NDC ASPECTS

Policy Brief

Accelerating towards Zero-Emission Vehicles: Options for Strengthening the Breakthrough on Road Transport

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Key messages

- Setting the road transport sector on a path towards decarbonisation is vital to achieving the long-term temperature goal of the Paris Agreement. The transition to zero-emission vehicles (ZEVs) is a key element of the sector's transformation.
- While progress towards the uptake and widespread adoption of ZEVs has increased in recent years, this progress falls short of what is needed to set the road transport sector on a pathway that is aligned with the goals of the Paris Agreement.
- At COP26 in 2021, several countries came together and pledged to accelerate this transition through enhanced international collaboration, as part of the Breakthrough on Road Transport.
- However, there are several options available to strengthen the Breakthrough on Road Transport and help drive the sector's transformation towards decarbonisation forward: (1) increasing country signatories, specifically through the creation of collective pledges on developed countries to enhance means of implementation for developing countries, (2) adopting explicit phase-out targets for new sales of fossil fuel vehicles, (3) incorporating these targets in countries' Nationally Determined Contributions (NDCs) and long-term climate strategies to enhance transparency and accountability, (4) promoting the sharing of best practices specifically aimed at electric retrofitting and developing standardised conversion kits for different vehicle models, (5) harmonising standards to help build a sustainable and just ZEV battery supply chain, and (6) developing harmonised emission standards for used vehicles between exporting and importing countries.

Introduction

Road transport currently accounts for 10% of global greenhouse gas (GHG) emissions and contributes to 70% of energy-related carbon dioxide emissions arising from the transportation sector as a whole (Intergovernmental Panel on Climate Change, 2022). In addition, the sector is one of the world's fastest-growing sources of GHG emissions. In the period 2010–2019, road transport emissions increased by around 1.7% each year (Intergovernmental Panel on Climate Change, 2022). According to the International Transport Forum (2021), global transport activity is projected to more than double by 2050, which would result in traffic emissions increasing by 16% against 2015 levels. Accordingly, decarbonising the road transport sector is vital to keeping the temperature goal of the Paris Agreement within reach.

The transition of the global vehicle fleet to ZEV technologies is an essential part of this transformation. As highlighted by the International Energy Agency (IEA), International Renewable Energy Agency (IRENA) and UN High-Level Climate Champions (2022), electrifying road transport offers significant decarbonisation potential. Between 2019 and 2022, global electric car sales more than tripled, from 4% to 14% (IEA, 2023). Nevertheless, while the market is growing rapidly, this progress remains insufficient to set the road transport sector on a pathway that is aligned with the goals of the Paris Agreement (IEA, IRENA and UN High-Level Climate Champions, 2022). Many countries remain locked into conventional fossil fuel vehicles and road transport emissions are predicted to

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continue rising (Axsen, Plötz and Wolinetz, 2020). To set the road transport sector on a pathway that is consistent with the Paris Agreement, the IEA (2021) suggests that by 2030, ZEVs must account for 60% of global car sales, 60% of buses, at least 80% of two and three wheelers, and roughly 35-40% of heavy truck sales.

The Breakthrough on Road Transport

The overall aim of the Breakthrough on Road Transport is to 'make zero-emission vehicles the new normal and accessible, affordable and sustainable in all regions by 2030' (UN High-Level Climate Champions, n.d). Currently, the Breakthrough has 33 country signatories, as well as several non-state and subnational actors that include cities, regional governments, carmakers, and fleet owners and operators.

At the Sharm-El-Sheikh Climate Conference in 2022 (COP27), a package of new international priority actions was identified for the road transport sector for 2023, that are summarised below (UN High-Level Climate Champions, 2022):

1. To adopt common targets and measures that support a Paris-aligned ZEV transition;
2. To significantly enhance the provision of assistance to support emerging markets and developing economies by launching a shared commitment with a delivery plan;
3. To improve the sustainability of ZEV battery supply chains globally, by establishing a mechanisms for sharing best practices and knowledge, supporting implementation, as well as exploring ways to harmonise standards;
4. To accelerate both the development and deployment of ZEV infrastructure globally, by establishing a mechanism for sharing best practice, knowledge and supporting implementation;
5. To start a dialogue with importer and export countries, with a view to developing harmonised quality standards for used ICE vehicles and commitments to support the international trade of second-hand ZEVs; and
6. To enhance coordination and transparency of international collaboration on ZEVs.

