



NDC ASPECTS

NDC ASPECTS - Transformation Opportunities, Challenges and Policy Options in Energy-Intensive Industries, Transport, Buildings, Agriculture, Forestry and Other Land Use (Deliverable 4.3)

WP4 – Transformation Opportunities, Challenges and Policy Options

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Assessing sectoral governance gaps and policy options

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Preface

The NDC ASPECTS project provides inputs to the Global Stocktake under the Paris Agreement (PA) and supports the potential revision of existing Nationally Determined Contributions (NDCs) of the PA's parties, as well as development of new NDCs for the post 2030 period. The project focuses on four sectoral systems that are highly relevant in terms of the greenhouse gas emissions they produce yet have thus far made only limited progress in decarbonization. Advancing these transformations will require to understand and leverage the Eigenlogic of those systems and to take into account specific transformation challenges. These sectors are transport & mobility (land-based transport and international aviation & shipping), emission-intensive industries, buildings, and agriculture, forestry & land-use, including their supply by and interaction with the energy conversion sector.

1. Changes with respect to the DoW

Within WP4 task 4.4 (Sectoral analysis of transport), a decision was made to focus the analysis solely on freight transport and to not study passenger transport. This was chosen for several reasons, detailed below.

First and foremost, while these two components of the transport sector are obviously connected through sharing some common infrastructure and sometimes vehicles, it has become apparent that they often have different stakes and challenges. For instance, zero-emission freight transport implies transforming existing production and consumption systems to reduce goods deliveries, shorten supply chains and facilitate modal shift and logistics optimization (Harry-Villain et al., 2021), which does not impact passenger transport. In addition, since the actors involved in each sub-sector (shippers, logistic service providers, freight carriers...) are quite different, organizing discussions specific to each-sector allows them to be more precise and come up with more relevant and implementable solutions.

Consequently, in order to be able to address one sub-sector adequately and in sufficient detail to be able to raise ambition, have specific policy and stakeholder-oriented analysis, it is necessary to focus specifically on it, and to put the other aside.

In that regard, it was decided to focus solely on freight transport, as it is often more overlooked than passenger transport, despite its important role in transport-related emissions. Indeed, freight represents 46% of transport emissions and this proportion is expected to keep growing, even if slowly (ITF, 2023). CO₂-related emissions for this sub-sector are expected to double between by 2050 with current policies (ITF, 2023).

Furthermore, it is also less considered in NDCs. An analysis of NDCs carried out by GIZ in 2017 shows that only 16 non-annex 1 countries mentioned freight logistics in their NDCs by this date (GIZ & BMUB, 2017). According to the Slocat Partnership's NDCs Hall of Fame, two-thirds of second-generation NDCs do not include plans to reduce CO₂ emissions related to freight, and most do not include comprehensive freight decarbonization solutions (Slocat, 2022). Even if some measures may be cross-cutting, their impact may not be as notable as if they were freight-specific measures, for the reasons cited above (ITF, 2021). Overall, no second-generation NDCs or LTS contain freight-related targets (Slocat, 2021a).

Taking all of this into consideration, the ITF calls for additional efforts to be put into the decarbonization of freight transport (ITF, 2021).

Lastly, choosing the same focus helps favor synergies and knowledge-sharing between work packages: the analysis carried out as part of the WP4 transport sectoral analysis will indeed feed into the sectoral conversation (WP1), reinforcing its analytical background and making it more concrete and impactful.

In the case of Task 4.6 (AFOLU), it was decided to put a greater focus on forest. Most of the existing studies see the highest potential for mitigation in forestry and at national level many of the NDCs explicitly provide goals or targets for forests and at international level increasing support and increasing numbers of initiatives are leading to a complex landscape. The agriculture subsector is addressed from the side of production and with more emphasis on the relations with forests as a driver of land use change. In terms of mitigation options, demand side options are not considered given the lack of robust information to do reliable estimates at the moment. Instead, land food prints along time series of FAOSTAT commodities are explored to improve the understanding of the demand side impact on land use.

