

Technology neutrality and the European Green Deal Which solutions for a competitive EU automotive sector?

Master in Sustainability Management - First Annual Conference

*Event organised by SDA Bocconi's Master in Sustainability Management (MSM)
in collaboration with ECCO and Agora Verkehrswende*

Conference held on 16 October 2024 at SDA Bocconi in Milan.

SUMMARY OF THE CONFERENCE DEBATE AND PROCEEDINGS

The First Annual Conference of the SDA Bocconi Master in Sustainability Management aimed to bring together economists, policymakers, and industry leaders to discuss the optimal design of climate policies while addressing the industry's shift towards competitiveness. The panellists focused on key issues, including the cost-effectiveness of a technology-neutral approach in climate policy, potential market failures from stringent technology-neutral regulations, the benefits of technology-specific policies for fostering innovation, and essential reforms within the single market to support industrial transition competitiveness in line with climate objectives. To facilitate the discussion, Agora Verkehrswende and ECCO presented a paper that examined technology-neutrality approaches from an economic theory perspective, critically analysing their role in driving industrial transformation towards green or net-zero technologies. The paper highlighted the EU's CO2 regulations for cars and vans as a case study, emphasizing its significance in the context of the European automotive sector's global competitiveness amid the transition to zero-emission mobility.

The following sections of this document provide a summary of the panellists' key contributions to the debate, in line with the conference agenda. The summary has been drafted according to the full video recording of the conference available at the following link:

<https://eccoclimate.org/technology-neutrality-and-the-european-green-deal-which-solutions-for-a-competitive-eu-automotive-sector/>

ChatGPT has been used to refine the final language quality of text

The complete version of the discussion paper drafted by Agora Verkehrswende and ECCO is made available in separate files.

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CONFERENCE AGENDA

14:30	<p>Opening speech</p> <p><u>Enzo Baglieri</u> - Associate Dean at SDA Bocconi, Professor of Technology, Innovation and Operation Management, Bocconi University</p> <p>Conference introduction</p> <p><u>Matteo Leonardi</u> – Executive director at ECCO think tank</p> <p><u>Christian Hochfeld</u> – Executive Director at Agora Verkehrswende</p>
14:50	<p>Background speech</p> <p><u>Baptiste Legay</u> - Deputy Head of Unit for Road Mobility, DG Climate Action at the EU Commission</p>
15:05	<p>Conference paper presentation - Critical assessment of technology-neutrality regulation approaches for climate policies. The case for the transitioning to zero-emission road mobility.</p> <p><u>Massimiliano Bienati</u> - Transport Programme Lead, ECCO think tank</p> <p><u>Carl-Friedrich Elmer</u> - Senior Economist, Agora Verkehrswende</p>
15:25	<p>Discussion panel A - Technology neutral vs technology specific regulations in the perspective of the economic theory</p> <p>Chair</p> <p><u>Matteo Di Castelnuovo</u> – Master in Sustainability Management Director, SDA Bocconi</p> <p>Speakers</p> <p><u>Lucia Visconti Parisio</u> - Full Professor of Public Economics, Università Milano Bicocca</p> <p><u>Alfredo Di Tillio</u> - Associate Professor of Economics, Bocconi University</p> <p><u>Daniel Gros</u> - Director of the Institute for European Policymaking, Bocconi University</p> <p><u>Enrico Giovannini</u> - Full Professor in Economics Università Tor Vergata and former Italian transport Minister</p> <p><u>Daniel Sperling</u> - Founding Director, ITS-Davis and Co-director, ITS-Davis European Transport and Energy Research Centre</p>
16:25	<p>Coffee break</p>

16:45	<p>Impulse speech <u>Sigrid De Vries</u> - Director General of the European Automobile Manufacturers' Association (Acea)</p>
17:00	<p>Keynote speech - <i>The Green Deal in the perspective of the new EU Single market</i> <u>Enrico Letta</u> - President at Jacques Delors Institute and former Italian Prime Minister (Video message)</p>
17:15	<p>Discussion panel B – <i>Policies to be addressed for a competitive transition of the EU automotive industry in the new Single Market in the context of global market dynamics</i></p> <p>Moderator <u>Giulio Piovaccari</u> - Correspondent at Reuters News Agency, international service</p> <p>Speakers <u>Friedrich Hinrichsen</u>, VP Public Affairs Enlarged Europe Stellantis <u>Thomas Becker</u> - VP Sustainable Mobility at BMW Group <u>Enzo Baglieri</u> – Professor of Technology, Innovation and Operation Management, Università Bocconi</p>
18:15	<p>Q&A Closing remarks <u>Francesco Perrini</u> – Professor of Management at Bocconi and SDA Bocconi Associate Dean Sustainability</p>

OPENING SPEECH & CONFERENCE INTRODUCTION

Enzo Baglieri - Professor of Technology, Innovation and Operation Management, Università Bocconi and Associate Dean Master Division at SDA Bocconi.

