Climate Compatible Growth

DATA-TO-DEAL (D2D): OPEN DATA AND MODELLING OF LONG-TERM STRATEGIES TO FINANCIAL RESOURCE MOBILIZATION – THE CASE OF COSTA RICA

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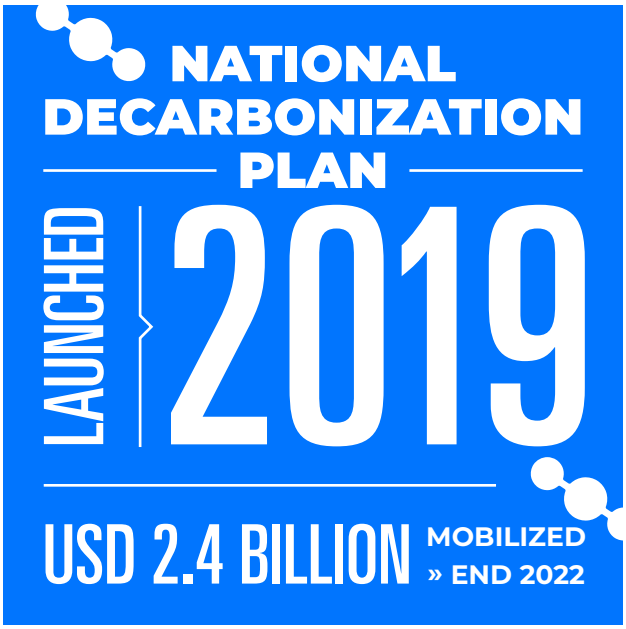
Abstract

Climate compatible and inclusive growth is needed to lift the vulnerable out of poverty and ensure we avoid climate impacts. To achieve this, there is a need to create clear pipelines for the considered release of funds, which include activities, analysis, and workflows to help countries move from 'data-to-deal'. A fundamental first step to delivering this objective is understanding the sectoral transformations required over time to transition to net-zero emissions – such as penetration of electric vehicles, electricity generation from renewable sources, and reforestation – and how these interact with other socio-economic development priorities – such as poverty eradication, technological leadership in green tech, job creation, air quality, etc. This knowledge can inform a roadmap encompassing conducive institutional, policy, and regulatory measures, sectoral goals, and a project pipeline. This comprehensive roadmap can be explored by formulating long-term low greenhouse gas (GHG) emission development strategies (LT-LEDS or Long-Term Strategies) – as defined under the Paris Agreement.

JAIME REIMER / PEXELS



Long-Term Strategies (LTSs) can be developed through an iterative process of codesign with stakeholders and experts to form a joint vision of a development path. Once a roadmap is defined, it can be used by governments to inform financing sources mobilization and instruments to deliver the measures defined in the LTS, providing signals to align broader finance flows towards creating a lower carbon economy. This exercise can increase access to and effectiveness of international climate finance. This is illustrated with a case example of Costa Rica. The data-driven and stakeholder-codesigned National Decarbonization Plan (the country's LTS) was launched in 2019. It has been the foundation on which at least USD 2.4 billion has been mobilized from international concessional finance sources by the end of 2022. An essential input underpinning this process was a carefully crafted and nationally owned LTS study of around USD 200k direct costs1 – which leveraged 'public good' advanced-schools[2], open models[3], communities[4], principles[5], and goals[6].

Introduction

Appropriate climate compatible growth trajectories are required to contain the climate crisis[7]. These are increasingly technically feasible and can come with net economic growth benefits that support socio-economic development objectives[8]. This will require the reduction of carbon emissions by producing low-carbon electricity (e.g., through a large-scale rollout of energy from renewable sources); undertaking massive electrification (e.g., deployment of electric vehicles and electric cooking stoves) and switching to other carbon-free fuels (e.g., green hydrogen for heavy industry); increasing the share of public and non-motorized transportation; improving efficiency and reducing waste across all sectors, particularly from energy and food consumption; switching to less carbon-intensive industrial processes, agriculture practices, building materials, and diets; and halting deforestation and protecting and regenerating natural carbon-rich ecosystems to balance the remaining emissions[8].

