TECHNOLOGY NEEDS ASSESSMENT

REGIONAL TECHNOLOGY BRIEF

LATIN AMERICA & THE CARIBBEAN

Countries in **LATIN AMERICA AND THE CARIBBEAN** (LAC) have a geographically determined vulnerability to the impacts of climate change. Climate change projections show increasing mean temperatures rising by up to 4.5°C compared to the pre-industrial period by the end of the 21st century across the LAC region. These projections are associated with physical impacts, which include altered precipitation regimes, increases in heat extremes, increased intensity and frequency of cyclones, sea-level rises and the greater risks of droughts in the region. These physical impacts will have severe consequences on all production sectors, especially the agricultural and water sectors, which are highly dependent on climate.

Moreover, climate change projections are coupled with observed trends in the direction of increased energy consumption, which has more than tripled over the past forty years. This is expected to continue to grow steadily over the coming decades, due to the region's economic growth, rising middle classes and related changes in consumption. Together, this indicates a worrying future for the region for which immediate action is required in order to reduce the negative consequences for regional populations, while supporting the region's efforts to achieve the Sustainable Development Goals. Immediate action to scale up the transfer and diffusion of climate-friendly technologies for purposes of both adaptation and mitigation is one possible avenue for managing the impacts, both current and expected, of climate change.

Enhancing the development, transfer and uptake of technology is a key pillar of the international response to climate change. Since 2009, the global Technology Needs Assessment (TNA) project has included twenty-two countries in the Latin America and Caribbean region, the objective being to assess and articulate countries' technology needs in relation to climate change adaptation and mitigation.

TNA COUNTRIES IN LATIN AMERICA & THE CARIBBEAN

2009-2021
Antigua and Barbuda, Argentina; Belize, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guyana, Haiti, Honduras, Jamaica, Panama, Peru, Suriname, Trinidad and Tobago, Uruguay

2020-2023
Bahamas, Saint Kitts and Nevis

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UNEP DTU PARTNERSHIP

UN environment programme

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TECHNOLOGY NEEDS

Technology Needs Assessments (TNAs) were strongly emphasized in the Paris Agreement, and they play a central role in the newly agreed UNFCCC Technology Framework, which provides overarching guidance to the UNFCCC's Technology Mechanism. Greater support to developing countries in conducting effective TNAs and implementing Technology Action Plans (TAPs) will be instrumental in enhancing implementation of the Paris Agreement.

TNAs provide information about the potential, ability and scale of climate technologies, and they can play a unique role in the formulation and implementation of NDCs. They are a highly practical tool that provides an effective and solid foundation upon which developing countries can both scale up and implement action on climate technologies. Countries can therefore pursue both the targets they agreed under the Paris Agreement and their national Sustainable Development Goals.

With funding from the Global Environment Facility, UNEP through the UNEP DTU Partnership, supports developing countries in preparing their TNAs and TAPs within the global Technology Needs Assessment project. Since 2009, close to a hundred developing countries have joined the project, of which 22 are in Latin America

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and the Caribbean. Technical assistance, capacity-building and guidance are being provided by UNEP and UNEP DTU Partnership through their Regional Centres for the TNA project, which in Latin America and the Caribbean include Fundación Bariloche (Argentina), Libélula (Peru) and currently the University of the West Indies, located in Jamaica.

ADAPTATION TECHNOLOGIES

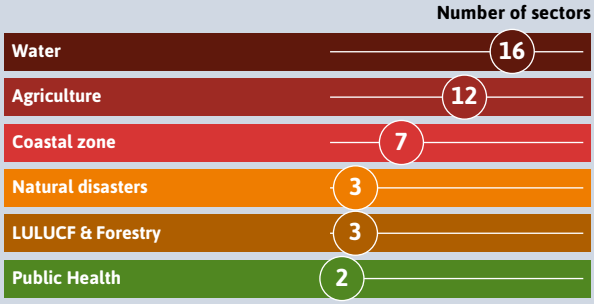
The LAC region is characterized by rapid economic and demographic growth, which are triggering urbanization and changes in consumption. These socio-economic changes are putting pressure on the region's agricultural and water sectors, which are, at the same time, severely impacted by climate change. Increases in drought and flooding events do indeed put a stress on the availability of freshwater and food security. In addition, the region's coastal zones and their populations are at risk because of increasing tropical cyclone activities and rising sea levels.