In his opening speech, Prof. Baglieri welcomes attendees providing a context about the Bocconi School of Management, which is part of Bocconi University. Professor Baglieri highlights that sustainability is a central theme in the school's research and education, with a strong focus on its impact on business management. He acknowledges the importance of mobility as a key area of focus within the program, which is why the event is dedicated to discussing the automotive sector and its role in sustainability. Finally, he encourages both in-person and online participants to engage with the content and networking opportunities, emphasizing the importance of fostering connections at such events.

Matteo Leonardi Executive director at ECCO think tank

In his opening speech, Leonardi introduces the goals and mission of ECCO think tank, emphasizing its independence in advocating for climate action and energy transition. Leonardi emphasizes the importance of creating a dedicated space for dialogue on key policy approaches to achieving decarbonization. He highlights the complexity of this transition and points out that technology neutrality as a pricing-based policy has limitations and might need to be supplemented by policies that addresses broader social and industrial needs.

Leonardi argues that the technology neutrality approach, although adopted in some sectors and contexts, might not suffice, as in the case of the electricity sector, where additional mechanisms - such as capacity mechanisms and social policies - had become necessary to support a fair and resilient transition. He stresses that investments in infrastructure should not be viewed as mere subsidies but as essential public investments, including those needed for electric grids to handle renewable energy and electric mobility demands.

He concludes by cautioning against using technology neutrality as a justification to weaken core components of the EU's Green Deal, such as the CO2 standards for vehicles, which relies on specific regulations to drive decarbonization. Leonardi emphasizes that this conference's objective is to clarify and evaluate the role of technology neutrality in Europe's decarbonization strategy, particularly in the mobility sector, and its effectiveness in reaching climate goals.

Christian Hochfeld, Executive Director at Agora Verkehrswende

In his speech, Hochfeld addresses the importance of balancing climate targets with industrial competitiveness in Europe's automotive sector. Hochfeld stresses that achieving Europe's 2050 climate neutrality goals (and Germany's 2045 target) demands an urgent shift to electric mobility to align transport to these decarbonization goals. He calls for collaboration between Germany and Italy, highlighting that climate action shouldn't be seen as a competitive arena but rather as an

opportunity for joint progress in the EU. He further emphasizes the urgency of taking immediate action, as delaying climate change mitigation will only increase future costs.

Hochfeld introduces the concept of a "VUCA world" - one marked by Volatility, Uncertainty, Complexity, and Ambiguity - and argues that Europe needs a different kind of VUCA, with "Vision, Understanding, Clarity, and Activity". This includes a clear vision for climate targets, a strong understanding of the fast-tracking of electric mobility, clarity in investment and planning for the automotive sector, and timely actions to maintain competitiveness.

Hochfeld points out that the automotive industry faces critical challenges, especially in meeting climate goals while maintaining profitability amidst global competition. He encourages discussions on whether Europe should prioritize technology-specific pathways, such as accelerating electric mobility. He concludes by expressing hope for productive discussions at the conference and a successful transition for Europe's automotive industry, blending climate objectives with economic vitality.

BACKGROUND SPEECH BY THE EU COMMISSION

Baptiste Legay, Deputy Head of Unit for Road Mobility, DG Climate Action at the EU Commission (delegated by **Beatriz Yordi**, Director, Carbon Markets and Clean Mobility, DG Climate Action, European Commission)

In his speech, Legay provides an overview of the EU's strategy for transitioning to zero-emission mobility. He provides an update on the EU's climate policy, highlighting significant achievements in emission reduction since 1990, alongside economic growth. He emphasizes the goal anchored into law at EU level of reaching climate neutrality by 2050, with an at least 55% emissions reduction target by 2030 underlining, however, that transport remains a key challenge, as it is the only sector with rising emissions since 1990, making swift action necessary.

Legay explains the EU aims for climate neutrality by 2050, with a target to cut emissions by at least 55% by 2030, as laid out in the "Fit for 55" legislative package and that this ambitious goal requires rapid and significant action in the transport sector to ensure that the overall emissions reduction is achieved. A major milestone is the commitment to a 100% reduction in CO₂ emissions for cars and vans by 2035. He describes the CO₂ standards regulation as technology-neutral, meaning the standards do not prescribe specific technologies but focus on achieving zero tailpipe emissions. He mentions that electromobility is de facto the dominant approach. He also notes that the Political Guidelines for the next Commission indicate that the current technology-neutral approach will be extended to ensure e-fuels have a role to play through a targeted amendment of the regulation, as part of the foreseen review in 2026. He indicates that the regulation's long-term approach is intended to provide certainty and predictability for manufacturers, as well as to drive innovation and investments in clean technologies, which will also require the upskilling and reskilling of workers in the automotive sector. Legay also mentions various flexibilities within the regulation, such as incentives for eco-innovation and opportunities for manufacturers to pool to meet emissions targets. He also stresses that alongside the regulatory framework, the EU has also implemented a

supportive framework, including the Alternative Fuels Infrastructure Regulation, which mandates charging and refuelling infrastructure deployment. Additional initiatives like the Critical Raw Materials Act and the Net Zero Industry Act aim to support the supply chain and industrial transformation.

