

Sustainable Infrastructure: The path to achieving Net-Zero and Resilient Services in LAC (D2209)

Description:

Latin America and the Caribbean (LAC) is exceptionally vulnerable to the adverse impacts of climate change. The region is experiencing rising temperatures, leading to phenomena such as droughts, heatwaves, irregular precipitation patterns, and sea-level changes. Infrastructure services (water supply, sanitation, waste management, electricity, and transportation) can contribute to reduce greenhouse gas emissions but are also expected to be highly impacted by climate variations and extreme weather events. There is a significant knowledge gap regarding these topics in the region, which needs a clear path in order to simultaneously achieve net-zero and resilient infrastructure services.

The broad objective of this Technical Cooperation (TC) is to study the dual role of infrastructure services in both contributing to and being impacted by climate change. This TC aims to generate evidence-based policy recommendations to facilitate the achievement of two key objectives: net-zero emissions and enhanced resilience of services in the LAC region.

The main value added by the present TC will be: i) the generation of today non-existing data and knowledge on the intersection between climate change and infrastructure services in Latin America and the Caribbean; and ii) the identification and evaluation of impactful policies that will allow to achieve net-zero and resilient infrastructure services.

Submitted by:

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Category:

Research and Dissemination

Tags:

energy net-zero resilience sustainable infrastructure transport water and sanitation

Linked Ideas:**Whiteboard:****Team Leader Name**

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Alternate Team Leader Name

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Has the proposal been discussed and authorized by the responsible sector or country department/division, as applicable?

Yes

Team Leader Responsible Department

INE

Are there specific countries that will directly benefit from your proposal?

Yes

Mark the specific countries that will be directly benefited from your proposal?

Argentina

Bahamas

Barbados

Belize

Bolivia

Brazil

Chile

Colombia

Costa Rica

Dominican Republic

Ecuador

El Salvador

Guatemala

Guyana

Haiti

Honduras

Jamaica

Mexico

Nicaragua

Panama

Paraguay

Peru

Suriname

Trinidad y Tobago

Uruguay

Venezuela

**Where applicable, describe how the proposal aligns with the respective country strategy (for each country selected)
Does the proposal align to one or more sector frameworks?**

Yes, the proposal aligns with at least one sector framework

Identify and describe how the proposal aligns to the sector framework(s)

The proposal aligns to four sector frameworks:

1. Climate change sector framework: This TC aligns with the following lines of action: (a) Improve the availability and use of climate information and data for robust and transparent decision making, (b) promote a multisector approach to tackling climate change; (c) implement approaches aimed at monitoring and evaluating climate actions.

2. Transportation sector framework: This TC aligns with the following lines of action: (a) Promote efficient, inclusive, sustainable, and quality mobility for urban and interurban passengers, (b) promote technological transformation in the sector, (c) increase the availability of sector information and knowledge.

3. Energy sector framework: This TC aligns with the following lines of action: (a) promote universal, reliable, and affordable access to energy services, reaching out to rural and low-income urban areas; (b) upgrade backbone and regional transmission infrastructure capacity when operating over rated capacity and to allow new power generation capacity from variable renewable energy sources; (c) improve the resilience and adaptability of the infrastructure to natural phenomena and adverse effects of climate change; (d) promotion of efficient and sustainable power generation; (e) expanding sources, collecting, updating and publishing significant volumes of data to boost transparency and grease the wheels for adequate decision making; and (f) building capacity to help adopt international standards.

4. Water and sanitation sector framework: This TC aligns with the following lines of action: (a) Promote universal access to quality water and sanitation services with equity, inclusion, and affordability; (b) the design of policies and programs incorporates disaster and climate change risk management and promotes water security; (c) drive innovation in the sector.

Select the regional challenges and cross-cutting issues to which the proposal aligns to

Social Inclusion and Equality

Productivity and Innovation

Economic Integration

Climate Change and Environmental Sustainability

Institutional Capacity and Rule of Law

Gender Equality

Diversity

Justify the alignment to each selection above

Social inclusion and equality: In this TC, the identification of policies to achieve net-zero emissions and resilient services will also focus on social inclusion and equality. Its goal is to ensure that vulnerable and marginalized communities have equal access to resilient infrastructure services, reducing disparities in service provision and promoting social equity. Beyond access, the policies to be identified and evaluated will pay special attention to the distributional impacts of pricing policies aimed at funding climate mitigation and adaptation policies.

Productivity and innovation: Creating knowledge to improve the resilience of infrastructure services would benefit firms and industries, in terms of their competitiveness, productivity, and innovation capacity. Indeed, disruptions in the provision of transport, electricity, and water services impact firms' productivity. For instance, in the LAC region, 56% of losses suffered by firms after a disaster are due to transport disruptions, which is higher than in any other region and the global average is estimated at 40% (Rozenberg et al., 2019).