Generally focusing on two adaptation sectors each, countries in the region have most frequently prioritized water (89 percent), agriculture (67 percent) and coastal zones (39 percent), as key adaptation sectors.

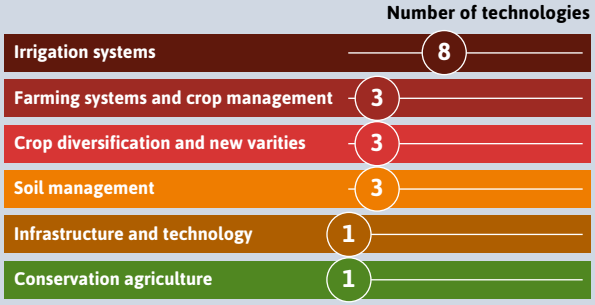
In the water sector, countries' technology priorities include rainwater-harvesting, storm-water reclamation and reuse, water mapping and modelling, and water-quality monitoring. For example, Jamaica prioritized rainwater harvesting in order to collect, store and conserve surface run-off by households. Using rainwater-harvesting, Jamaica envisages being more resilient in facing restricted water supplies in areas affected by increasing periods of drought triggered by warming temperatures.

In the agricultural sector, the priority is on technologies for irrigation and farming systems, such as drip irrigation, micro-sprinklers, soil nutrition, soil conservation and the introduction of climate-resilient crops. In Suriname, the development of climate-resilient crop varieties is considered key to ensuring future food and nutritional security. This goes hand in hand with Suriname's NDCs, which stress the goal of increasing the contribution of the agricultural sector to the national economy while taking into consideration the projected effects of climate change.

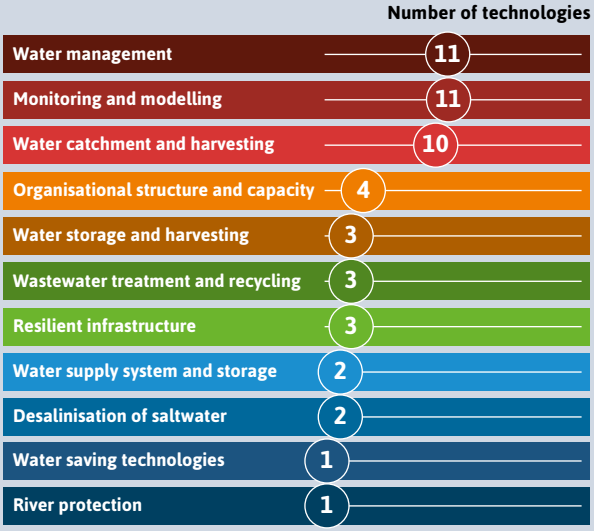
TNA ADAPTATION PRIORITY SECTORS (18 LAC COUNTRIES)



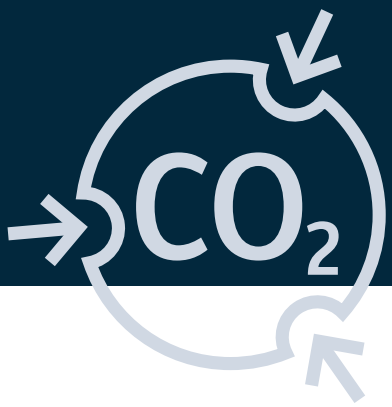
TECHNOLOGIES FOR ADAPTATION IN THE AGRICULTURE SECTOR (18 LAC COUNTRIES)