Legay underscores the importance of global trends, noting that countries like China, the US, and emerging economies are rapidly moving towards adopting zero-emission vehicles. He stresses the EU's competitive advantage in the automotive industry and the need to maintain this position amidst the global transition. The automotive sector is crucial for the EU's economy, representing over 6% of GDP and employing millions of workers. Looking ahead, the EU's focus will be on ensuring that successful industrialization and the green and digital transitions go hand in hand. In this Legay highlights the upcoming Clean Industrial Deal, the Automotive Industrial Plan, and the need for continued dialogue with industry stakeholders to ensure stable regulatory frameworks, infrastructure, and skills development. In conclusion, Legay stresses the need for continued dialogue with the industry and stakeholders to ensure the success of the green transition.

DISCUSSION PAPER PRESENTATION

Introductory speech

Massimiliano Bienati, *Transport Programme Lead at think tank ECCO*

In his introduction to the discussion paper presentation, Bienati outlines the origins of the project. He explains that the initial idea for the project emerged in 2022 during the EU's discussions on CO2 standards and the 2035 ban on combustion engines. As public debate heated up, ECCO recognized a distortion in the understanding of technology neutrality, particularly in the context of climate mitigation, transport decarbonization, and the automotive sector's transformation amid a changing energy paradigm. Bienati acknowledges the collaborative effort behind the project and the discussion paper, mentioning the fruitful interaction with Agora and Bocconi University.

Paper presentation

Carl Friedrich Elmer, *Senior Economist, Agora Verkehrswende*

Elmer introduces his talk acknowledging the consensus on the need for zero-emission mobility but highlights ongoing debates about the appropriate policy measures to achieve it, particularly whether the market should determine the path or if the state should play a more active role. He explains that this introduction is aimed at setting the stage for the first discussion panel.

The speech first addresses the broader issue of decarbonizing the transport sector, which is currently the only sector in the EU with growing emissions. Transport accounts for a significant share of greenhouse gas emissions, with road transport responsible for 75% of transport-related emissions, and cars alone contributing 60% to these emissions. This makes CO2 regulation for cars the central focus of the discussion.

Moving into the theoretical part of the speech, Elmer explores the distinction between "technology neutrality" and "technology specificity" emphasizing that technology neutrality refers to regulations that set overall emissions reduction targets without discriminating between technologies that can be used to achieve those targets. The idea is that the market, with its decentralized knowledge, will decide on the most efficient technologies. However, this approach assumes perfect market conditions - unbiased competition and fully informed, rational actors - which often do not exist in reality. In practice, markets can be distorted by factors like existing technological path dependencies, information asymmetries, and infrastructure limitations. He argues that in such cases, technology neutrality may not lead to the most cost-effective solutions emphasizing that. Instead, targeting market imperfections through technology-specific interventions can be both economically more efficient and environmentally more effective. This is illustrated at the example of the market uptake of fuel-efficient vehicles and in particular electric vehicles (EVs). These imperfections include knowledge spillovers, where the benefits of technological advancements in green technologies (such as EVs) extend beyond the original innovator and benefit society at large. Without sufficient government intervention, these spillovers may not be adequately captured by the market, leading to underinvestment in green technologies. Another market barrier mentioned is consumer behaviour. Consumers tend to undervalue the long-term savings from fuel efficiency or electric vehicles due to "externalities," where people do not fully account for future energy cost savings when making purchase decisions. This behaviour, rooted in myopia or a focus on immediate costs, further hampers the transition to cleaner technologies.

Given these challenges, the speaker argues that relying solely on carbon pricing or technology neutrality will not achieve decarbonization in the most cost-effective manner. Instead, a policy mix is needed - one that combines carbon pricing with targeted interventions like CO2 standards. These standards not only drive technological innovation (especially in EVs) but also provide investment certainty for both manufacturers and the suppliers of infrastructure, such as charging stations. CO2 standards also help address consumer myopia by incentivizing manufacturers to supply more efficient vehicles, benefiting consumers in the long term.

Elmer then moves on to assess the effectiveness of policies aimed at including renewable fuels (such as biofuels and e-fuels) in the CO2 standards. However, the speaker argues against this approach, noting that including renewable fuels would undermine the goals of the CO2 standards for several reasons. First, while EVs still have significant technological improvements to be made (such as production cost reductions and efficiency gains), implying substantial positive externalities, the combustion engine has reached its technological limits, diminishing the prospects of further advancements. Furthermore, including renewable fuels in the regulation could also distort market incentives, diverting renewable fuels away from sectors like aviation and shipping, where electrification is not feasible. This could lead to inefficiencies and further delay the decarbonization of these harder-to-abate sectors.