Economic integration: This proposal underscores the need for regional cooperation in facing the global challenge of climate change. For instance, the joint management of natural resources such as water basins requires integration and cooperation. Promoting resilient infrastructure services also supports regional economic integration as it can facilitate the flow of goods and services across borders within Latin America and the Caribbean.

Institutional capacity and rule of law: The TC acknowledges the importance of policies and regulations to achieve net-zero and resilient infrastructure services. It promotes institutional capacity building and adherence to the rule of law in the development and implementation of policies that ensure sustainable and climate-resilient infrastructure.

Climate change: This proposal directly addresses climate change by focusing on the dual role of infrastructure in both contributing to and being impacted by climate change.

Environmental sustainability: This proposal directly addresses environmental sustainability by promoting net-zero emissions and resilient infrastructure services in the LAC region.

Gender equality: This TC will evaluate policies to ensure that vulnerable and marginalized communities have equal access to resilient infrastructure services, reducing disparities in service provision and promoting social equity.

Diversity: This TC will evaluate policies to ensure that vulnerable and marginalized communities have equal access to resilient infrastructure services, reducing disparities in service provision and promoting social equity.

What is the estimated funding that you need in order to implement this proposal?

900000

Select the expected outputs of this proposal

Policy Dialogues

Events (other than policy dialogues)

Knowledge Products

Are outputs strictly Knowledge Products?

Yes, the output is strictly a Knowledge Product

Describe the motivation and main question(s) this TC intends to answer.

Infrastructure services are at the core of the climate agenda in Latin America and the Caribbean. Regarding greenhouse emission, transportation stands as the second-largest contributor (25% of total emissions), only behind electricity and heat production, which contributes 42% (Calatayud et al., 2023). In LAC, the role of transportation in emissions is even more critical, since electricity generation is relatively clean (with 53% of the energy generated in the last two decades being generated by hydroelectric plants, and non-conventional renewable energies being on the rise). Inadequate solid waste management can also contribute to both greenhouse gas emissions and air pollution: in LAC, 40% of municipal solid waste flows to the environment and 9% has no identified destination, being incineration a serious problem in some cities of the region. There is no way of complying with the Paris Agreement without making fundamental transformations in the infrastructure sector. Beyond the need to implement policies that contribute to climate change mitigation, making infrastructure resilient to the impacts of climate change is a paramount priority in LAC. Countries in the region need to prepare to deal with effects of climate change, especially in the infrastructure sector. The infrastructure sector is already reporting variations in the operational conditions it typically faces, but also the damage or total destruction of assets due to more frequent and intense extreme weather events. In Colombia for instance, electricity demand is increasing due to rising temperatures: household consumption increases by 6% due to the use of air conditioning as an adaptation action (McRae, 2023). Water operators are facing surface water sources problems: 77% are dealing with reduced river flows and 70% report increased water source turbidity, which, in turn, increases treatment costs (Solis & Serebrisky, 2023). Moreover, several important seaports and coastal airports in the region face substantial flooding risks attributed to expected sea-level rise driven by climate change (Calatayud et al., 2023). The described events are problematic not only because of asset damage but also because of social and economic losses due to service interruptions, which can surpass the value of damaged assets. Despite these specific figures, there remains a considerable knowledge gap concerning the impact of climate change on infrastructure services in LAC countries. Furthermore, countries are called to prioritize, design, plan, build and retrofit infrastructure, as well as to construct additional infrastructure to withstand the impacts (OECD, 2018), but they need evidence on the cost-effectiveness of the set of available policies in the region to make infrastructure services resilient. Overall, this TC intends to identify knowledge gaps and emerging research areas that are necessary for infrastructure services to effectively tackle the urgent challenges posed by climate change. It will also aim at identifying and evaluating policies that will allow to achieve net-zero and resilient infrastructure services.

Describe the methodological approach to be used and the type of data (when applicable) which will be used

This TC will start with the collection of climate change related information of infrastructure services, including water, sanitation, waste management, electricity, and transportation. There are critical information gaps that must be addressed. For instance, in the Water, Sanitation, and Solid Waste sector, it is imperative to understand the anticipated impact of climate change on different water uses. Additionally, the contribution of waste to greenhouse gas emissions in the region must be assessed, considering the proportion of waste that undergoes incineration. The latter aspect can be initiated through the systematic use of data from the recently launched Waste and Circular Economy HUB. In the energy sector, while the Energy Path 2022 accounts for demand growth and the expansion of electricity generation in alignment with individual country expansion plans, it is essential to go a step further. This entails developing investment scenarios that allow for renewable energy sources to increase beyond the scope of individual country energy plans, ensuring consistency and facilitating the achievement of commitments outlined in the Paris Agreement. Secondly, this TC will identify emerging research areas at the intersection of climate change and infrastructure services, by conducting an exhaustive meta-analysis of existing literature, engaging with experts, and analyzing current trends and developments. Thirdly, the TC will lay out practical and actionable policy recommendations tailored to the specific needs and challenges identified within the Latin American and Caribbean context.

