries when they formulate or update their LTS.

Financial policies and regulations include standards, accounting systems, guidelines, disclosure requirements, and mandates of supervisory authorities. Financial policies and regulations are not very common in LTS by either developed or developing countries, meaning countries waste an important chance in aligning LTS targets and investments. Information on how governments plan to create a regulatory environment that provides a framework for the financial sector is generally lacking in LTS, with the exception of a few frontrunners that allow us to provide the following recommendations (see also **Table 4**):

- Development of dedicated national strategies for financing long-term emission pathways
- Regulatory framework (e.g. financial disclosure, taxonomy systems) that stimulate public and private investment in economic activities that are consistent with limiting global warming to the targets set in the Paris Agreement
- Pursue a mandatory implementation of the TCFD recommendations

Fiscal policy levers play a role in shaping budget, shifting private sector investments and consumer behaviour. They are used most frequently tool in LTS by both developed and developing countries. Countries extensively refer to fiscal policy levers such as carbon pricing mechanisms, levies, tax rebates and subsidies. However, it is essential to gradually stop financing activities that undermine the climate objectives (Zamarioli et al., 2021) and it is questionable that governments do not or hardly address current public finance levers that support and stimulate activities that are counteractive to reaching the goals of the Paris Agreement in their LTS. Our main recommendations are (see **Table 5**):

- Use fiscal policy measures to influence prices and incentivise the shift of finance flows away from CO₂-intensive industries towards low-carbon investments
- Consider a carbon pricing instrument: either a carbon tax (i.e. putting a price on carbon) or an emission trading system (i.e. cap-and trade systems for carbon emissions). Both are broadly used by countries to reduce emission. The effectiveness depends on how the instrument is set up and on other factors (e.g. a country's economic structure)
- Eliminate fossil fuel subsidies and implement green tariff structures

Public finance includes public financial levers such as grants, debt, equity, guarantees, and insurance (Whitley et al., 2018). Public finance is widely used by developed and developing countries to stimulate more green and sustainable investments. Dedicated annual state budgets can increase the value of public sector investments in responding to climate change. Our recommendations are (see **Table 6**):

- Use finance levers to expand mobilisation of private investments to decarbonise the economy, and to transform financial systems (i.e. provision of credit guarantees)

¹⁰ A more detailed explanation of the categorisation of instruments according to (Whitley et al., 2018) can be found in **Annex III**

- Establish public funds to support critical sectors and specific projects to ease and fasten the public sector transition
- Ease the access to climate financing facilities, and international funding
- Increase budget allocation for research & development in critical sectors (i.e. Energy Storage and Distribution)

Information instruments such as transparency initiatives, awareness campaigns, corporate strategies, certification and labelling are also widely used in LTS among both developed and developing countries, albeit in general terms. However, information instruments are soft, their outcomes often unclear, and in the LTS they hardly focus on finance. Therefore, we provide the following recommendations (see **Table 7**):

- Use green labelling and certification to stimulate more green investments
- Formulate Green Bond standards and guidelines, increase the transparency and establishment of green and sovereign bonds
- Involve businesses, science, and civil society to increase awareness-raising campaigns for different sectors
- Extend the public awareness raising programs to emphasize the benefits of low-carbon policies and lead society towards a low-carbon lifestyle

5.2. Formulation and development of LTS - Recommendations

Stakeholder engagement. Given the scope and size of the required economic transformation, various groups and stakeholders are broadly affected by low emission pathways, and engaging them can advise the development of LTS in a fair and just transition (Jotzo et al., 2021). Based on the findings our recommendations for future LTS development are two folded (see **Table 8**).