In the context of adding compliance flexibilities to the regulatory framework, Elmer discusses banking and borrowing mechanisms arguing that flexibility must not become a loophole that delays necessary emissions reductions toward climate goals. Elmer also introduces the issue of regulating energy consumption to encourage a more sustainable electric vehicle fleet, and to avoid the production of overly large vehicles and inefficient energy usage.

In conclusion, the speaker warns against weakening the CO2 standards, as doing so would harm the credibility of EU climate policies and undermine future emission reduction targets. Weakening the standards could lead to a cycle of relaxed regulations, ultimately preventing the EU from meeting its decarbonization goals. The speaker emphasizes the importance of maintaining strong, credible CO2 standards to support the transition to zero-emission mobility

Notice: The presentation used by Elmer for his speech is made available in a separate file

ACADEMIC DISCUSSION PANEL

Technology Neutral vs. Technology Specific Regulations in the Perspective of Economic Theory

Academics reactions to the discussion paper presentation

Chair

Prof. Matteo Di Castelnuovo, *Director Master in Sustainability Management, SDA Bocconi*

The Chair expresses gratitude for the insightful presentations and welcomes the first panel discussion of the day, titled "Technology Neutral vs. Technology Specific Regulations in the Perspective of Economic Theory". He remarks the importance of the event and the topic, noting how it intersects with economics, energy, market failures, technological adoption, and industrial strategies. Di Castelnuovo also emphasizes the role of sustainability in the automotive industry and the importance of educating future leaders on these topics. The aim is to engage a wide range of stakeholders, providing a platform for diverse perspectives while grounding discussions in solid research. The Chair addresses Professors asking for their thoughts on the report that has been presented.

Prof. Lucia Parisio Visconti, *Full professor of Public Economics, Università Milano Bicocca*

Overall, Prof. Parisio's commentary highlights the limitations of relying on technology neutrality and underscores the importance of coordinated policies, standards, and infrastructure development to foster sustainable innovation in the automotive sector. She critiques the concept of technology neutrality in the context of the automotive industry's transition to zero-emission vehicles, describing it as a myth. She argues that technology neutrality relies on the unrealistic assumption of perfect competition, which is not present in complex industries and markets. She suggests that market failures require complementary policies to ensure effective outcomes.

Parisio, also highlights the coordination challenges within the industry, noting both vertical coordination (the alignment of production stages) and horizontal coordination (the intersection of the automotive sector with other industries, such as electricity, as electric vehicles become more prevalent). She points out the difficulty in ensuring equal access to charging infrastructure, particularly in less profitable or rural areas, and questions who will be responsible for installing

charging stations in these regions, emphasizing the need for central policy intervention to ensure a universal service standard. Parisio also questions whether innovation in the automotive sector would occur at the same pace without the existing standards, suggesting that regulatory obligations, such as CO2 standards, are essential for driving green technological advancements in general. Lastly, she raises concerns about the long-term profitability of the EU car industry, especially in the face of competition from countries like China, and wonders how the industry will fare without tariffs or continued innovation driven by regulatory standards.

Prof. Alfredo Di Tillio, Associate Professor of Economics, Bocconi University

Stimulated by a comment of the Chair about the potential for using the topic discussed in the report as an opportunity to design new exercises for a microeconomics course, particularly focusing on externalities, Prof. Di Tillio emphasizes the importance of the topic, particularly in raising public awareness about the issues surrounding the transition to green technologies, like electric cars. He points out that consumers often lack proper information, which leads to challenges in decision-making, such as focusing only on price and fearing the risks of early adoption. He also agrees with the authors' assessment of the market for electric cars, noting that traditional and electric cars are substitutes, but the goal should be to reduce pollution without affecting mobility.

Di Tillio also highlights the need for government intervention due to the positive externalities involved in research and development (R&D) for EV technology. He further remarks that the real debate may not be about neutrality versus specificity, but about accelerating the transition to electric vehicles, since it seems like electric cars are already the "winning" technology. While he agrees with much of the analysis, he disagrees with some points, such as the concern about the "lemon's problem," to the context of electric cars because he doesn't think it fully applies to this particular market. While the "lemon problem" involves situations where buyers cannot accurately assess the quality of a product (like a used car), Di Tillio argues that, in the case of electric vehicles (EVs), the situation is different. In any case, he considers this a minor issue. He concludes by affirming that investigating this topic is highly valuable.

Prof. Daniel Gros, Director of the Institute for European Policymaking at Bocconi University

The Chair introduce the speech of Prof. Gros, highlighting the view that many consumers do not always act rationally, as they focus on the price, neglecting long-term benefits like fuel efficiency. This constitutes a reason why governments might have to intervene in the market.