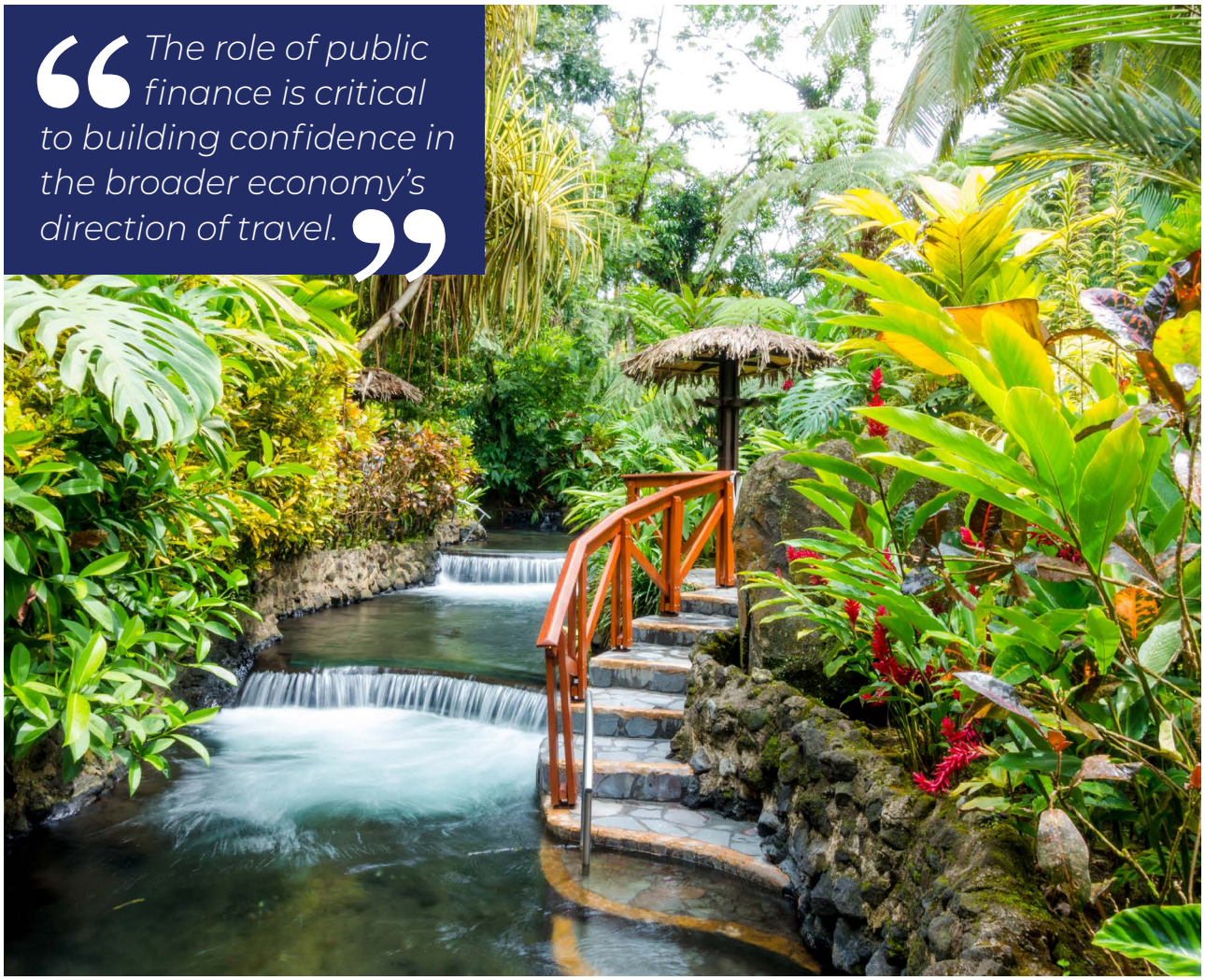
A first step to delivering this climate compatible growth is understanding how such sectoral transformations will need to evolve over time to achieve emissions reductions – at the required pace – and how these interact with other socio-economic development priorities given the specific country context. This can be achieved by formulating a long-term low greenhouse gas emission development strategy (LT-LEDS, hereafter long-term strategy or LTS). Under the Paris Agreement article 4.19, governments are invited to formulate and communicate their LTSs[9]. This invitation was reinforced in the Glasgow Climate Pact (1/CMA.3) agreed upon at COP26, which urges countries to communicate their LTSs and to update these strategies regularly as appropriate, in line with the best available science[10].

LTSs help transform a broad idea of transitioning to a net-zero economy into specific sectoral targets delineated by short, medium, and long-term milestones. And, thereafter, sequences of measures – including institutional policy and regulatory roadmaps – while considering socio-economic priorities such as poverty eradication, job creation, affordable energy access, and improved air quality. In addition they can anticipate potential challenges to achieve those targets, such as lack of technological know-how, lack of societal buy-in, fiscal impacts, and debt levels. These considerations can inform measures to manage tradeoffs tailored to local socio-economic context and development priorities.

However, moving from an LTS to implementation raises concerns about the finance required to deliver the objectives. 65 per cent of LTS submitted to the United Nations Framework Convention on Climate Change (UNFCCC) by September 2022 highlighted challenges relating to finance including safeguarding sound and balanced public finance and access to new sources of finance[11]. This is particularly the case for developing countries. Estimates indicate that climate-related investments globally should range between USD 4.5–5 trillion annually to achieve the transition to a sustainable, net-zero emission, and resilient world this decade. This implies a sixfold increase in current climate finance (USD 632 billion in 2019–20)[12][ii].

[i] LTS can also integrate elements of climate resilience and adaptation; in this paper we will focus on the mitigation elements of an LTS.

[ii] Other estimates indicate that global climate finance flows in 2019–2020 reached an annual average of USD 803 billion[13].



In addition, around two-thirds of infrastructure investment globally will be required in emerging and developing economies – as rapid rates of urbanization and population growth call for an expansion of transport, electricity, and other infrastructure[14]. This scale of action requires a decisive effort to redirect public and private financial flows away from high-carbon technologies, such as fossil fuel investments, which exceed USD 850 billion annually[12], into zero-carbon solutions.

The role of public finance is critical to building confidence in the broader economy’s direction of travel[15]. However, COVID-19, compounded by the war in Ukraine, has created extremely challenging fiscal and debt situations for developing countries. Very limited fiscal space to enable recovery and unsustainable external debt burdens have put a rising number of countries on the verge of a debt crisis[16]. Even before the pandemic, public investment globally was in a downward trend; rates in most developing countries are significantly below 6–8 per cent of GDP, exacerbating infrastructure gaps and highlighting the need to improve the quality and efficiency of investments[14].