2. Dissemination and uptake

As detailed in the DoW and the project's Communication, Dissemination and Exploitation Plan, the deliverable will be made available on the project website and advertised via the project's newsletter and social media channels. In addition, the resulting manuscripts will be submitted, in somewhat further revised form, to relevant academic journals. In accordance with the DoW, they will also feed into policy papers on specific issues of interest in the target sectors (MS 7-10).

The deliverable will be of use to different groups of stakeholders:

- Policymakers and societal stakeholders in the target countries can draw on the detailed analysis of opportunities, barriers and current national policy frameworks for the four sectors to identify priority areas for action and respective policy options.
- The sectoral analyses also constitute a significant contribution to scholarly debates on national mitigation policies in the four sectoral systems and target countries that are addressed.









3. Short Summary of results

This deliverable analyses transformation opportunities, barriers and policy options in about 10 countries for each of the four sectors energy-intensive industries, transport, buildings, and agriculture, forestry and other land use (AFOLU). The analysis shows that while there generally is the potential to achieve sufficient emission reductions to achieve the objectives of the Paris Agreement, mobilisation of this potential is impeded by strong barriers across all sectors. In addition, existing policies are nowhere nearly strong enough to overcome these barriers and mobilise mitigation opportunities. The sector reports contain options to strengthen policies for each target country as well as cross-country comparisons of results.

4. Evidence of accomplishment

The evidence of accomplishment of this deliverable is provided through the submission of this report. The work has resulted in one output per sector that provide detailed and up-to-date analyses of transformation opportunities, barriers and policy options in the four sectors in focus and are attached to this report (D4.3a-d).

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6	Asociación BC3 Basque Centre for Climate Change – Klima Aldaketa Ikergai	BC3	Spain	 BASQUE CENTRE FOR CLIMATE CHANGE We can. Addressing the global Sustainability, that's it!
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Executive Summary

This report assesses transformation opportunities, barriers and policy options across four hard-to-abate sectors, namely energy-intensive industry, transport, buildings, and Agriculture, Forestry and Other Land Use (AFOLU) in about ten target countries for each sector. The analysis is captured in one output per sector, which are summarised below. The four outputs are attached to this report (D4.3a-d).

Sectoral Analysis of Energy-Intensive Industries (Deliverable 4.3a)

By Simon Otto, Sebastian Oberthür, Annika Tönjes, Lauri Peterson, Hilton Trollip & Saritha Vishwanathan

Achieving the decarbonisation of energy-intensive industries (EIs) by mid-century is technically possible and essential to achieving the aims of the Paris Agreement. However, decarbonising EIs, such as steel, cement, chemicals and aluminium, faces significant economic, political and structural barriers across all levels of governance. To address these and accelerate industrial decarbonisation, far-reaching and comprehensive public policies and support are needed.

This study systematically analyses national sectoral decarbonisation barriers, enablers and policies for 13 major EI producing countries to assess if their respective national policy frameworks are fit for advancing the decarbonisation of EIs in line with Paris-compatible pathways. The analysis is based on case studies that systematically map national sectoral mitigation barriers, enablers and policies conducted or reviewed by national or sectoral experts. The countries studied are China, India, the United States (US), the European Union (EU), Japan, Norway, Russia, Saudi Arabia, Turkey, South Africa, Morocco, Nigeria, and Iran.

Major barriers to the deep decarbonisation of EIs continue to be economic challenges (e.g. high investment costs, long investment cycles), lack of targeted policy and international coherence, the limited commercial availability of deep decarbonisation technologies and lack of clean energy and feedstocks. Common enablers are ambitious national climate policies, the domestic potential for clean energy production, international cooperation and the economic opportunities of industrial decarbonisation. However, our analysis shows that decarbonisation barriers and enablers are highly context specific and differ significantly across income countries. Whereas decarbonisation in high-income industrialised countries is mainly hampered by the lack of technologies and clean energy supply, low- and middle-income countries often lack the political will, but also fiscal and governance capacity to proactively steer the sectoral transformation. At the same time, the latter tend to have high renewable energy potential offering significant opportunities for economic development through green EIs, or long-lasting experience with state-led industrial policy. To address these barriers and exploit these opportunities comprehensive, timely, proactive and context-specific sectoral policies are needed.