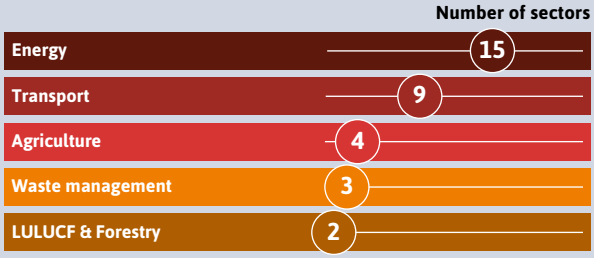
TECHNOLOGIES FOR ADAPATATION IN THE WATER SECTOR (18 LAC COUNTRIES)



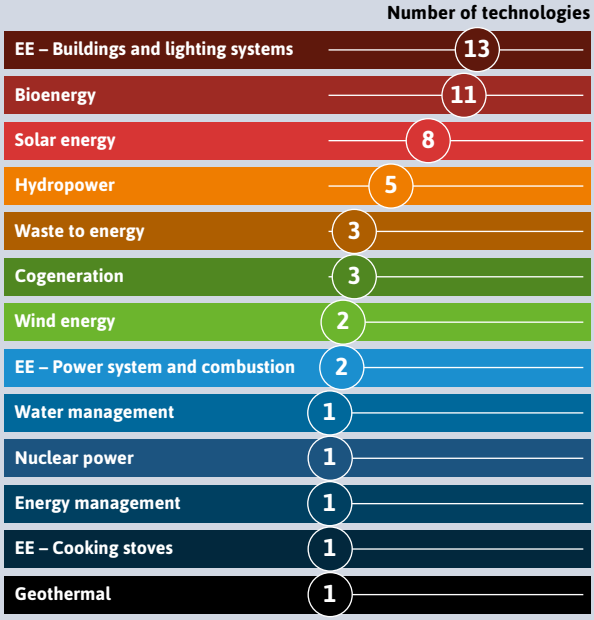
TNA TECHNOLOGY NEEDS ASSESSMENT



TNA MITIGATION PRIORITY SECTORS (17 LAC COUNTRIES)

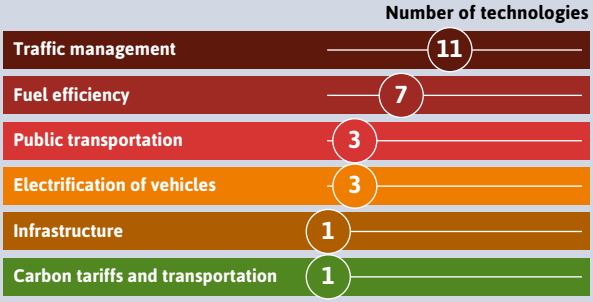


TECHNOLOGIES FOR MITIGATION IN THE ENERGY SECTOR (17 LAC COUNTRIES)



EE = Energy Efficiency

TECHNOLOGIES FOR MITIGATION IN THE TRANSPORT SECTOR (17 LAC COUNTRIES)



MITIGATION TECHNOLOGIES

More than a quarter of the energy used in the LAC region now comes from renewable energy. Over the past decade, there have been staggering improvements in the cost-competitiveness of low-carbon technologies such as lithium-ion batteries, solar technologies and onshore and offshore wind. The rapid decrease in the costs of such climate technologies offers an opportunity to tap further into the renewable energy potential of the region and to transition to low-carbon and sustainable development.

For many countries, there are significant challenges in the transport sector. The growth in population and urbanization in the region is increasing the use of motor vehicles, triggering higher rates of congestion, traffic accidents and air pollution. Countries are therefore identifying significant needs for technologies to reduce the pressure on urban transport infrastructure and the greenhouse gas emissions associated with it.

In their TNAs, 88 percent of Latin American and Caribbean countries prioritized energy as a mitigation sector, 53 percent transport and 24 percent agriculture.