Following these priority actions, the IEA, IRENA and the UN High-Level Climate Champions subsequently released their 2023 Breakthrough Agenda Report in September 2023. With respect to road transport, five key updated recommendations were put forward (IEA, IRENA and UN High-Level Climate Champions, 2023):

1. 'Governments should agree on a timeline by which all new road vehicle sales should be zero-emission, with interim targets for countries taking into account their level of economic development and ability to scale up infrastructure. Governments should put effective and legally binding policies in place to implement these commitments. Targets should be Paris-aligned and should include all vehicle types;
2. Governments and international organisations should increase low-cost financing and dedicated funding to projects to accelerate ZEV adoption in EMDEs, focusing on ensuring that EMDE countries are aware of and have ready access to technical assistance and financing offers, and ensuring the effectiveness of project delivery and policy development support;
3. Governments should work together to agree on harmonised sustainability standards and metrics, including battery carbon footprint, responsible sourcing and broader environmental, social and governance risks and

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impacts wherever possible. In the context of digital product passports, they should work towards enabling global interoperability, including harmonised data governance (i.e. data collection, management, assurance and verification standards). Further, governments should jointly address priority areas for sustainable value chains including transport, trade and recycling bottlenecks for battery materials at the end of life, circularity-based product design and processing, and technical assistance for developing markets and emerging economies on EV battery end-of-life management;

4. Governments should agree to further increase technical and financial assistance to support charging infrastructure. Governments and companies should support and leverage the mechanisms established for sharing best practices, knowledge, and relevant technology, and for supporting implementation by countries and Non-State Actors at national and regional levels; and
5. Exporting and importing countries should agree on minimum standards for cross-border trade of used vehicles. Countries should establish a publicly accessible database for tracking cross-border used vehicle trade. Governments and companies should develop strategies to define and legislate quality standards, enforced at ports of export and defined based on standards established by importing countries, for used Internal Combustion Engine (ICE) vehicles, as well as commitments to support the international trade of second-hand ZEVs, and publish plans by COP28.'

Progress towards ZEVs in the last few years has grown exponentially. The Breakthrough provides an important platform to continue building on this progress and accelerate the transition towards ZEVs, particularly through strengthening collaboration among countries focused on the delivery of specific international priority actions. Notwithstanding, the Breakthrough suffers from some important limitations that could hinder its ability to transform the sector towards decarbonisation. Accordingly, this paper sets out these key limitations below and offers some concrete recommendations to address these, that also broadly seek to ensure that the Breakthrough on Road Transport is well integrated in the overall success of the Paris Agreement.

Strengthening the Breakthrough

Increasing country signatories through the creation of collective pledges on developed countries to enhance means of implementation for developing countries

As mentioned above, only 33 countries are signatories to the Breakthrough. The vast majority of these are from Europe and North America (Figure A). Only a limited number of signatories are from the Global South (Figure A). This may in part be explained by the challenges faced by developing countries concerning the introduction to and adoption of ZEVs, including limited availability of charging infrastructure, high upfront purchasing costs, inadequate grid capacity, and technological barriers primarily in relation to battery technology (see Gupta and Rhoads, 2022; Ashok et al., 2022; Alotaibi, Omer and Su, 2022).