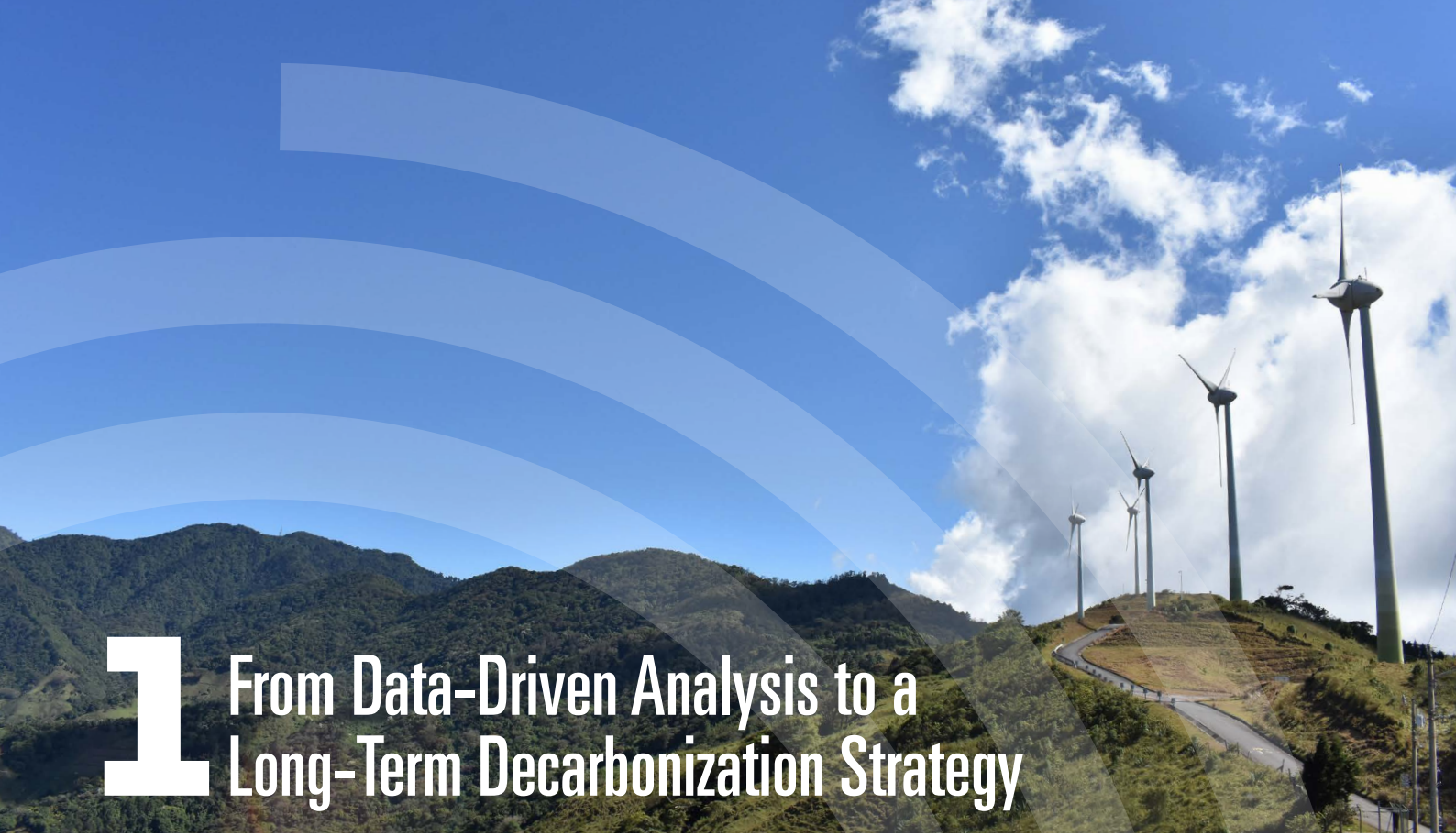
International climate finance will therefore play a critical role in helping developing

countries, including by easing public finance constraints and making finance available to invest in measures that can achieve the objectives of the Paris Agreement and Sustainable Development Goals (SDGs). Climate finance from developed to developing countries amounted to USD 40.1 billion per year on average in 2019–2020. 79 per cent of the climate-specific finance was channeled through bilateral, regional, and other channels, with the remainder consisting of contributions or inflows to multilateral climate funds and multilateral financial institutions[13].Despite an increase in climate finance flows, they remain considerably below what would be expected, given the investment opportunities identified and the cost of failure to meet climate stabilization targets[13].

In this paper, we argue that formulating an appropriate LTS can help governments plan financial resources for delivery, clarify the role of public resources, and increase access to and effectiveness of international climate finance. Once specific targets and sequences of measures for sectoral transformation towards the net-zero objective have been agreed upon in an LTS, governments can clarify investment priorities and financing approaches to deliver the targets. With the type, scale, and timing of measures, projects can be defined, and financing sources can be identified. This process can inform, for example, the role of public finance, fiscal policy and debt. In addition, it can signal to international finance providers the country's priorities and ambition under an integral portfolio of actions aligned with its commitments under the Paris Agreement.

By the end of 2022, 57 LTSs had been submitted under the UNFCCC[16]. Costa Rica was one of the first developing countries to present such a plan in 2019, which has been recognized as a high-quality, ambitious plan internationally[18]. This presents an opportunity to explore how this LTS mobilized international climate finance towards its implementation.

The rest of the paper is structured as follows. In Section 1, we explore the process of developing an LTS using stakeholder codesign driven by open data and open models to inform a consensus on a pathway towards net zero and sustainable development. Section 2 explores how an LTS can enable financial resource mobilization and address challenges for international climate finance access. Both sections include specific examples from Costa Rica's case, sharing characteristics of its LTS formulation process and the finance resources mobilized, to date, for its implementation. Finally, Section 3 presents lessons learnt from the Costa Rica case that can be relevant in the international context.