- Stakeholders from federal and regional governments, as well as the private sector, academia and civil society are essential in the development of a credible LTS.
- Powerful tools and methods for stakeholder engagement include online surveys, expert consultations, public hearings, workshops and establishing working groups

Synergies with existing strategies and regulatory frameworks can significantly advise the quality of the LTS. Synergies increase coherence and commitment and send signals to non-state actors. Overall, LTS that are built upon institutional, legislative, or governance frameworks can increase efficiency in achieving the LTS targets (Jotzo et al., 2021). A large majority of the countries have built their LTS on existing strategies or other regulatory frameworks. Based on this finding we recommend, that:

- Future LTS development should continue building on existing policies and regulations, both national and international. Doing so is likely to require the engagement of multiple ministries, broadening the ownership of the LTS (see also **Table 9**). In return, new strategies and regulatory framework should also reflect on targets set in LTS.

Monitoring and Evaluation is key to a successful LTS and must be included in its design (Aguilar Jaber et al, 2020; Jotzo et al, 2021; Rocha & Falduto, 2019). Evaluation methods and revision cycles can help countries to ensure that they are on track with implementing the LTS, and adjust implementation pathways if necessary. In order to ensure accountability and an impactful implementation of their LTS, MRV measures are required (Oberthür, 2019). Most LTS contain specific monitoring methods and evaluation processes, including a timeframe for updating the strategy. Thus, based on the findings we recommend for LTS to (see **Table 10**):

- Specify monitoring methods (e.g. review of policy frameworks against pre-set benchmark (Jotzo et al., 2021)) as well as evaluation processes
- Set targets in a way that their implementation can be monitored and evaluated
- Assess co-benefits of mitigation policies (e.g. air quality, green jobs, SDG implementation)
- Identify and specify the entities that will be involved in the monitoring, evaluation and LTS revision process, including roles and responsibilities

LTS and NDC alignment is key to ensure ambitious NDCs as well as to stay on track to implement LTS. NDC revision cycles can create an opportunity for the governments and policy makers to align their LTS with the NDC targets to reduce the risk of not being properly integrated into policy and implementation planning (Hans et al., 2020). While many developed and developing countries aim to align NDCs and LTS, through regular updates of both documents, some countries have missed the opportunity to link NDCs to their LTS. Therefore it is recommended for future LTS to:

- Explain LTS and NDCs and their alignment in both documents, by including the increasing ambitions of successive NDCs based on the long-term ambitions of the LTS
- Specify a timeframe (even if the Paris Agreement does not) for new or updated LTS (like for NDCs), realignment of policies with new (un-)certainties can increase efficiency.
- Fixed LTS revision cycles may help to synchronise ambitions and priorities in NDCs and LTS

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Annex I: Overview of analysed LTS

This report includes all 32 LTS that were submitted up to October 1, 2021 (including the EU for its 27 Member States) to this portal: <https://unfccc.int/process/the-paris-agreement/long-term-strategies>.

Table A - 1: List of submitted LTS to UNFCCC

Country	Title	Date of communication
Austria	Long-Term Strategy 2050- Austria	11 December 2020
Belgium	Belgium's long-term strategy	10 December 2020
Benin		12 December 2016
Canada	Canada's Mid-Century Long-Term Low- Greenhouse Gas Development Strategy	17 November 2016
Costa Rica	National Decarbonization Plan	12 December 2019
Czech Republic	Climate Protection Policy of the Czech Republic	15 January 2018
Denmark	Climate Programme 2020	30 December 2020
EU	Long-term Low Greenhouse Gas Emission Development Strategy of the European Union Member States	06 March 2020
Fiji	Fiji Low Emission Development Strategy 2018-2050	25 February 2019
Finland	Finland's Long-term Low Greenhouse Gas Emission Development Strategy	06 October 2020
France	National Low Carbon Strategy	08 February 2021
Germany	Climate Action Plan 2050	04 May 2017
Guatemala	E estrategia nacional de Desarrollo conbajas emisiones de efecto invernadero	06 July 2021
Hungary	National Clean Development Strategy 2020-2050	17 September 2021
Indonesia	Long-Term Strategy for Low Carbon and Climate Resilience 2050	22 July 2021
Japan	The Long-term Strategy under the Paris Agreement	26 June 2019
Latvia	Strategy of Latvia for the Achievement of Climate Neutrality by 2050	09 December 2020
Mexico	Mexico's Climate Change Mid-Century Strategy	16 November 2016
Netherlands	Long term Strategy on Climate Mitigation	11 December 2020
Norway	Norway's Long-term Low-emission Strategy for 2050	25 November 2020
Portugal	Roadmap for Carbon Neutrality 2050 (RNC2050)	20 September 2019
Republic of Korea	2050 Carbon Neutrality Strategy	30 December 2020
Singapore	Charting Singapore's Low-Carbon and Climate Resilient Future	31 March 2020
Slovakia	Low-Carbon Development Strategy of the Slovak Republic until 2030 with a View to 2050	30 March 2020
Slovenia	Resolution on Slovenia's Long-term Climate Strategy until 2050 (ReDPS50)	23 August 2021
South Africa	South Africa's Low-Emission Development Strategy 2050	23 September 2020
Spain	Estrategia De Descarbonización a Largo Plazo 2050	10 December 2020
Sweden	Sweden's long-term Strategy for reducing Greenhouse Gas Emissions	11 December 2020
Switzerland	Switzerland's Long-Term Climate Strategy	28 January 2021
The Republic of the Marshall Islands	2050 Climate Strategy "Lighting the way"	25 September 2018
Ukraine	Ukraine 2050 Low Emission Development Strategy	30 July 2018
United Kingdom	The Clean Growth Strategy	17 April 2018
United States of America	United States Mid-Century Strategy for Deep Decarbonization	15 November 2016