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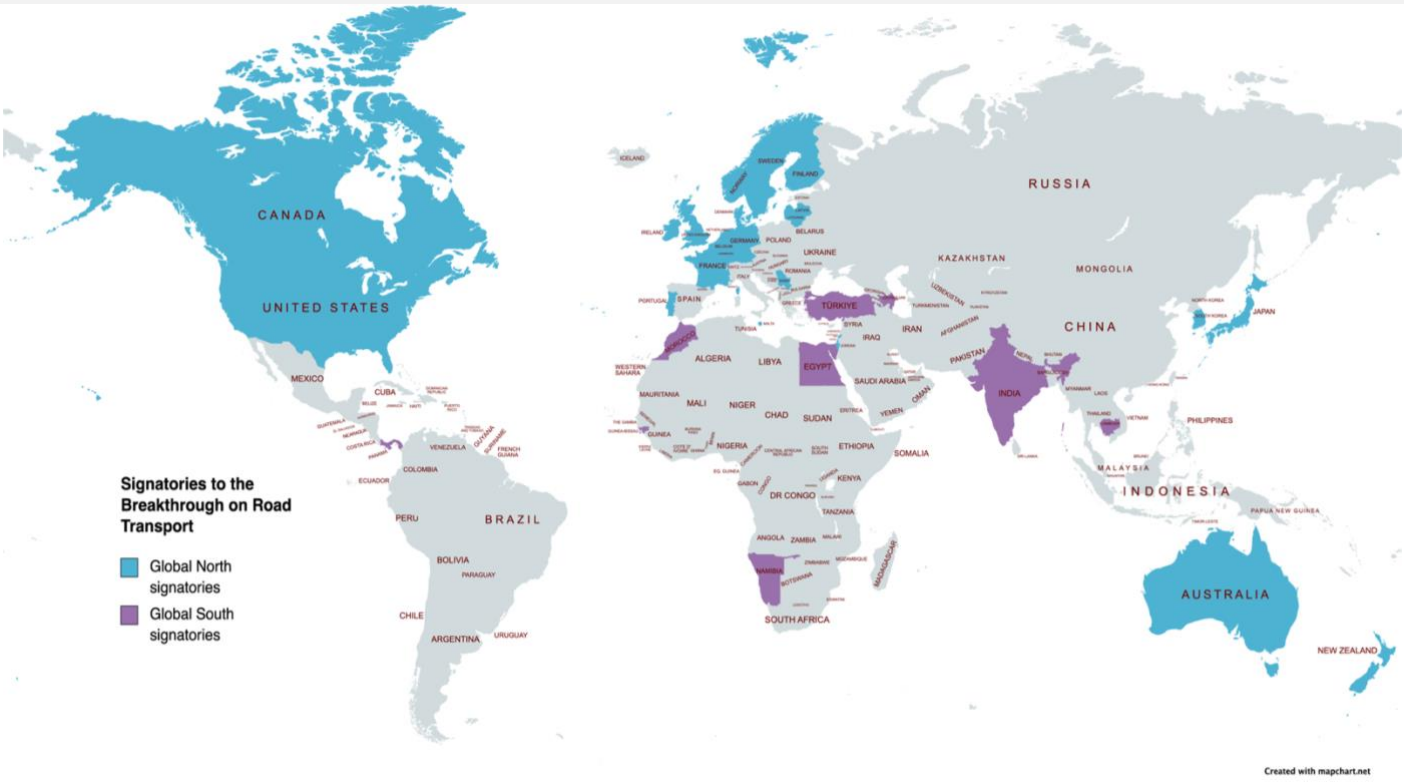

Figure A: Overview of signatories to the Breakthrough on Road Transport

Crucially, as Figure B below shows, five of the world's key car-producing countries are missing from the Breakthrough, namely China, Mexico, Brazil, Spain and Thailand. China's absence is especially important. In addition to being the world's largest vehicle manufacturer, China is also leading the way in terms of ZEV sales, followed by Europe and the United States (IEA, 2023). In 2022, China accounted for 60% of global electric car sales (IEA, 2023).