To analyse national frameworks, we review relevant academic literature and identify key policy functions or levers that are needed to achieve the deep decarbonisation of EIs. We then assess the extent these are exploited by domestic policies. Our findings show that no country has a sufficiently coherent and comprehensive policy framework in place that can achieve the sectoral transformations needed for the deep decarbonisation of EIs. Existing policies instead mainly focus on incremental changes and limited emissions reductions, although some notable exceptions exist. Somewhat unsurprisingly, high-income countries, in particular the US, the EU and Norway, are starting to develop some transformative industrial climate policies, but also here crucial policy gaps remain. Overall, we find a particular

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lack of, and need to strengthen policies focused on demand reduction, material efficiency and circularity, the build-up of public capacity, and the enhancement of international cooperation.

Our findings show that more ambitious, proactive, and radical industrial climate policies are needed in a timely manner to put the sector on track to achieve a Paris-compatible pathway. This need for further political, private sector and academic discussion on the design and implementation of transformative industrial climate policies.

Designing comprehensive policy packages for freight transport decarbonization: lessons from an international comparison (Deliverable 4.3b)

By Lauren Harry-Villain, Yann Briand, Henri Waisman, Harro van Asselt, Catherine Hall, Frederic Rudolph, Dipti Gupta, Marcio de Almeida D'Agosto, Ricardo Delgado Cadena, Jordi Tovilla, Thalia Hernandez, Nnaemeka Vincent Emodi, Alicia Zhao, Ryna Cui, Mark Gjerek, Rico Merkert, Maria Rosa Munoz, Sidsel Ahlmann Jensen, Amin Hassani

Reaching the Paris Agreement goal requires transformative systemic change in all main emitting sectors of the economy, including transport. Nonetheless, despite the fact that freight represents 8% of global greenhouse gas emissions, current strategies to diminish this sub-sector's emissions are far from being sufficient to meet this objective.

Existing research identifies the different transformations required to decarbonize the freight transport sector, but often addresses only some modes of transportation or aspects of the transition. Adopting such a segmented approach could lead to putting aside some of the systemic changes which should be implemented, such as the spatial reconfiguration of supply chains. Moreover, it could result in the identification of measures which may have a negative rebound effect on other necessary transformations. Consequently, it is challenging for policymakers to pinpoint the appropriate and efficient decisions that they must take to enable or accelerate the decarbonization of the freight sector.

In this paper, we present an integrated approach to analyze national freight decarbonization actions and attempt to show through a cross-country comparison that this comprehensive tool can be used to guide public policies. This approach uses different existing analytical frameworks: it is based on a pathway design framework which allows the consideration of all drivers of change, which is combined with an analysis of feasibility conditions and then of policy instruments. It has been applied and tested by in-country research teams in eleven countries: Brazil, Colombia, India, Mexico, Nigeria, the United States, South Africa, Australia, Ecuador, Norway and Iran.

Our results show that this method is helpful in guiding the development of policy packages made of various policy instruments. The analysis revealed that individual policies are not sufficient to reach some targeted decarbonization transformations.

Barriers and Policy analysis: Building Decarbonisation (Deliverable 4.3c)

By Chun Xia-Bauer, Sriraj Gokarakonda, Ece Ural, Siyue Guo, Jyoti R. Maheshwari, Saritha Sudharma Vishwanathan

Buildings are crucial in climate mitigation due to their significant share in final energy consumption and GHG emissions. However, the sector decarbonisation has been slow to move. This study aims to

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identify key barriers to building decarbonisation and analyse policy instruments addressing these barriers. In addition, the study also briefly discusses the contribution of building decarbonisation to the SDGs as enablers for taking up the decarbonisation measures.