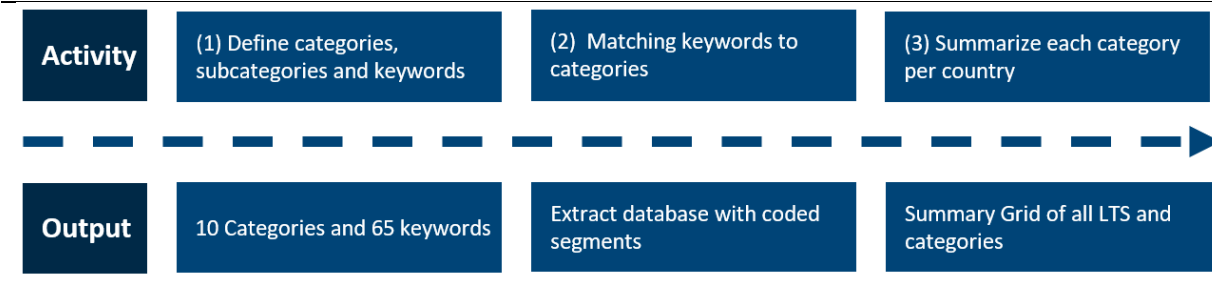
Annex II: Methodological approach to assess finance in LTS

This report pursues to consolidate information on the scope and intensity on how countries consider Art. 2.1(c) of the Paris Agreement in 32 LTS. In this report, we operationalise Art. 2.1(c) of the Paris Agreement among various categories using a qualitative textual analysis approach. The assessment of the LTS is two-folded and based on a consecutive approach. First, each LTS is summarised by category (*Analytical part I*). Second, each LTS is evaluated and scored for each (sub-) category to identify frontrunner characteristics (*Analytical part II*). The complete textual analysis of the paper was done with the software MAXQDA 2020 and is explained step by step in this section.

Analytical part I - Data aggregation

We textually analyse LTS in a 4-step research process summarised in **Figure A - 1**.

Figure A - 1: Phase flow of Analytical part I



Note: Full phase flow diagram of Analytical part I see **Figure A - 2**.