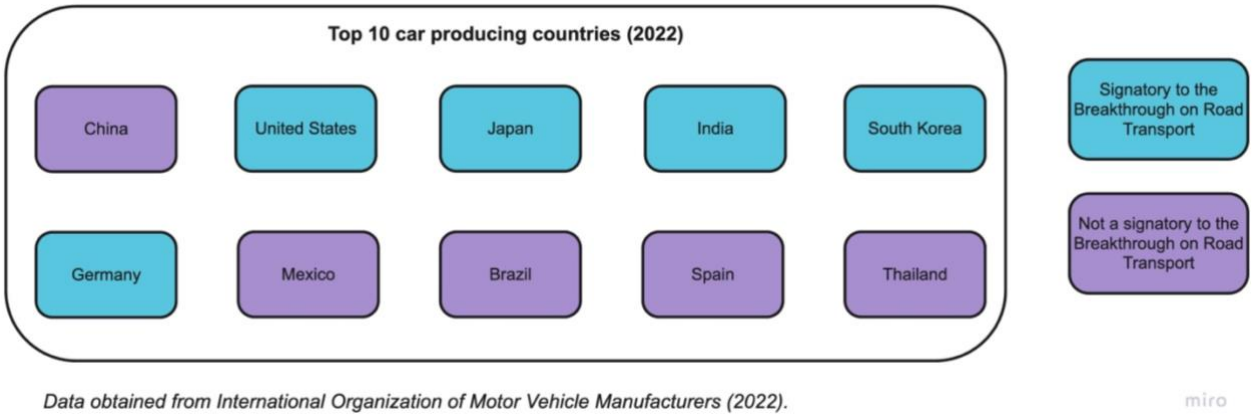

Figure B: Overview of key car producing countries

While a number of these top car-producing countries have not joined the Breakthrough on Road Transport, several, such as China, Mexico and Thailand, have adopted ambitious national targets towards embracing a ZEV future. Accordingly, getting these countries on board is arguably feasible. The Breakthrough should therefore aim to specifically target these key players. To do so, however, the Breakthrough must offer sufficient incentives for joining. In particular, such benefits should focus on national enabling conditions that make a ZEV future possible.

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To get more countries on board and join the Breakthrough, the provision of advantages that specifically benefit emerging economies and developing countries with their domestic transitions will be vital. According to the International Council on Clean Transportation, around $2.5 billion of financial support will be required over the next five years to enable EMDEs to transition towards ZEVs (Miller et al., 2021). Nevertheless, only 37 of 177 EMDEs have received financial support (Miller et al., 2021). In addition, this amounts to just over $160 million across the last five years (Miller et al., 2021).

Currently, there are no concrete commitments on developed country signatories to provide support to emerging economies and developing countries as part of the Breakthrough on Road Transport. **Accordingly, the signatories to the Breakthrough on Road Transport should agree to mobilise collective pledges, specifically from developed country signatories, that enhance means of implementation for developing country signatories,** particularly through scaling up financial, technical and capacity-building support, as well as technology transfer. This aligns with recommendations 2 and 4 put forward by the 2023 Breakthrough Agenda Report (IEA, IRENA and UN High-Level Climate Champions, 2023).

These pledges should target specific challenges and offer different types of support. One example could include the provision of technical assistance to support infrastructure design, to help accelerate the development and deployment of ZEV charging infrastructure across countries. Another could take the form of financial assistance that supports the development of national and/or regional ZEV supply chains, in addition to the development of local electric, power and repairing industries, in order to promote and share the benefits of a just energy transition. In addition to technical and financial assistance, another example could include technology transfer from developed to developing countries, including advanced battery and charging technologies.

Adopting explicit phase-out targets for new sales of fossil fuel vehicles

The goal specified by the Breakthrough on Road Transport is broad and vague. The aim to make ZEVs the ‘new normal’ does not provide a specific or measurable target. Specifying a more precise goal than the existing vision would send a more explicit signal to its signatories, in addition to sending strong international guidance to key industry players who are vital to the sector’s transition.

Crucially, no specific timeframe is set by which all vehicle sales must be ZEV. This is despite an increasing number of national governments, as well as provincial governments and several major automakers, setting their own defined targets to phase-out new sales of fossil fuel vehicles. Many of the existing country signatories to the Breakthrough on Road Transport already have their own domestic targets in place. These timeframes range from as early as 2025 to 2050. While most of these targets concern the phase-out of cars specifically, some countries have widened the scope of their targets to include other types of vehicles, including vans, medium- and heavy-duty vehicles, and light commercial trucks. For example, the Norwegian government has committed to banning the sale of fossil fuel cars by 2025 (Petro Online, 2023), and both the UK and Japanese governments have committed to banning the sale of fossil fuel cars from 2035 (Gallagher, 2023; The Climate Group, 2022).