Please specify the type(s) of Knowledge Product (s) this TC encompasses:

Databases & Datasets

Technical and Policy Notes

Working Papers

Please provide a brief description of the output(s) selected above (The number of units planned, and the estimated cost). If you selected others, please specify.

1. Component 1. Data collection on climate change and infrastructure services (US\$ 300,000). This component will finance information gathering on the contribution of water, sanitation, solid waste management, electricity, and transportation to greenhouse gas emissions. This data is fundamental in understanding and quantifying the carbon footprint associated with these sectors. The component will also finance data collection on historical and anticipated climate change impacts on both the demand and supply of infrastructure services. This information will further be an input for activities to be carried out in Component 2.

Activities in this component include the collection and systematization of information on a) impacts on electricity demand, b) impacts on water demand, c) contribution of transportation to greenhouse emissions, d) impact of solid waste management on greenhouse gas emission, e) investments scenarios to further increase renewable energy sources in the electricity mix, f) existing infrastructure stock and its exposure and vulnerability in order to calculate the incremental investments to increase its resilience, g) examination of sustainability considerations included in Public-Private Partnership contracts, h) assessment of the existence of contingency plans in utilities in the region, among others.

Outputs in this component will include three technical notes with the description of the collected data, as well as one BBL to present the results.

2. Component 2. Identification of emerging research areas on climate change and infrastructure services (US\$ 300,000). This component will finance a set of activities aimed at identifying the key research areas necessary for infrastructure services to effectively tackle the urgent challenges posed by climate change. Initial activities of this component will include a meta-analysis of related literature on the sectors of transport, energy and water and sanitation. This systematic review will allow to identify what is being done in the region and possible knowledge gaps, finding research questions in each sector. Emphasis will be placed on research questions that explore the nexus of climate change impacts and adaptation measures across various sectors. As a result, research areas and potential studies will be identified, requiring a process of filtering, prioritization, and selection based on their quality and alignment with the research question. The outcomes of this identification will be shared with a panel of experts from the scientific community in Latin America and the Caribbean, specializing in critical research areas such as climate change, energy, transportation, water, and sanitation. The primary aim of this presentation is to validate the prioritized questions in the context of the policies necessary to achieve the commitments of the Paris Agreement within each respective sector.

Activities in this component include: (i) compiling a list of relevant research institutions and researchers; (ii) designing and disseminating a call for proposals; (iii) selecting projects according to the following criteria: (a) policy relevance; (b) potential for policy impacts by leveraging or building contacts with key stakeholders; (c) contribution to knowledge base; (d) innovation; (e) rigorous and feasible research design; (f) solid dissemination plan; (g) affiliation with a leading center of expertise; and (h) relevance to one of the following three lines of research: policies to achieve net-zero infrastructure services, assessment of the expected impacts of climate change in infrastructure services, and policies to achieve climate-resilient infrastructure services. Outputs of this component will include three BBL (one for each of the subsectors: transport, energy, water and sanitation) as well as three technical notes with the systematic reviews of the literature.

3. Component 3. Elaboration of papers providing evidence-based policy recommendations (US\$ 300,000). This component will finance a set of rigorous research projects that will assess different public policy options and determine their cost-efficiency or suitability to address the mitigation and adaptation challenges in the region. For this purpose, a research network will be implemented to announce a call for papers on the most important research areas that have been previously identified. The call for paper will finance studies to delve into the most urgent and relevant questions. The results from these papers will be presented internally in INE to get feedback from sector specialists and will subsequently be disseminated externally.

Papers are expected to cover the following topics: a) the calculation of the incremental investments costs to increase assets resilience, b) case studies on the impact of Decision Making under Deep Uncertainty (DMDU) as a strategy to identify non-regrets investments in the climate change context, c) Cost-Benefit analysis of retrofitting or increasing resilience in infrastructure assets, d) the effectiveness of demand-sided policies, e) the potential and effectiveness of Nature-based

Solutions in the region, f) assessment of redundancy investment as a strategy for resiliency, g) Analysis of Contingency Plans in LAC utilities, h) pricing for resilient infrastructure services, among others.

Outputs of this component will include a minimum of six working papers as well as three databases related to the identified projects.

Outcomes: If the outputs are delivered successfully, what is the change expected (in capacity, knowledge, behavior, etc.)

If the outputs are delivered successfully, this will lead to at least three outcomes:

1. Authorities and operators in the LAC water and sanitation sector have started the implementation of policies to achieve resilient and net-zero infrastructure services.
2. Authorities and operators in the LAC energy sector have started the implementation of policies to achieve resilient and net-zero infrastructure services.
3. Authorities and operators in the LAC transport sector have started the implementation of policies to achieve resilient and net-zero infrastructure services.

(0) Attachments

0 Comments