Gros, challenges the idea that regulators should decide which technology consumers should choose. He argues that while the market may have imperfections, these imperfections are not necessarily more severe for EVs than for internal combustion engine vehicles (ICE). The mere existence of a market imperfection thus does not constitute a rationale for subsidizing EVs.

Gros challenges also the commonly held belief that EVs are inherently more expensive than ICE. He points to the example of China, where EVs are no longer expensive, suggesting that European producers may be using oligopolistic power to inflate prices. He is confident that the cost of EVs, particularly batteries, will decline as economies of scale are reached, similar to other mass-market

products. He stresses that reducing costs should be the primary focus, as this will allow consumers to make better decisions, with other benefits naturally following.

Gros also discusses the tension between preserving Europe's automobile industry and importing cheaper foreign cars. He advocates prioritizing green objectives, even if it means allowing foreign companies, particularly Chinese manufacturers with superior technology, to produce EVs in Europe. He questions the hesitation to let Chinese firms take over factories in Europe, particularly when some of these factories are underused and could help lower production costs.

Prof. Enrico Giovannini, *Full professor in Economics at Università Tor Vergata in Rome and former Italian transport Minister*

The Chair turns to Prof. Giovannini, noting his unique experience as a former Minister of Transport and Infrastructure and his involvement in commissioning a significant study on decarbonization. He highlights that this background puts Giovannini in an ideal position to provide insights and comments on the subject of sustainable transport and decarbonization policy.

Giovannini emphasizes the significance of the conference paper and the broader discussion on the decarbonization of the automotive industry, especially regarding the transition to electric vehicles (EVs). As a former Minister of Sustainable Infrastructure and Mobility, he reflects on his involvement in shaping the CO₂ regulations, including the decision on the ICE car ban for 2035. In this, he emphasizes the urgency of addressing this issue also by focusing on real-world consequences of mobility based on combustion engines such as air pollution and premature deaths, which are often overlooked in the debate. He points out that, in Europe, the pollution contributes to around 300,000 premature deaths annually, with about 50,000 occurring in Italy alone. By 2035, just looking at the share of pollution due to transport, he estimates that 200,000 Italians could die if action is not taken to address transport-related pollution. He stresses that the debate should not just be about car production or profitability, but also about saving lives.

Giovannini also highlights a growing market shift where younger generations (18-year-olds) are showing significantly reduced interest in owning cars. This trend, observed in both Europe and the US, complicates the debate about the future of car ownership, which impact market dynamics and the need for a rapid transition to cleaner vehicles. He mentions the failure to predict technological trends, as evidenced by the shift from hydrogen to electric vehicles also for heavy transport, and how technological neutrality can sometimes lead to wasted investments. He contrasts this with the approach taken by China, where a specific (electric) technology-driven approach has been implemented, which led that country to become the world leader in electric mobility.

In this respect, for some sectors he argues for technological “multiplicity” rather than strict “neutrality”, pointing to the need for diverse technologies to coexist rather than adhering to a single solution, as in the case of maritime transport, where different technologies like liquid gas, ammonia, and hydrogen will compete over the next years. In conclusion, Giovannini remarks the importance of adapting to technological advancements quickly and making the right investments to protect public health and ensure long-term sustainability in the automotive and transport industries in general.

Prof. Daniel Sperling, Professor and founding Director at Institute of Transportation Studies UC Davis and Co-director, ITS-Davis European Transport and Energy Research Centre

To introduce Prof. Sperling, the Chair addresses the significant, yet often underestimated, impact of transport on climate change, especially in developed economies. In regions like Europe, the UK, and the US, transport contributes over a quarter of total emissions, with road transport being the primary source. Although electricity production is the leading global emissions source, transport dominates in advanced economies.

Prof. Sperling begins his speech by emphasizing the global urgency of addressing climate change and air pollution, noting the widespread consensus around electric vehicles as the future of the automotive industry, both for light vehicles and larger trucks. Sperling praises the discussion paper on regulatory approaches, describing it as a sophisticated analysis of market-driven and policy-based solutions.

Drawing on his 16 years on the California Air Resources Board, Sperling outlines California's leadership in ambitious climate policies similar to those in Europe, including a cap-and-trade system and a mandate for all new vehicle sales to be zero-emission by 2035. He highlights the state's simultaneous goal for trucks to reach zero emissions by 2040 and notes that California's EV policies align closely with European approaches, though with some regulatory variations.

Sperling identifies three key areas impacting regulatory policies for EVs: consumer choice, trade issues and industrial policy, and the design of regulatory frameworks. He underscores the economic and environmental benefits of electric vehicles, including their cost advantages for consumers as technology matures. While he supports electric vehicles as the dominant future technology, he suggests that policy frameworks should remain somewhat flexible. For example, allowing "e-fuels" (synthetic fuels) as a niche option could reduce political pushback against strict EV mandates by offering consumers and industry more choices, even though e-fuels will likely remain more expensive than EVs. He claims that "banking and borrowing," or allowing companies to trade credits, would enhance regulatory efficiency. He felt that Europe's current practice of pooling credits among companies, such as partnerships with Tesla, could be expanded to allow more flexible trading, similar to California's approach.