1 From Data-Driven Analysis to a Long-Term Decarbonization Strategy

Under the Paris Agreement, countries agreed to pursue efforts to limit the increase in global average temperature to 1.5°C. The 2018 IPCC Special Report on Global Warming of 1.5°C underscores that to have a likely chance of limiting warming to 1.5°C, global greenhouse gas emissions must be cut by 45 per cent by 2030 and reach net zero soon after 2050[7]. LTSs typically describe what is required to achieve a transition in line with the 1.5°C temperature rise limit of the Agreement while also reaching desired societal outcomes[19].

Several examples of LTS processes exist; for energy, many are well documented by the International Renewable Energy Agency (IRENA)[20]. Costa Rica's LTS, communicated in 2019 to the UNFCCC[21], defines a roadmap of technological and policy transformation across all sectors of the economy, with a vision for achieving net-zero GHG emissions by 2050 while ensuring economic growth and compliance with the SDGs.

Creating narratives describing possible futures, analyzing and modelling scenarios based on those narratives, and communicating and discussing assumptions and results with stakeholders have been identified as core building blocks to designing an LTS[19]. Models can be used as a framework to test strategies and facilitate a policy debate around decarbonization, quantifying possible pathway options to define the LTS[8,22]. Most LTSs presented to date include modelled scenarios, illustrating pathways to achieve the parties' long-term vision and varying in type and scope[23]. While some parties (Austria, Canada, Finland, Slovakia, Sweden, and the United States) design their own models to produce or contribute to the mitigation scenarios deployed within their LTSs, others, such as Costa Rica, Cyprus, Finland, Portugal, Spain, Sweden, and Ukraine have opted to tailor generic models to fit their specific national circumstances, such as the TIMES or OSeMOSYS partial equilibrium model, the LEAP integrated assessment model, the EPPA computable general equilibrium model, and the GCAM integrated assessment model[24].

A key objective of these mathematical tools is to quantify transformations over time in physical terms (e.g., per cent of renewable electricity; share of mobility fulfilled by electric public transport, walking, or biking; hectares of forest to reforest) and their impact on GHG emissions.

Along with quantifying related socio-economic indicators, highlighting positive impacts that can bring sectors on board (e.g., reduced energy prices leveraging cheap renewable power; improved quality of public transport and associated reduction in accidents; increased productivity in agriculture, ecosystem services provided by forests, or creation of green jobs) and negative impacts that need to be acknowledged and addressed to ensure a just transition (e.g., jobs lost in polluting industries , stranded assets, fiscal impacts).

Analytical work to investigate the technical, economic, and social dimensions of decarbonization scenarios, using sectoral and macro-economic modelling tools, can be useful to inform the LTS design process. However, there are complexities and political sensitivities in designing LTSs, given the transformations they entail. Therefore, to be effective, any analytical simulation should be developed to produce inputs for policy discussions which can be understood, discussed, and accepted by a working majority of stakeholders[2,8].

In Costa Rica, the LTS design process was led the Minister of Environment and Energy (MINAE) and the Climate Change Directorate (DCC) team, technically supported by both a national and an international consultant team and financed by NDC Invest and Deep Decarbonization Pathways for Latin-America and the Caribbean (DDP-LAC)[1] programme of the Inter-American Development Bank (IDB). The consultation process was also supported by funds from the German Cooperation through the Climate Action II project[21]. It recognized the need to inform the technological pathway using an approach that combined qualitative and quantitative methods. The former was addressed through a back-casting approach that was driven by stakeholders. This established the policy packages required in the desired decarbonized future and defined strategies and actions needed for the decarbonization pathway. The quantitative analysis was executed by a rapidly empowered[iii] local modelling team, established at the University of Costa Rica. They built a basic dataset[iv] and translated that information into long-term scenarios by incorporating updates and stakeholder engagement to model scenarios and a representation of the policy instruments available to (feasibly) achieve the desired output. The data used were publicly available[27] and the modelling framework used was based on the Open Source Energy Modelling System (OSeMOSYS)[4] tool. The combination of open data, (peer-reviewed) open tools[4], and transparent workflows allowed for a level of principle-based[28], community-focused accountability[v]. The workflow that defined the participatory stakeholder engagement was specifically developed to provide policy support. The results included the identification of measures to promote public transport and active mobility via a modal shift from private transport (accompanied by an increase in concurrent generation from low-carbon sources).

Costa Rica's Ministry of Environment and Energy used these and other inputs to discuss possible decarbonization pathways and associated actions with line ministries, civil society, and the private sector[29]. The pathway agreed upon was reflected in the National Decarbonization Plan (NDP) launched by the President of the Republic in February 2019 and submitted before the UNFCCC as its LTS. This LTS defined Costa Rica aspirations to be a modern, green and

[iii] The upskilling activities included regional meetings and participation in the annual ICTP Joint Summer School[3]. This has since resulted in the launch of the Energy Modelling Platform School for Latin America[25]. (Now in its second year).

[iv] The structure and basic data form the basis of 69 starter data-kits recently released to accelerate similar processes[26].