To address this shortcoming, the signatories to the Breakthrough on Road Transport should agree to explicit phase-out dates for the sale of new fossil fuel vehicles. This aligns with recommendation 1 of the 2023 Breakthrough Agenda Report, which calls for ‘a timeline by which all new road vehicle sales should be zero-emission’ (IEA, IRENA and UN High-Level Climate Champions, 2023). Several expert analyses suggest that this should

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be 2035 for light-duty vehicles and 2040 for heavy duty vehicles (see IEA, 2021; see also Miller et al., 2021). However, a one-size-fits-all approach does not accommodate the prevailing context in different countries. Flexibility should be afforded to take account of developing countries' differing circumstances, including the barriers that they face in the transition towards ZEVs, as mentioned above. In addition, affording flexibility at this stage of the transition is crucial to respecting the country-driven approach captured by the Paris Agreement. Developing countries will require more time to phase-out fossil fuel vehicles and ultimately, make a full transition towards ZEVs.

Incorporating phase-out targets in countries' NDCs and long-term climate strategies to enhance transparency and accountability

Tracking, measuring and reviewing global progress towards the sectoral goals of the Breakthrough Agenda takes place annually through the Global Checkpoint Process, supported by the Breakthrough Agenda Report. Given that sectoral progress is discussed and reviewed globally, however, there is a lack of country-specific tracking. If country-specific progress was showcased, this would help enhance transparency and accountability. This is the one of the rationales underpinning the Paris Agreement's transparency mechanism, the Enhanced Transparency Framework (ETF). Under the ETF, the information that is reported on by the parties, primarily their GHG emissions and domestic climate policies and measures, is made available to both party and non-party stakeholders, and reviewed both by experts and through a multilateral peer-review process. By shedding light and providing clarity on a country's individual progress, the ETF arguably provides a stimulus for building trust and confidence, in addition to promoting ambition through international peer pressure (van Asselt and Kulovesi, 2020).

To address this limitation, the signatories to the Breakthrough on Road Transport should therefore incorporate these phase-out targets for the sale of new fossil fuel vehicles into their NDCs and long-term climate strategies, to enhance transparency and accountability. In doing so, these pledges would be consequently subjected to the Paris Agreement's ETF. Each signatory to the Breakthrough on Road Transport would therefore be required to report on their progress towards implementing and achieving these specific targets. To further strengthen transparency, it would be important that Breakthrough signatories would include a relevant indicator (e.g., % of sale of fossil fuel vehicles) in their Biennial Transparency Reports under the ETF to allow for tracking progress over time. This would also help to promote overall consistency between the Breakthrough on Road Transport and the Paris Agreement.

Promoting the sharing of best practices aimed at electric retrofitting and developing standardised conversion kits for different vehicle models

Availability and affordability of ZEVs continue to preclude their uptake. Moreover, even if all new vehicles sold were electric, replacing the entire fossil fuel fleet could take several decades (Keith, Houston and Naumov, 2022). Retrofitting cars offers a way of overcoming these barriers, by arguably providing a cheaper alternative that can help unlock the transition to ZEVs faster. While in its infancy, retrofitting is slowly but surely emerging as a complementary approach to electromobility in several countries (Jang, Coelho and An, 2023). At the moment, however, the Breakthrough on Road Transport is completely silent on this matter.

One of the most important challenges concerns the dearth of electric retrofitting-specific regulations and policies across the majority of countries (Jang, Coelho and An, 2023). Absent specific regulations and policies, consumers

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will be faced with expensive, lengthy, and potentially unreliable retrofitting options. This will also likely impede industry leaders from investing in R&D, if there is no robust legal and regulatory framework already in place (Jang, Coelho and An, 2023). Breakthrough members France and India have highly regulated retrofitting industries. Drawing from lessons learned and their own experience, these countries could take on a lead role by helping other signatories to develop the necessary legal and regulatory frameworks. **Accordingly, the signatories to the Breakthrough on Road Transport should promote the sharing of best practices specifically aimed at electric retrofitting**.