The research begins by synthesizing existing literature to identify key barriers for three building mitigation strategies on a global scale: improving building envelope performance, transitioning to low-carbon heating, cooling, and cooking systems, and adopting energy-efficient appliances and lighting. The report then examines how various policy instruments, including governance and planning measures, regulatory frameworks, economic incentives, market-based approaches, and capacity-building initiatives, address these barriers. On the global level, the research also analysed the interactions between all building mitigation strategies (the three above, sufficiency, and minimising embodied carbon of building materials) and SDGs and found these strategies could directly be linked to 12 SDGs. The co-benefits that contribute to SDGs could potentially enable mitigation in the building sector

As the second step, the research analysed the same categories of key barriers in ten selected countries. The identified barriers align closely with the global findings, although certain barriers are specific to particular countries. The report maps and compares policy measures implemented by each country to address these barriers. Most countries employ a mix of policies, with the European Union (EU) demonstrating the most comprehensive approach, followed by China and the United States.

Regulatory instruments are the most popular. All countries have building energy codes and MEPS for appliances and equipment. However, for building energy codes, except for China, the US, and the EU, the compliance rate is low in most countries. Besides, although all countries have MEPS, the numbers of appliances with MEPS vary significantly across the countries. Three countries (the EU, China, and Japan) out of six countries with significant heating demand have policies to ban fossil fuel boilers in buildings. Except for regulations, information instruments such as appliance labelling, which is often implemented with MEPS, are found in all countries, showing similar variations as the MEPS. Another common instrument is building information disclosure, except in Vietnam and Indonesia. Most countries have implemented at least some economic instruments, among which subsidies/grants are most common. Furthermore, most countries have implemented government lead-by-example through regulations, national strategies, or projects. While the above-mentioned regulatory, information, economic, and lead-by-example instruments have been widely implemented, several policy instruments have only been applied in a few countries: policy roadmaps, phasing out fossil fuel subsidies, energy efficiency obligations (EEOs), ESCOs policy package, One-stop shops (OSS), RD&D policies, carbon pricing for heating fuel. Based on the findings, we provided recommendations for enhancing commonly deployed instruments and for developing missing policies drawing on good practices observed in other countries.

The report concludes by acknowledging its limitations and suggesting areas for future research to further explore building decarbonisation policy measures in greater depth.

Are national policy frameworks for the AFOLU sector aligned to increase mitigation ambition? Lessons from 10 countries (Deliverable 4.3d)

By María José Sanz, Itxaso Ruiz, Theo Rouhette

The contribution of the AFOLU sector for achieving net zero by mid-century is critical and few countries will rely on the sector to achieve the goal of the Paris Agreement. However, the sector faces significant

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economic, political and structural barriers across all levels of governance. To address these and materialize the potential of the sector, far-reaching and comprehensive public policies and support are needed.

This paper analyses the national policy frameworks of 10 countries where the AFOLU sector, in particular Forest, seem to be considered in their NDCs and will play a role for achieving net zero by mid-century. First, we identify general sectoral mitigation barriers, challenges and opportunities and analyse how these are manifested at national level, based on country case studies conducted or reviewed by national experts. Second, we consider if national policy frameworks are fit for the purpose of the AFOLU sector to contribute to country LTS targets.

Our findings show that mitigation barriers differ significantly across countries, while economic (e.g. lack of investments for transformative actions) and structural barriers (e.g. weak land tenure regimes) are identified as the most crucial common challenges. At the same time, the analysis indicates that key high forest countries identified the sector as a means to increase their NDC ambition. To exploit this potential and increase mitigation ambition support (blend comprehensive context-specific sectoral policies are needed).

However, national policy frameworks vary significantly, both in terms of existing policies and approaches for the AFOLU sector. While many countries have some form of sector or subsector specific mitigation targets and foreseen support for their actions (both domestic and international), enforcement of existing policies have so far failed to trigger sustained over time mitigation efforts. However, developing and emerging economies seem to be unable to provide the needed support measures due to a lack of financial means at domestic level. The lack of means and capacity in many developing countries regarding the AFOLU sector points out the need for better orchestration of the existing international cooperation, with more focus on transformative investments. The article concludes by providing policy recommendations to advance national climate policy frameworks, as well as general lessons learned for the AFOLU sector, in particular for forest.

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