[v] Consistent with U4RIA goals[2].

emission-free economy - and to strengthen its leadership - becoming a decarbonized economy with net-zero emissions by 2050. This vision was backed with sectoral targets across ten axes of transformation covering transport, power generation, buildings, industry, waste, agriculture, livestock and biodiversity. Eight cross-cutting strategies were defined to complement sectorial action with institutional and fiscal reform, funding strategy, digitalization, just transition, human rights and promotion of gender equality, transparency, and education and culture. Targets across sectors span between 2018 and 2050 (see examples in **Table 1**), including milestones in every decade and activities required towards delivering the target, creating a policy roadmap with assigned responsibility across government agencies and line ministries[21].

This process also enabled the identification of potential lock-ins that should be avoided, which are included in the LTS. For example, to avoid the promotion and adoption of "transitional" transportation technologies that create barriers for the decarbonization of the transport system in the medium- and long-term; to avoid investments in infrastructure that favor the use of private vehicles rather than public transport; avoid short-term investment in the electricity sector aimed at lowering user rates without firstly evaluating their impact on emissions during their lifespan; and to prevent extensive livestock farming from competing with areas for forest and conservation[21].

Axis	Objective	Long term (2050)	Medium term (2030–35)	Short term (2022–30)	Immediate action (2023)
1	Development of a mobility system based on safe, efficient, and renewable public transport and on active mobility schemes	Make public transport the #1 commute option. 85 per cent of public transport is zero emissions	30 per cent of buses electric	Bus service concession contracts include goals and conditions associated with the use of electric or zero-emission buses	To modernize the concession scheme for 2021 to reward efficient and decarbonized service provision
4	Consolidation of the national electricity system with the capacity, flexibility, intelligence, and resilience necessary to supply and manage renewable energy at a competitive cost	Electric power as the primary source of energy for the transport, residential, commercial, and industrial sectors	The electricity matrix operates at 100 per cent with renewable energy	Integrated sectorial planning of the electrification process of the country's different uses is implemented	To promote studies for the decarbonization of thermal energy support
5	Development of buildings of different uses (commercial, residential, institutional) under high efficiency standards and low-emission processes	50 per cent of buildings operate under high electrification or use of renewable energy in cooking processes and water heating	100 per cent of new buildings adopting low-emission, resilience systems, and technologies under bioclimatic parameters	Increase of 10 per cent in the use of wood, bamboo, and other local materials in buildings	To strengthen the guidelines for low emission, sustainable construction for public buildings and social housing through public biddings
10	Management of the rural, urban, and coastal territory oriented towards Conservation and sustainable use, growing forestry resources, and ecosystem services	4,500 hectares of green areas operate as recreational parks in the Greater Metropolitan Area	Move from 52 to 60 per cent of forest area	Expand the national payment for ecosystem services	To design and launch new generation of Payments for Ecosystem Services

Table 1 *Examples of objectives and target milestones of Costa Rica's LTS*

2 From LTS to Mobilization of Financial Resources

International literature suggests that governments can play three primary roles in mobilizing the required investments to achieve their climate objectives and SDGs: (i) create an enabling environment (policies and regulation) for long-term climate-aligned investment; (ii) enable the effective use of public budgets and investments, including through dedicated funds and/or financial intermediaries to encourage a shift towards climate-aligned sustainable development; and (iii) mobilize private climate investments through tailored application of financial risk-mitigation instruments[30].

This broad set of levers can be assessed against measures defined in the LTS, matching needs with suitable tools and resources. For example, early action on decarbonization is likely to require significant efforts to redirect public investments, which in turn is likely to require aligning sectoral plans with the objectives of the LTS. To make sure those plans are binding, governments can require that agencies in charge of implementing public investments justify within national public investment systems how the projects they execute are aligned with the decarbonization goals. In addition, having a government-backed LTS – assigning ownership of projects and activities within the government – can give confidence to international finance institutions and the private sector and unlock these resources.

Costa Rica's LTS defined in its annex a framework with more than 70 targets from 35 different government agencies and line ministries. These were to be immediately implemented (by 2023) before the end of the term of the government in office (at the time of the launch of the LTS). The framework presented under each axe the overall objective, the goal for this period, indicators, activities and key actors. Defining concrete actions to align public finances across government agencies, including regulatory actions (e.g., establishing the rules on how the electricity price for electric vehicle charging stations can be set), investments (notably to enable public transit), studies (e.g., assessing options to fund an updated payment for ecosystem services scheme), and policy and institutional reform (e.g., evaluating fiscal policy given the decarbonization of the transport sector). This detailed action informed the National Development and Public Investment Plan[31] of the Ministry of National Planning and Economic Policy (MIDEPLAN) and served as a basis to leverage finance through policy-based loans, as presented in the following section.

This exercise can help remove barriers to accessing international climate finance. Challenging aspects of mobilizing and delivering climate finance from public sources include matchmaking actors at the international and national levels. Once matched, they need to design and implement climate projects; determine intervention specifics that meet country needs, regulations, and policies; ensure climate mitigation; and overcome high fragmentation of climate plans and programmes at the country level[32]. Country ownership and country-driven strategies have also been highlighted as important elements for ensuring that developing countries are taking the lead in developing and implementing funding proposals. In addition, limited availability of disaggregated data at the sector and subsector level, as opposed to overall needs estimates, constitutes one of the major gaps identified by developing countries to clarify finance[33]. More detail is given about these barriers to climate finance and how an LTS can help address them in **Table 2** below.