Finally, Sperling addressed some broader considerations, such as the importance of designing policies to promote efficiency in EV design. He pointed out that not all EVs are equally energy-efficient—some larger EVs require significant amounts of critical materials and generate higher electricity demand. Sperling argues that future regulations should consider these differences and aim for a more efficient, sustainable path as efficient, politically acceptable, and minimally disruptive as possible

In closing, Sperling expresses confidence in the global shift towards EVs, though he acknowledged challenges, especially within the United States, where inconsistent federal policies create uncertainties. This lack of regulatory continuity makes it difficult for the industry to confidently plan and invest in long-term shifts. Nevertheless, he appreciates the international alignment he observed between California and Europe and offers optimistic views on the current regulatory direction, suggesting that with continued refinement of policies, the transition to EVs could be both smooth

and economically beneficial. Ending on a positive note, Sperling encouraged further international dialogue to solidify shared goals and effective policy frameworks

END OF THE ACADEMIC DEBATE

KEYNOTE SPEECH BY SIGRID DE VRIES

Sigrid De Vries, *Director General of the European Automobile Manufacturers' Association (Acea)*

Ms De Vries highlights that the technology neutrality concept has been a fundamental principle in the automotive industry for some time, and she finds it interesting that it has now resurfaced in academic and policy discussions, underscoring the importance of neutral ground in enabling innovation within the sector. She then reflects on the European Commission's portrayal of the decarbonization process, where things may appear well-structured "on paper." However, she expresses concern over this optimistic view, as it does not necessarily align with the real-world challenges faced by the automotive industry.

The speaker's experience at the Paris Motor Show serves as an illustration of these challenges, where the ongoing transformation of the industry, particularly the shift toward electric vehicles (EVs), was very visible, underlining the most dramatic and profound changes in the industry's history. This transformation involves not only technological advancements but also changes in the entire value chain, including vehicle architecture, the sales model, consumer behaviour, and industrial practices. While acknowledging that electric vehicles are set to become the dominant technology, De Vries stresses that the shift to electrification goes beyond just adopting new technology. It requires a fundamental restructuring of the automotive market, which involves changes to consumer behaviour, societal acceptance, and the involvement of a variety of stakeholders. The transition to EVs must move beyond early adopters and reach a broader consumer base. However, there is a notable gap between governmental policy objectives and consumer readiness to embrace electric vehicles, resulting in a disconnect that needs to be carefully managed.

On a positive note, the speaker points to the substantial investments being made in the European automotive sector, which includes over 70 billion EUR annually dedicated to research and development (R&D) and more than 250 billion EUR earmarked for electrification. In total, over 350 electric vehicle models are either available or soon to be launched, reflecting a strong commitment from the industry to meet decarbonization goals. The speaker also emphasizes the importance of workforce reskilling, noting that the automotive industry in Europe employs over 13 million people directly and indirectly, and that the transformation requires upskilling and reskilling to keep pace with the industry's evolving needs.

De Vries points out many consumers are still hesitant about switching to electric vehicles, particularly due to concerns over charging infrastructure, vehicle affordability, and overall usability. The speaker shares concerns about studies that show some EV owners are considering reverting to traditional vehicles due to these uncertainties. This represents a worrying trend that could hinder the industry's transition toward sustainability. In this, she stresses that policymakers and industry

leaders must do more to understand consumer concerns and to ensure that the transition to EVs is as smooth as possible. This includes ensuring that electric vehicles are not only affordable but also practical and reliable for everyday use. The speaker suggests that while the automotive industry is making significant strides, there is still work to be done to bridge the gap between regulatory expectations and consumer realities. In terms of future strategies, she claims that while battery electric vehicles (BEVs) will dominate the market in the long term, there needs to be a broad range of options to meet consumer needs during the transition period. A flexible regulatory framework that allows for different technologies, such as hydrogen and synthetic fuels, will be crucial to accommodate the diverse needs of the market, particularly in the heavy-duty vehicle segment. She underscores the importance of technology neutrality, which is not a call for unlimited innovation but for the freedom to offer consumers a range of choices while still adhering to sustainability goals. The issue of Europe's reliance on China for key materials and components, particularly batteries, is also raised by De Vries. She acknowledges the importance of cooperation with China but emphasizes the need for Europe to strengthen its resilience and self-sufficiency in the supply chain to ensure security and competitiveness in the long term. She notes that Europe must learn from China's advancements while maintaining its independence and competitiveness on the global stage. High production costs - driven by factors such as labour, electricity, and regulatory burdens - have resulted in higher prices for European-made EVs compared to those produced in countries like China. This price disparity limits consumer adoption and complicates the industry's ability to compete in the global market. The speaker calls for concerted efforts from both industrial actors and policymakers to address these cost challenges, including reducing production costs and improving the regulatory environment.