In the energy sector, countries are predominantly prioritizing technologies for energy-efficient buildings and lighting systems, bioenergy and solar energy. In Antigua and Barbuda, energy use in office buildings accounts for nearly 20 percent of the country's annual greenhouse gas emissions, prompting the need to invest in less energy-consuming infrastructure. In its TNA, the country identifies the need to develop energy-efficient buildings, including passive houses, which would help reduce electricity peak loads and contribute to reducing greenhouse gas emissions.

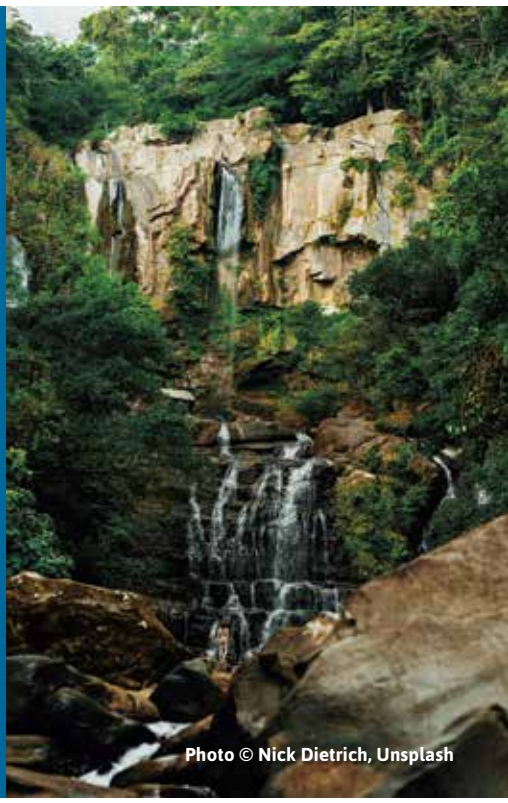
Improving the energy efficiency of the transport sector is a priority for many countries in the region. For example, Panama reports a need to switch to alternative fuels such as bioethanol in order to reduce the level of greenhouse gas emissions. This would stimulate investment, create new jobs and generate greater added value to the country's agricultural production. By using biofuels, CO_2 emissions can be reduced by up to 95 percent compared to fossil fuels, depending on the raw material used.

DESIGN OF A KNOWLEDGE-MANAGEMENT SYSTEM FOR TROPICAL FOREST MANAGEMENT AND ECOSYSTEM SERVICES IN COSTA RICA

More than half of Costa Rica is covered by tropical forests, which are widely acknowledged to be vital in supporting local ecosystems and acting as carbon sinks. However, the country has recognized its current lack of instruments to facilitate access to information. These could be used to improve the decision-making process in relation to climate protection when it comes to managing forests.

Starting in 2017, the Climate Technology Centre & Network (CTCN) supported the country in conducting a response plan for the design of a data and information management system to improve the management of tropical forests.

The project aimed at developing effective and feasible IT tools to provide access to information and enhance decision-making capabilities in responding to the expected impacts of climate change. Through the enhanced capacity for designing profound climate-change strategies, the knowledge-management system will enable more efficient and effective responses to the future impacts of climate change on forest ecosystems in Costa Rica.



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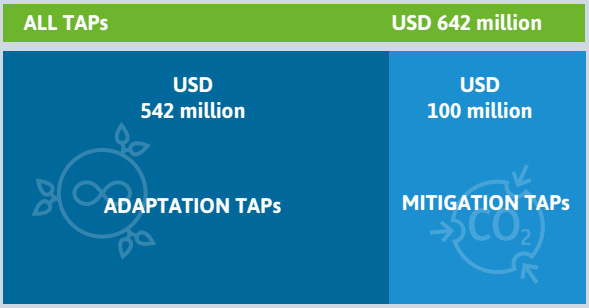
FINANCIAL NEEDS

Taking their prioritized climate technologies as a starting point, countries are preparing Technology Action Plans (TAPs) as part of their TNA process. TAPs support the implementation of technologies on the desired scale in order to achieve the climate and development benefits already identified in the TNAs.