Barriers to climate finance	How an LTS can help address barriers
Matchmaking actors at the international and national level to design and implement climate projects.	An LTS allows the Ministry of Finance and the rest of the government to coordinate funding received from international donors, as it establishes an umbrella for the overall transition and can inform a list of priorities for which the government is requesting support. It also facilitates matching resources with funders looking for transformational investments, as the LTS can clarify a whole government effort to align national public budgets or to identify possible public–private financing schemes. This can increase the effectiveness of access to international climate finance.
Identifying and designing interventions that meet country needs and are aligned with national regulation, policies, and planning.	An LTS can ensure that stakeholder engagement includes the requisite knowledgeable multi-sector experts and that appropriate political economy analysis insights can be tailored to needs.
Demonstrating the benefits of climate actions for development.	The LTS modelling can be developed such that it quantifies, translates, and communicates appropriate development information.
High fragmentation of climate plans and programmes at the country level.	In quantifying scenarios in the LTS via stakeholder engagement, an LTS allows for inconsistent fragmentation to be identified and discussed. Further, if the LTS helps unlock funding for implementation (discussed below) this can create strong incentives for defragmentation.
Country ownership and country-driven strategies.	The LTS should be undertaken by national-level stakeholders with, if needed, technical assistance to carry out qualitative and quantitative analysis. This can require rapid and deep capacity building of local institutions that are self-sustaining. This can be achieved by taking advantage of technical assistance programmes such as the DDP-LAC programme[8,34] of the Inter-American Development Bank (IDB) and the Joint Summer School on Modelling Tools for Sustainable Development at the International Centre for Theoretical Physics[3].
Limited availability of disaggregated data at the sector and subsector level.	Having a government-backed LTS – assigning ownership of projects and activities within the government, including responsibility for open data development – can enable trust and facilitate resources from international finance institutions and the private sector.

Table 2 *LTS role to address climate finance barriers.*

Leveraging international climate finance

Investments to deliver a pipeline of projects resulting from an LTS may require different financial solutions. According to the latest Global Landscape of Climate by the Climate Policy Initiative, in 2019/2020 the public sector accounted for 51 per cent (USD 321 billion) of tracked climate finance, with development finance institutions (DFIs) continuing to provide

the majority of public finance at almost 70 per cent. Private actors accounted for the remaining USD 310 billion, representing 49 per cent of the total, with commercial financial institutions and corporations contributing almost 80 per cent of this amount. The financial instruments most used to channel climate finance are debt and equity. In 2019/2020, debt accounted for 61 per cent of climate finance flows, of which 88 per cent was market-rate debt and almost 100 per cent of the concessional loans were provided by public institutions; equity investments accounted for 33 per cent. On the other hand, grants accounted for 6 per cent (USD 36 billion) of 2019/2020 climate finance, with governments as the main source of grant funding[12].

In Costa Rica, the formulation of the NDP/LTS itself attracted international assistance (grants) from multiple bilateral and multilateral development agencies. In particular, in 2018, the Inter-American Development Bank (IDB) started an academic collaboration with the University of Costa Rica, using analytical tools to assess technical roadmaps to net-zero emissions in the energy, transport, and buildings sectors[35] through the DDP-LAC project[8,34] for around USD 200k1. In addition, at the request of the Government, IDB financed local and international experts to compile existing knowledge and policy plans in energy, transport, building environment, waste management, agriculture, livestock, and forestry[29]. The aim was to understand better the aggregate impact of existing policies on GHG emissions and how sectoral plans could be extended over time to reach the net-zero goal collectively.

Once published, the LTS served as a backbone for mobilizing financing from international public sources through the Ministry of Finance, which coordinates finance from multilateral and bilateral entities. As a result, between LTS's publication in 2018 and the end of 2022, Costa Rica has secured at least USD 2.4 billion of international finance directly linked to it[vi] (See **Table 3**).

Concessional loans contributed 96 per cent of the total international public resources. This type of loan can lower overall capital costs and increases the profitability of infrastructure needed to decarbonize, such as the public transport system. 59 per cent of the loans were policy-based (PBL) amounting to USD 1.4 billion; this financial instrument provides liquid (fungible) concessional funding disbursed upon evidence of the delivery of policy and regulatory reform programmes[36]. PBLs can mobilize more significant amounts of funding than traditional technical assistance. In addition, their fungible concessional nature can attract more interest and ownership from the Ministry of Finance, for whom delivering the reforms agreed upon becomes a priority to secure the disbursement of funds. Programmatic PBLs with two sequential disbursements against the delivery of measures defined in the National Decarbonization Plan, from the IDB, the French Development Agency (AFD), and World Bank (WB) enabled early stages of implementation of the strategy.

Grants for around USD 86 million, 4 per cent of the total funding, can also be linked to the LTS. Technical cooperation linked to the PBLs supported delivery of studies to inform the reforms required under the loans from the IDB and AFD[34]. For example, to inform new climate change budget markers, guidelines to assess the alignment to the NDP of the projects were submitted to the National Public Investment System; inputs were provided to inform the National Strategic Development Plan to 2050; the reform of the Ministry of Public Works and Transportation (MOPT) was evaluated, given responsibilities linked to the LTS; and an assessment was conducted

[vi] The resources mapped in this analyis are not exhaustive.

regarding the fiscal and macro-economic implications of decarbonizing and for options to manage the transition. Other grant funding was received from the International Climate Initiative (IKI), the German Agency for International Cooperation (GIZ), United Nations Development Programme (UNDP), The United Nations Entity for Gender Equality and the Empowerment of Women (UNWomen), Food and Agriculture Organization of the United Nations (FAO), and International Labour Organization (ILO) (see **Table 3**).