To identify relevant categories for our analysis, we framed the design of this study with assessments and recommendations from the literature. In **Activity 1 (Figure A - 1)**, the domains of interest (hereafter: (sub-) categories) represent the operational objectives of this study (see **Table A - 2**). First, we looked at finance in very general terms. We identified to what extent LTS reflects Article 2.1.c literally and word-by-word (**4.1.2**) and to what extent finance needs and gaps (**4.1.1**) are communicated. Secondly, we applied the recommendations by Whitley et al. (2018) on government tools to shift and mobilise finance (**4.2**). In our assessment, one focus was on the differentiation between tools by current actions (already under implementation) and planned ambitions (to be implemented). Notably, there were not always sharp boundaries between current initiatives and ongoing activities and ambitions and plans. Third, based on recommendations by Jotzo et al, (2021) we considered LTS formulation design and proceedings by the extent of cooperation and consulting in the development of the LTS (**4.3.1**) and the alignment of the LTS with existing strategies (**4.3.2**). In addition monitoring and evaluation (**4.3.3**) and LTS alignment with NDCs (**4.3.4**) were considered. In parallel and through an iterative process, relevant keywords were selected based on their link with finance and their use in the literature of Art. 2.1(c). In total we identified and searched for 65 keywords. As indicated in **Table A - 3** keywords were allocated to subcategories representing the basis for the output of **Activity 2**. MAXQDA 2020 searched and located relevant keywords in each LTS. Any match of a keyword in the LTS defined a ‘findspot’. All findspots were isolated into coded segments with four sentences before and four sentences after each findspot in order to understand the context in which keywords are used.

Table A - 2: Domains of interest (extended)

Category		Finance		Government Tools			Development Process and Implementation			
Sub-Category	Finance Needs and Gaps	Article 2.1(c)	Financial Policies & Reg.	Fiscal Policy	Public Finance	Information Instruments	Formulation		Monitoring / Evaluation	
Content	Financing needs, cost estimates and general gaps	Structure, implementation and avoiding harmful activities	Action: Current assessment of tools being implemented.				Existing	MRV		
			Ambition: Instruments and strategies to be developed.				Cooperation, long-term strategies / regulatory frameworks	(frequency updates and structure of monitoring)	LTS alignment including revision cycle	
Motivation	Costs, investments, and information needs and gaps in the preparation process and implementation of the goals.	Detailed description of aligned finance flows being considered as an important part of the Article 2.1(c). (e.g. sending signals to private sector).	Climate finance strategy, financial frameworks, pricing, incentives / instruments used to leverage private capital + strengthen contributions of financial markets. Promoting green and sustainable investments to reach long-term strategy targets.	Instruments such as, carbon pricing mechanism, ETS, carbon tax, Polluter-pays principle, and national ceiling cap being implemented by a country to achieve targets and minimise the level of emission resulted from the activities / projects.	Government, private sector and international support to organisations, ministries, municipalities to create Funds or provide advices to redirect investments towards less harmful projects and to smooth the transition process.	Providing public campaigns, workshops, summits, awareness-raising education trainings and informative tools to the members of academia, business and civil society to increase the sensitivity towards carbon neutrality.	Stakeholder and key expert involvement in the preparation process. Synergy with existing regulatory, legislative and financial frameworks as a fundamental step in the formulation of LTS.	Synergy with existing regulatory, legislative and financial frameworks as a fundamental step in the formulation of LTS.	Methodologies in monitoring, evaluation process and update the goals set in LTS. All the countries differ in their approach towards these processes.	The alignment of the LTS and NDC. Governments and policy makers aligning LTS with NDC targets to maintain the difference between short-term and long-term goals in these strategies.
Literature	Hans et al. (2020); Rocha & Falduto (2019)	Ross & Fransen (2018); Whitley et al. (2018)	Whitley et al., (2018)			(Jotzo et al., 2021)				