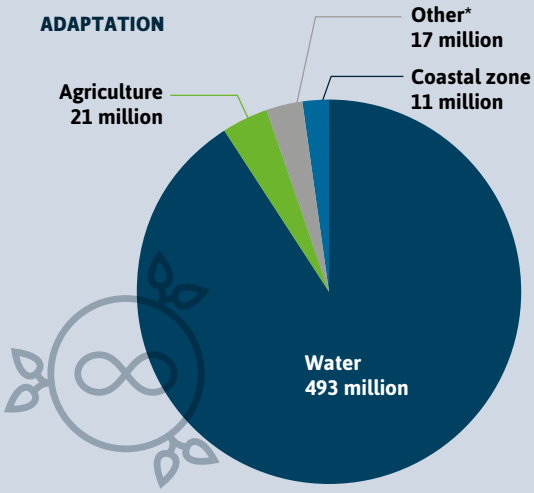
A TAP consists of several actions, which can take various forms. For example, one possible action is a technology demonstration project aimed at overcoming public opposition to a specific technology. Another example of an action might be a program to train local engineers in order to address the barrier of a lack of the skills needed to operate a specific technology. An action could also aim to overcome indirect barriers to technology transfer and uptake, with associated co-benefits, such as the provision or upgrading of related infrastructure. Every TAP contains an indicative investment proposal for each technology, to be taken into account when it comes to funding by potential public and/or private funders.

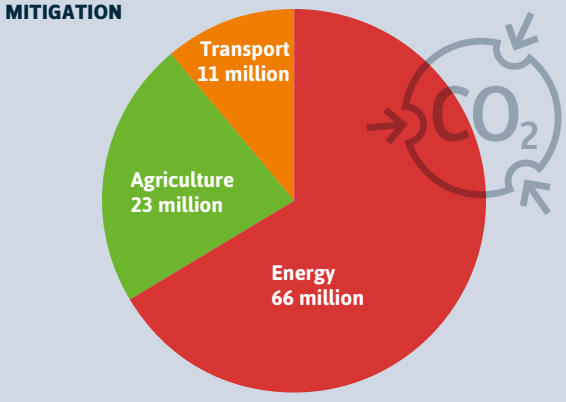
Currently, TAPs are available for fourteen countries in the LAC region: Argentina, Belize, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Grenada, Guyana, Honduras, Panama, Peru and Uruguay. The total estimated budget for implementing the priority climate technologies included in these TAPs is USD 642 million, USD 542 million for adaptation, and USD 100 million for mitigation. A main reason for the difference between the total budgets for mitigation and adaptation is that a larger number of adaptation TAPs have been developed by countries in the region. These countries, although low contributors to anthropogenic climate change, are already experiencing the effects of such change and have an immediate need to adapt and build resilience to current and projected impacts.

14 LAC COUNTRIES' ESTIMATED FINANCE NEEDS (USD) FOR TAP IMPLEMENTATION



DISTRIBUTION OF ESTIMATED FINANCE NEEDS (USD) IN TAPS, LAC





*Other sectors: Education, Energy, Natural disasters, Public health, Tourism, Transversal

ADAPTATION FINANCE

The total estimated budget for implementing fourteen countries' TAPs for adaptation amounts to USD 542 million, with actions in the water sector making up about 91 percent of this, followed by the agriculture, land-use, land-use change and forestry (LULUCF), with about 4 percent.

In Guyana, a total budget of USD 220,000 has been estimated to fund the development of groundwater mapping and modeling systems. This budget is being allocated to several different actions, such as making groundwater management a high national priority, integrating water resource management into the country's long-term national planning, identifying and securing external funding and financial support, and providing a budget to national institutions in order to build scientific assessment centers.

Another example is Uruguay, which estimated it needed USD 9.3 million to finance projects for the protection and recovery of coastal zones. This budget is dedicated to the institutional development of climate risk management, physical investments for coastal protection, such as the implementation of erosion protection works, and technology training at universities for both decision-makers and the general population.