Source	Funds (USD)	Instrument	Objectives
IDB	45,000	Grant – Technical Cooperation	LTS design – Modelling and policy analysis[35]
IDB	230 million	Programmatic Policy Base Loan	CR-L1142: Towards a Green Economy: Support for Costa Rica's Decarbonization Plan I. Policy and regulatory reform in energy, transport, agriculture, and ecosystem sectors. As well as within national economic planning processes and fiscal and budgetary policy[37]
IDB	500,000	Grant – Technical Cooperation	CR-T1217: Strengthening the Management and Monitoring of Climate Action. To support achieving policy commitments related to climate management and monitoring defined under PBL CR-L1142[38]
IDB	450,000	Grant – Technical Cooperation	CR-T1224: Support for the Strategy of Strengthening Mass Public Transport of People by Bus. Including support for the implementation of the public transport electrification project and electronic payment system. To support achieving policy commitments under the PBL CR-L1142 and CR-L1139[39]
IDB	850,000	Grant – Technical Cooperation	CR-T1218: Support for policy reforms and implementation of Nature-Based and Climate-Smart Agriculture Solutions that contribute to Costa Rica's National Decarbonization Plan[40]
IDB	220,000	Grant – Technical Cooperation	CR-T1219: Support for the Transformation of the Energy Sector towards a Decarbonized Economy as per the NDP to support achieving policy commitments under the PBL CR-L1142[41]
IDB	400,000	Grant – Technical Cooperation	CR-T1240: New Skills for the Agriculture of the Future. Develop a proof of concept of a "bootcamp" in agricultural technical high schools so that education in agriculture can adapt to the new demands of the labour market[42]
IDB	500,000	Grant – Technical Cooperation	CR-T1239: Support for the Development of the National Hydrogen Strategy towards a Decarbonized Economy, in line with the Decarbonization Plan[43]
IDB	300 million	Programmatic Policy Base Loan	CR-L1147: Towards a Green Economy: Support for Costa Rica's Decarbonization Plan II. USD 250 million in ordinary capital from the IDB, plus USD 50 million from the Government of Korea. Loan to continue to back Costa Rica's NDP. This loan is the second in a series of two programmatic policy-based lending operations[44,45]
IDB	400,000	Grant – Technical Cooperation	CR-T1259: Support for the implementation of the "Towards a Green Economy II" Program (CR-L1147). To complement the Decarbonization Plan reform actions in relation to Nature-Based Solutions and Agriculture. [46]
IDB	350,000	Investment Grant BID Lab	CR-G1010: Circular Economy from Agroforestry Residues for Decarbonization[47]
AFD	150 million	Policy-based loan	Policy and regulatory reform in energy, transport, agriculture, and ecosystem sectors. As well as within national economic planning processes and fiscal and budgetary policy[48].
AFD	2.79 million	Grant – Technical Cooperation	Grant linked to the 150 million policy-based loan to support the government in the delivery of a set of regulations and analysis, including for the management and monitoring of climate action
AFD	€100 million	Policy-based loan – Tranche II	Policy and regulatory reform in energy, transport, agriculture and ecosystem sectors. As well as within national economic planning processes and fiscal and budgetary policy[44,45].

Table 3 *Resources mobilized for LTS design and implementation (in construction)*

Source	Funds (USD)	Instrument	Objectives
WB	300 million	Policy-based loan	First Fiscal and Decarbonization Management Development Policy Loan (DPL)[49]
WB	300 million	Policy-based loan	Second Fiscal and Decarbonization Management DPL, in support of Costa Rica's efforts to protect 'people's income and jobs from the impact of COVID-19, strengthen small and medium enterprises (SMEs), reinforce fiscal sustainability, and lay out foundations for a strong post pandemic recovery based on green and low-carbon development'[50]
IMF	700 million	Loan, IMF's Resilience and Sustainability Trust (RST)	See[51]
GCF	271 million	Loan 250 million, Grant 21,300	FP166: Light Rail Transit for the Greater Metropolitan Area (GAM). This project aims to install an 85 km double-track, electric light rail transit system in San José's Greater Metropolitan Area which will be powered by more than 98 per cent renewable electricity[52]
Germany	€12,500 million	Grant, IKI	Project "Low-carbon and climate-resilient transformative pathways (Transforma)". To shift production systems from relevant sectors towards low-carbon and climate-resilient pathways, in support of Costa Rica's Nationally Determined Contributions (NDCs) and the implementation of the NDP[52]
GIZ NDC	€10 million	Grant, IKI	Project: ACCION Clima – NDC Implementation and Regional Knowledge Transfer – including in line with the NDP[53]
CABEI/ GIZ	10million	Grant	NAMA Facility Coffee Support Project USD 10 million in support of the decarbonization process of the coffee sector in Costa Rica[54]
UNDP	210,800	Joint Fund	The Joint Collaborative Programme (JCP) to strengthen the social protection system and accelerate SDG achievement through concrete changes in institutional arrangements and local initiatives in three specific cantons, enhancing synergies and coordination between economic, social, and environmental national policies[55]
FAO	210,800	Fund	The Joint Collaborative Programme (JCP) to strengthen the social protection system and accelerate SDG achievement through concrete changes in institutional arrangements and local initiatives in three specific cantons, enhancing synergies and coordination between economic, social, and environmental national policies[55]
ILO	210,800	Fund	
UN WOMEN	210,800	Fund	
UNDP GEF	7,471,945	Grant	Seventh Operational Phase of the GEF Small Grants Programme, aims to strengthen environmental management capacities of country partners at the community level and the engagement of these with national authorities. This will facilitate the introduction of improved management practices, landscape restoration and reforestation efforts, aligned with the country's development plans and decarbonization process[55]
UNDP	250,000	Grant	Forging a common pathway to 2030. To develop material conditions, evidence and data for the strengthening of democratic governance in Costa Rica. This builds upon the NDP and the post-COVID-19 recovery plans, where transitioning to a green economy based on natural capital has become priority[56]
UNDP	350,000	Grant	Project: Rapid Financing Facility. Development of a Green and Inclusive Economy Investor Map to detail investment opportunities for transforming the economy into one more inclusive and greener, as well as the conditions that would allow progress over different priority sectors with an intersectional gender approach[56]
UNDP	4,386,210	Grant + Co financing	Project: International Waters SIXAOLA. To strengthen the transboundary multi-stakeholder integrated water resource management (IWRM) in the Sixaola River Basin shared by Costa Rica and Panama[57]
Total	**USD 2.4 billion**		