Table A - 3: (Sub-) categories and relevant keywords

	Finance	Government Tools				Development Process and Implementation			
	All categories	Financial Pol. & Reg.	Fiscal Policy	Public Finance	Information Instr.	Coop./consultation	Existing strategies	MRV	LTS alignment
Article 2.1c**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
awareness*					Yes				
bank*			Yes			Yes	Yes		
bond*			Yes	Yes			Yes		
cap** trad*			Yes				Yes		
capita*			Yes						
carbo* pric*	Yes		Yes				Yes		
centr* bank*	Yes	Yes	Yes	Yes		Yes			
civil societ*					Yes	Yes			
commitment*						Yes	Yes	Yes	Yes
cross-secto*		Yes	Yes						
cycle*								Yes	Yes
debentur*			Yes				Yes		
debt*			Yes	Yes			Yes		
design		Yes							
disclos*		Yes					Yes		
divest*			Yes						
education*					Yes	Yes			
enabl* env*		Yes					Yes		
equit*			Yes	Yes			Yes		
ETS**			Yes						
evaluat*								Yes	Yes
fiducia*	Yes		Yes						
fin* insti*	Yes					Yes			
fin* marke*	Yes	Yes	Yes				Yes		
financ* flow*	Yes					Yes	Yes	Yes	Yes
financ* mech*	Yes		Yes				Yes		
financ* sect*	Yes	Yes	Yes	Yes	Yes		Yes		
fisca*	Yes								
formulati*		Yes				Yes			
funding*	Yes		Yes	Yes			Yes		
grant*			Yes	Yes					
guarantee*			Yes	Yes					
implementation*							Yes		
instrument*			Yes	Yes			Yes		
insuranc*			Yes			Yes			
inter* support*				Yes		Yes			
invest* plan*	Yes	Yes					Yes		
investor*						Yes	Yes	Yes	Yes
levy*			Yes						
linkage*						Yes	Yes	Yes	Yes
loan*			Yes	Yes			Yes		
market* mechan*	Yes		Yes				Yes		
mobilisation*	Yes	Yes	Yes	Yes	Yes		Yes		
NDC*								Yes	Yes
pathway*							Yes	Yes	Yes
physic* risk*			Yes	Yes			Yes		
Polluter-pays pr*		Yes	Yes				Yes		
pric* sig*	Yes		Yes				Yes		
privat* financ*	Yes					Yes	Yes		
privat* sector*	Yes					Yes			
public fin*	Yes			Yes			Yes		
regulator*		Yes				Yes			
reporting*								Yes	Yes
scenario analy*								Yes	Yes
signal*			Yes				Yes		
stakeholder*					Yes	Yes			
strand* asset*							Yes		
subsid*	Yes	Yes	Yes	Yes	Yes		Yes		
tariff*			Yes				Yes		
tax*			Yes				Yes		
taxonom*			Yes			Yes	Yes		
tracking*								Yes	Yes
transformation*	Yes							Yes	Yes
transit* risk*			Yes	Yes			Yes		

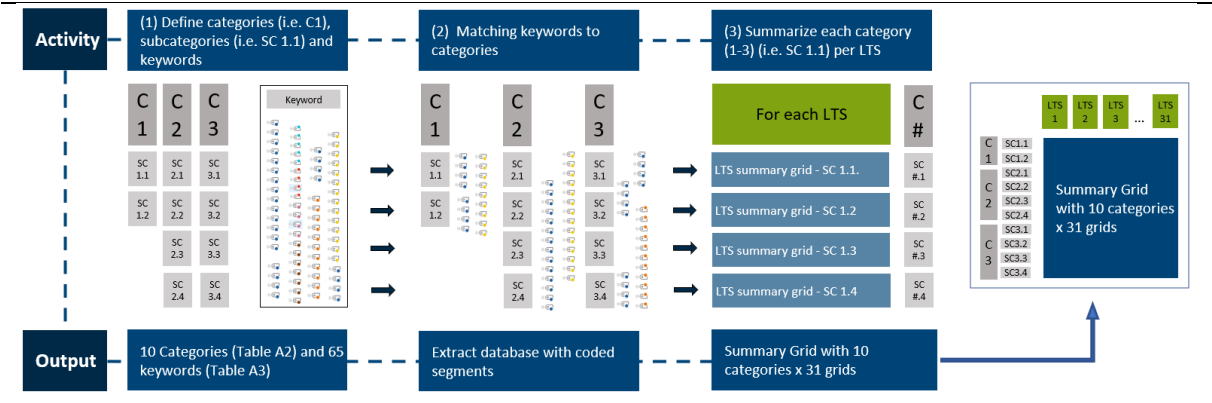
Note: Keyword-category matching for segmenting. Reading example: Keyword Article 2.1c** is matched to all categories. Results only indicative and do not represent sharp analytical assumptions. Manually look into the LTS are necessary anyway for each summary.