MITIGATION FINANCE

The needed finance to implement the fourteen countries' key priority technologies for mitigation, is estimated to a total budget of USD 100 million. The energy sector takes up the major share of this, accounting for 66 percent, followed by the agriculture, LULUCF and forestry sector, which makes up about 23 percent, and the transport sector the remaining 11 percent.

The Dominican Republic estimates it needs about USD 1.2 million to enhance energy efficiency in public buildings. The budget includes actions such as expanding the capacity of energy-saving programs in public institutions, developing a financing mechanism to support initial investments in LED luminaires, and energy-efficiency provisions in building codes for public buildings.

Another example is Honduras, which estimates it needs to allocate USD 2 million for the uptake of biodigesters in the agriculture sector. The budget includes

the establishment of a fund to co-finance the technology development, the identification of technicians and students to be trained in the use of the technology, and the development of a GHG measurement process for bio-digesters.

CAPACITY BUILDING NEEDS

Through the TNA process, countries have also identified their needs for capacity building concerning their prioritized technologies. Typically, this means institutional and organizational capacity building, as well as the training of technicians, extension officers, etc.

For instance, El Salvador has identified several capacity building needs in relation to the building of elevated homes in flood zones. This includes, among other initiatives, the organization of workshops and training for government and civil society in order to encourage changes in attitude and behavior among the population regarding the use of elevated homes and their advantages.

Another example is Belize, which has expressed the need to establish an on-going training program for laboratory technicians and nursery field-workers in connection with Irish potato production. These training programs would ensure the sustainable implementation of the technology.

These are examples of the capacity building needs that have been identified. More information for each country can be found in the available TNA and TAP reports.

THE LOW-CARBON AND EFFICIENT NATIONAL FREIGHT LOGISTICS INITIATIVE IN COLOMBIA

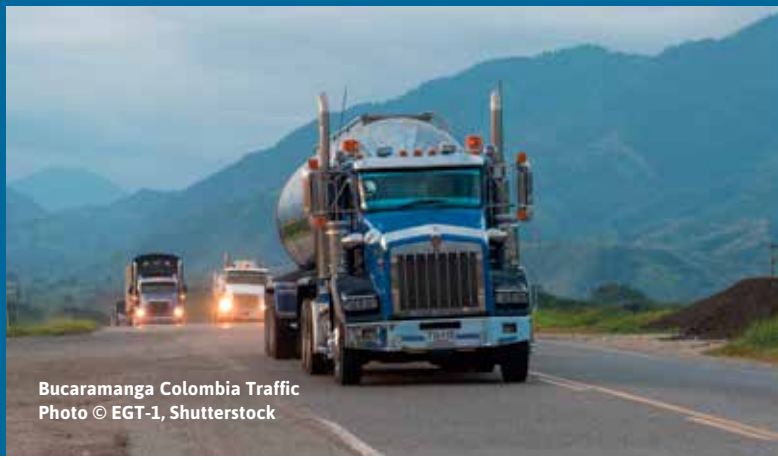
In its TNA, Colombia identified the transport sector as a main priority area for the reduction of greenhouse gas (GHG) emissions. The country prioritized the following technology actions in order to improve its transport system and reduce its emissions:

- Introduction of transport control technologies
- Improve vehicle operations
- Improvements to fuel quality
- Increase the uptake of improved engine technologies.

Building on its TNA, Colombia has developed a medium-size project with the GEF Trust Fund, which is implemented by the Inter-American Development Bank. With a total cost of five million USD, the goal of the project is to reduce GHG emissions from the freight transport sector.

The project focuses on:

- Training local staff, freight transport stakeholders and truck-drivers in more efficient and cleaner driving practices
- Developing and implementing a pilot program for a freight broker service
- Designing, developing and improving the existing freight information systems at the Ministry of Transport.



Bucaramanga Colombia Traffic
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