Table 3 *(continue) Resources mobilized for LTS design and implementation (in construction)*

In the table above each quanta of finance was linked directly, indirectly, or inspired by Costa Rica's LTS. As a foundation, the integrity of the LTS and its interface with appropriate national and bilateral cooperation was critical. In the next section we discuss the IDB-AFD Policy-Based Loan (PBL) in

illustrative granularity. Of particular significance is reference to lower-carbon transport identified in the LTS. This resulted in the sponsoring of subsequent more detailed studies and investment plans. These in turn are related to the release of larger loans.

IDB-AFD Policy-Based Loan

The plan enabled funding from an IDB policy-based loan (PBL) – co-funded with the French Development Agency (AFD) – that combined IDB expertise in energy, transport, land-use, and climate governance[29]. The two institutions lent money to the government at preferential rates to help implement the regulatory part of the plan. The IDB loan of USD 230 million has a repayment term of 20 years, a grace period of five and a half years, and an interest rate based on LIBOR. It also has parallel funding of USD 150 million from the AFD[58]. The IDB and AFD also provided technical assistance attached to the PBL to support the development of policy reforms for USD 8.7 million (See **Table 3**).

The loan aims to support the implementation of political reforms focused on three pillars informed by the LTS: strengthening the management and monitoring of climate action in Costa Rica in the planning, investment, and public budget process; conserving and restoring high-carbon ecosystems and integrating low-carbon practices in agriculture; and encouraging the use of electric energy, particularly moving towards electro-mobility and modern and efficient public transport[37]. Twenty triggers were defined in the PBL across these pillars to condition the release of funding. These include, for example, that MIDEPLAN reports that at least 50 per cent of the targets established in the annex to the Decarbonization Plan for 2018–2022 have been met; MIDEPLAN has approved and published guidelines to determine alignment with the Decarbonization Plan of projects submitted for recording in the National Public Investment System and to facilitate ranking by priority; the Ministry of Finance has developed climate change budget markers to identify and monitor climate spending in the national budget; MINAE has published the National Blue Carbon Strategy and presented the first progress report on its implementation; the Public Utility Regulatory Authority has approved and implemented a mechanism for calculating rates charged to end users of bus services that allows for the incorporation of electric buses into the fleet[37].

This was the first loan of two consecutive single-tranche operations; a second loan for USD 300 million was completed in 2022[44],[45]. Since the funds under a PBL are conditional to the delivery of the agreed policies and actions against defined indicators, the completion of these of these two loans suggest progress was achieved in all the pillars.

Activities supported by the technical cooperation (grant funding) provided with the PBL include the study The Benefits and Costs of Decarbonizing Costa Rica's Economy[59], which finds that, well-executed, the plan will bring USD 41 billion by 2050 in areas including economic productivity, competitiveness, quality of life, and ecosystem services, even after paying investment costs necessary to electrify transport, improve agricultural and livestock practices, and restore and protect ecosystems, which accounted for USD 37 billion. Other activities include the formulation of an LTS Investment Plan, identifying the type and scale of investments linked to each of the targets and activities defined in the plan as well as the policy and institutional processes/tools and know-how required to deliver those investments; a study to understand fiscal impacts of decarbonizing the transport sector and to identify possible fiscal strategies to manage it considering distributional impacts[60]; and the development of guidelines to prioritize projects registered under the National System of Public Investment if they are aligned with the NDP.

Lessons Learnt

To increase effectiveness in mobilizing finance, an LTS needs a solid data-driven, stakeholder engagement process that captures local socio-economic and development objectives to inform a consensus on a path to decarbonization. Such a process can inform a government-backed LTS with a comprehensive vision for low-carbon economic growth and broader sustainable development. In Costa Rica a net-zero emissions economy by 2050 was targeted, and a policy and investment roadmap to deliver it was developed.
Such LTS's can build trust in the ambition, seriousness, and clarity of how investment will lead the country to its decarbonization goal, that is, what investments are Paris-aligned. Defining specific targets for the short, mid, and long-term can open a space to identify financial needs and match suitable resources. Costa Rica's LTS, the National Decarbonization Plan, was designed based on open data and model driven analysis with deep and appropriate stakeholder engagement. It provides an example of how to deliver a national policy, translated into a pipeline of projects that, in turn, attracts financing from multilateral and bilateral resources. In particular, short-term targets included in the LTS can result in the mobilization of financial resources relatively soon after the official publication of an LTS. These can include policy and regulatory reforms, which could attract policy-based lending, as well as studies, prefeasibility studies, pilots, and infrastructure investments that can capture grants and concessional loans. LTSs can offer an umbrella to inform financing from multiple sources, reducing fragmentation of funding, facilitating matching of needs and funding, providing a programmatic government its own approach to align public and private resources towards a decarbonized and sustainable development.

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