In **Activity 3**, based on the coded segments and the LTS as a whole, we manually summarised all sub-categories for each LTS, resulting in a 330 cell-summary grid (Output of Activity 3). In addition, we

summarised sub-categories by official country groupings (Developing, LDC/SIDS, Developed) in order to identify common characteristics within regions. The full flow chart including all critical working activities and outputs is illustrated in **Figure A - 2**.

The overall aim of **Analytical part I** was two-folded. First, the identified country summaries (output activity 3) essentially faded in **Analytical part II**. Second, qualitative meta-summaries (output activity 4) by country groups spanned the surface for a general stock take to address the objectives of Art 2.1(c). The full research process in **Analytical part I** is illustrated in **Figure A - 2**.

Figure A - 2: Phase flow of Analytical part I (full)

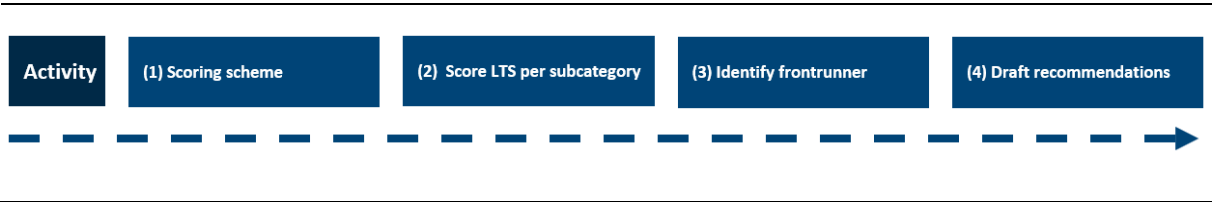


Note: C1, C2, C3 stands for the categories Finance (C1), Government Tools (C2), and Development Process and Implementation (C3) identified in previous Activities. SC1.1, SC1.2, SC1.3 stands for the sub-categories identified in **Table A - 2** more concretely *Article 2.1(c), Finance Needs, Finance Sources*. The same applies for subcategories two and three. In (3) the extracted segments provide information on the country level summarise of each sub-category for each LTS (*Country summary grid – SC1.1*). Final summary grid illustrated in the left square.

Analytical part II- Data evaluation

After data aggregation, we conducted an evaluation of each category and for each LTS. The overall aim of the data evaluation was to systematically identify frontrunners as well as country insights and highlights (see the Tables in sections 4.1, 4.2 and 4.3). Finally, we translated best-practice characteristics into recommendations for two reasons. First, recommendations can layer in the formulation and design process of LTS under preparation. Second, recommendations can discover blind spots in existing LTS for upcoming revision cycles. The research process from LTS evaluation to recommendation is summarised in the flowchart in **Figure A - 3**.

Figure A - 3: Phase flow of analytical part II



Based on the output of **activity 3** from **Analytical part I**, an internal scoring scheme was developed in **activity 1** of **Analytical part II**. We evaluated whether the summarised categories within the LTS are addressing the objectives of Art 2.1(c). The scoring scheme ranges from “0” (i.e. no information provided) to “+++” (i.e. frontrunner) and was applied across all (sub-) categories. Notably, there were

no sharp boundaries either between the scores nor the categories. The scoring purely served **Activity 3** to identify frontrunner and mentionable activities. There was no intention to quantitatively or qualitatively contra country LTS with other country LTS.