Finally De Vries points to recent recommendations by Mario Draghi on improving the competitiveness of the European automotive industry, emphasizing the need for regulatory improvements to ensure that European industries can thrive in a competitive global market while still meeting sustainability targets. The speaker concludes by reiterating that while significant progress has been made, the transition to a fully electrified automotive industry will require ongoing collaboration between the automotive industry, policymakers, and consumers to overcome the many challenges that lie ahead.

KEYNOTE SPEECH BY ENRICO LETTA

Enrico Letta , *President at Jacques Delors Institute and former Italian Prime Minister (recorded video message)*

In his video message, Enrico Letta presents insights from the report he prepared for the European Council and European Commission. The report, based on a nine-month tour across Europe, involved over 400 meetings in 65 cities across 27 countries, adopting a bottom-up approach to gather perspectives from various sectors of society. Letta outlines the report's main focus: how to finance the green, digital, and just transitions without altering the current EU treaties. He believes that while the decisions made during the last European legislature were correct, the critical issue now is how

to implement these decisions effectively. A key part of this implementation, according to Letta, is ensuring that society, entrepreneurs and workers are supportive of these changes. Without their acceptance, he argues, the transition will fail.

A centrale proposal in his report is the creation of a "Savings and Investments Union," designed to replace the unsuccessful Capital Markets Union. This initiative would link private investments with the funding required for the transition, especially given that many European countries are not in favour of continuing the Next Generation EU funding. The goal is to mix public and private investments to ensure the transition is financially viable without facing a negative backlash.

Letta Also touches on the fragmentation of the European single market, particularly in telecom, energy, and financial markets, which are still fragmented into 27 separate markets. This fragmentation hinders investment and growth, he argues, benefiting competitors outside of Europe. To address this, he calls for a reset and more integration within the EU, leveraging the single market as Europe's "hidden gem". He also proposes to creating a "fifth freedom" (potentially to complement the EU's four freedoms of movement), a "28th virtual state" for an optional unified corporate law across the EU, and other ideas aimed at improving the EU's integration and competitiveness. The speaker concludes by expressing confidence that the ideas presented in his report can contribute positively to discussions and the EU's future direction.

INDUSTRY DISCUSSION PANEL

Policies to be addressed for a competitive transition of the EU automotive industry in the new Single Market in the context of global market dynamics

*The discussion is here resumed by round of topics as emerged during the discussion and addressed by the Chair Mr Giluio **Piovaccari**, Reuters News Agency,*

Involved panellists are

Prof. Enzo **Baglieri**, Bocconi University and Associate Dean at SDA Bocconi

Friedrich **Hinrichsen**, VP Public Affairs Enlarged Europe Stellantis

Thomas **Becker**, VP Sustainable Mobility at BMW Group

One

Chair - Navigating the electrification challenge

Mr Piovaccari introduces the panel by reflecting on how the automotive industry is facing significant challenges, especially regarding the transition to electrification. He acknowledges that while many

people describe these times as “special” and marked by unpredictability, the changes happening in the automotive sector—particularly the shift towards electric vehicles (EVs)—are both technological and structural in nature. This transition is not only a matter of developing new technologies, but also involves changing how automakers procure raw materials, organize their operations, and interact with governments. Piovaccari emphasizes the need to focus on electrification, particularly from a European perspective, where Chinese automakers are seen as having an edge in EV technology.

Prof. Baglieri (SDA Bocconi) – The Real Question is When

Baglieri opens his speech by addressing the broader concept of technological transitions, emphasizing that while electrification is likely to become the dominant technology, the process of change is not straightforward. He likens this transition to past technological shifts, like the failed attempt at introducing HDTV in Europe in 1990-1994, where the market was not ready to adopt the new technology, despite significant investment and stresses that for a technological transition to succeed, it must not only meet the supply-side requirements but also align with market demand. He highlights the challenge of moving from the current reliance on internal combustion engines (ICE) to electric vehicles, noting that the two technologies will overlap for some time. He argues that the transition is being driven by policies and investments, but that the real question is when the shift will fully occur and whether it will create genuine value for consumers.

Baglieri points out that while electric vehicles might be technologically superior, the market response remains mixed. Some customers are enthusiastic about EVs (the "visionaries"), but the majority of consumers remain pragmatic, unsure about the benefits, costs, and overall value of electric vehicles. He suggests that many consumers don't fully understand the advantages of EVs or perceive their costs as too high compared to traditional vehicles. Until the market better understands and appreciates these benefits, the transition could take longer than expected. He underscores that the industry needs to shift focus towards market understanding and demand, not just technology development.