In addition to developing the necessary legal and regulatory frameworks, country signatories could also work together as part of the Breakthrough on Road Transport to invest in R&D. EV conversion companies are increasingly developing new kits tailored to certain vehicles, enabling car owners to convert their own fuel-driven vehicles to electric. Given that this generally represents a more cost-effective option to hiring a specialist to carry out the procedure, DIY conversion kits are gaining popularity among consumers. However, current conversion kits are limited in their variety (Jang, Coelho and An, 2023), with the vast majority of available kits specifically tailored to classic cars. Further investment in R&D is therefore crucial for the market's continued expansion and diversification, to enable the creation of more versatile kits (Jang, Coelho and An, 2023). In addition, given that the market is in its initial stages, many kits are still costly. **Therefore, country signatories should also aim to collaborate with industry experts to develop standardised conversion kits for different vehicle models in future.**

Harmonising standards to help build a sustainable and just ZEV battery supply chain

While ZEVs have zero tailpipe emissions, their overall carbon footprint extends beyond this, primarily due to their batteries. The production process for batteries involves intensive mining, extraction and refinement of critical minerals, such as lithium and cobalt (Kumar et al., 2021). In addition to the pollutants that are generated by procuring and exploiting raw materials, as well as the potential displacement of local communities, the battery manufacturing process can also result in high carbon emissions. Moreover, the electricity required for charging the batteries is still heavily dependent on fossil fuels in many countries, and there is the additional environmental cost associated with transporting these batteries (Yang, Huang and Lin, 2022). These factors raise significant environmental and social implications. Accordingly, as the demand for ZEVs continues rising, the industry is faced with the increasing challenge of ensuring that sustainability is achieved across battery supply chains (Kumar et al., 2021).

Some steps to target the sustainability of ZEV batteries have been taken, including at the EU level. For example, the EU's new Batteries Regulation addresses the entire life cycle of batteries, including material sourcing, the production phase and circulatory (European Commission, 2022). Other countries are also developing their own initiatives aimed at supporting the development of domestic battery supply chains, such as the US (Arora et al., 2023). Nevertheless, the development and harmonisation of environmental standards across the global supply chain is still lacking. As countries continue to establish their own domestic supply chains, international cooperation will be pivotal to developing a sustainable and just industry and mitigating the negative environmental and social implications associated with batteries. **Against this, the signatories to the Breakthrough on Road Transport should work together to harmonise standards that help build a sustainable and just EV battery supply chain.** This aligns with recommendation 5 of the 2023 Breakthrough Agenda Report, which calls on governments to 'work together to agree on harmonised sustainability standards and metrics, including battery carbon footprint, responsible

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sourcing and broader environmental, social and governance risks and impacts wherever possible' (IEA, IRENA and UN High-Level Climate Champions, 2023).

Developing harmonised emission standards for used vehicles between exporting and importing countries

Subjecting imported vehicles to mandatory emission standards is vital to the regulation of second-hand vehicles and tackling emissions. Several countries have minimum domestic emission standards already in place. Nevertheless, there are broadly three dominant sets of standards that countries follow, based on the regulations adopted by the US, Europe, or Japan (Climate Policy Watcher, 2023). However, these regulations differ to some extent, including in terms of their limit values, as well as required test procedures (Association for Emissions Control by Catalyst, 2022). In addition, previous studies have shown that a number of countries who have introduced their own national regulations and policies to govern imports of used vehicles are 'very weak' or 'weak', generating disparities and a lack of harmonisation concerning vehicle standards across the world (United Nations Environment Programme, 2020: p. 5).

To address this challenge, the signatories to the Breakthrough on Road Transport should aim to develop harmonised emission standards for used vehicles between exporting and importing countries. Promoting harmonisation will help facilitate a global shift to cleaner and safer vehicles, in addition to advancing the implementation of emission standards. This aligns with recommendation 3 of the 2023 Breakthrough Agenda Report, which calls on governments to 'agree on minimum standards for cross-border trade of used vehicles' (IEA, IRENA and UN High-Level Climate Champions, 2023).

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POLICY BRIEF

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