In **activity 2**, we applied the developed scoring scheme on the summary grids (for each LTS and each sub-category). Notably, this evaluation process was not purely based on a numerical decision, but rather on a context dependent assessment. For each category we faced different challenges as explained hereafter. For **category 1** (Finance) the analysis covered precise information. Concretely speaking, finance needs and gaps and whether the country focuses on *Art 2.1(c)* of Paris Agreement. Generally, for **category 2** (Government tools to shift finance) it was more challenging to identify frontrunners. For one subcategory *financial policies and regulation*, especially the depth of financial regulations, such as disclosure standards was an important indicator for the identification of best practices. Especially the explicit mentioning of green finance was seen as a plus. For the subcategory *fiscal policy levers*, the level of detail regarding measures such as carbon tax, subsidies, levies and tariffs was the most important criterion while for the subcategory *public finance* the number and depth of guarantees, grants, public funding and insurance was considered relevant. For the subcategory *Information instruments*, the fact that there were a lot of education programs for the society as a whole (and not explicitly finance-related) hardened the rating decision a bit. Again, the explicit mentioning of education programs regarding finance was seen as particularly positive.

In **activity 3**, we identified frontrunners per category from the scored summaries of the previous activity. Basically, we continued evaluating the findings of the summary grids in Analytical part I and the results from the scoring method to structurally assess frontrunners and best practice examples. Regarding the identification of frontrunners, it became apparent that it was hardly the case that one country appears as a frontrunner in all four subcategories (*Financial Policies & Regulation, Fiscal Policy, Public Finance, and Information Instruments*), but rather that some countries have particular strengths in some categories. It would seem in order to identify best-practice LTS, one has to combine the strengths of different LTS in different categories. Finally, in **activity 4**, we streamlined the identified characteristics per category with those identified in the literature and bridged them to key recommendations.

Annex III: Categorisation of tools to shift and mobilise finance

Categories and instruments mentioned below are based on (Whitley et al., 2018). We relied on this publication extensively and provide some additional background information here.

Financial policy and regulation: there are more than 1,200 climate change or climate-related laws worldwide (Whitley et al., 2018), but not all of these laws have a direct financial component. We focused on regulatory frameworks that have (partly) been developed to shift financial flows towards low-carbon development. Whitley et al. (2018) for example lists the Chinese “Guidelines for Establishing the Green Financial System” or the EU taxonomy as a classification system of sustainable activities as examples for this category. We also followed Whitley et al. (2018) in the differentiation between mandatory and voluntary disclosure requirements and categorised the former under ‘Financial Policy and Regulation’ and the latter under ‘Information Instruments’.

Public finance: Whitley et al. (2018) uses a narrow definition for this category and focus on expenditure from majority government-owned financial institutions and funds. We therefore included the disbursement of grants, loans or guarantees from these public funds in this category. These instruments aim to shift financial risk in order to incentivise private investment. This category also entails international fund structures, including finance from multilateral development banks.

Information Instruments do not necessarily stem from the government, but can also be created by businesses, investors or the civil society. In this category, we again focused on measures that specifically targeted the financial sector as there is a large number of specifically education and awareness programs that promote general knowledge about climate change. Following Whitley et al. (2018), we included voluntary standards for green bonds or disclosure requirements in this category as they represent a step towards increasing transparency in the financial market. While the categorisation by Whitley et al. (2018) served as the basis for our analysis, the authors also acknowledge that there are overlaps between the categories and a clear categorisation of instruments might not always be possible. Therefore, we sometimes included an instrument in two categories. A non-exhaustive categorisation of instruments can be found in **Table A - 4**.

Table A - 4: Government tools to shift and mobilise finance (based on Whitley et al., 2018)

Fin. Policy / Regulation	Fiscal Policy	Public Finance	Information Instruments
<ul style="list-style-type: none"> ▪ Financial framework and mechanisms ▪ Standards ▪ Mandatory disclosure requirements 	<ul style="list-style-type: none"> ▪ Carbon Tax ▪ Carbon pricing ▪ Levy ▪ Polluter-pays principle ▪ Budget support ▪ Public procurement ▪ Feed-in tariff ▪ Subsidies 	<ul style="list-style-type: none"> ▪ Grants ▪ Loans ▪ Guarantees ▪ Green credits ▪ International financing 	<ul style="list-style-type: none"> ▪ Certification and labelling ▪ Awareness campaigns ▪ Scenario analysis and stress testing ▪ Green bonds ▪ Voluntary disclosure

Note: Non-exhaustive, based on (Whitley et al., 2018).