Chair - EU's 2035 ICE Phase-Out and Market Adaptation

Piovaccari takes a moment to expand on the role of governments in shaping the transition, using the example of the European Union's 2035 regulation that mandates the phase-out of internal combustion engines. He acknowledges that many see such regulations as top-down, politically driven decisions that do not necessarily align with market conditions. However, he suggests that such policies might be necessary to push the industry forward, especially if markets are reluctant to make the transition on their own. He introduces the idea of "game theory," suggesting that by setting firm targets (like the 2035 deadline), governments can effectively prevent a reversal and force the industry to adapt, even if it might not be fully prepared. Piovaccari implies that while these policies may seem driven by politics, they could ultimately be essential in overcoming market inertia.

Becker (BMW) - Adapting to Fragmented Markets and BMW's Multi-Path Strategy

Becker takes the opportunity to provide a critical viewpoint on the EU's 2035 regulations. While acknowledging the concept of top-down supply side regulation he stresses that such policies overlook the fragmentation within the European market at the demand side. He explains that while

countries like Norway and the Netherlands are leading in EV adoption, other countries such as Italy, Spain, and Poland are lagging behind. This disparity and asymmetry create significant challenges for automakers who need to address varying levels of infrastructure, consumer awareness, and market readiness. Becker argues that this fragmentation makes it difficult to implement a coherent European-wide strategy for EV adoption without accounting for these regional differences. He also highlights that local governments, such as mayors of cities, play a critical role in EV adoption by deciding whether to invest in charging infrastructure, a decision that is outside the scope of Brussels-based regulations.

Becker is particularly concerned about the uncertainty of the future and the pace at which technology and markets evolve. He recalls the industry's prior experience with the EU's voluntary agreements in 2004 to reduce carbon emissions, which were not successful, leading to stricter regulations in 2006. Despite these failures, he notes that the industry has continued to progress, especially with the rise of electric vehicles starting around 2014. He points out that while regulations like the 2035 targets may seem set in stone, the reality is that future market and technological changes are highly unpredictable. From BMW's perspective, Becker insists that the company cannot afford to rely solely on one technology (electric vehicles) or one scenario. BMW plans to continue improving combustion engines, ramp up EV production, and invest in hydrogen fuel-cell technology, viewing it as part of a more flexible, diversified approach to meet the demands of an uncertain future.

Hinrichsen (Stellantis) - Target Fines: Industry Diversity and Stellantis' Position

Hinrichsen takes the word to shift the conversation to more immediate concerns, particularly the European Union's 2025 carbon reduction targets. He questions the assumption that the entire automotive industry will face significant fines for not meeting these targets, which could amount to billions of euros. According to Hinrichsen, this prediction ignores the diversity of decisions and strategies within the industry, as different carmakers are taking varied approaches toward meeting the emissions reduction goals. He expresses concern that labelling the entire industry with a blanket fine expectation is premature, as not all manufacturers will face the same challenges or penalties. He argues that Stellantis has been very clear on fines and not to change the targets.

Becker (BMW) - Advocating for a Broader Approach to Decarbonization Beyond 2035 Target

Becker emphasizes that BMW is committed to meeting the legal obligations for emissions reduction, and the company will not pay fines in 2025. However, he expresses concern over the current path to achieving the 2035 targets. He advocates for a broader, more nuanced discussion about decarbonization that goes beyond a "black and white" approach. Becker argues for a comprehensive strategy that takes into account the entire carbon footprint of the transportation sector, not just the type of vehicle technology (electric vs. combustion engines). He suggests including the carbon footprint of the energy used to power vehicles, whether it's electricity, hydrogen, or traditional fuels. Additionally, Becker raises the issue of the aging European vehicle fleet, which has been getting older over the past decade, and the potential emissions consequences of not addressing this issue. He calls for a broader conversation on how to manage and reduce emissions across the entire sector, rather than focusing solely on the technology choices.

Chair – Delay 2025 targets?

Piovaccari acknowledges the uncertainty surrounding the market and the requests from some stakeholders, like the European auto lobby, to delay the 2025 emission targets recognizing that both BMW and Stellantis, along with others in the industry, do not support this request.

Hinrichsen (Stellantis) - No Changes to 2025 Emission Targets, Focus on EVs and Charging Infrastructure

Hinrichsen expresses appreciation to the conference discussion paper, emphasizing that it aligns with Stellantis goals. He stresses that there should be no changes to the 2025 targets and no rushed review. Instead, he advocates for a thoughtful discussion scheduled for 2026, which will consider all relevant points. He argues that discussing changes to the targets 15 months before the deadline is impractical and not serious. Hinrichsen then highlights the need to focus more on electrification, stimulating demand, and increasing consumer confidence in battery electric vehicles. He also emphasizes the importance of reliable and fast charging infrastructure to eliminate charging and range anxiety, stating that these concrete policies are essential for the industry to meet the 2025 targets.

Two

Chair – Market Stagnation

Piovaccari shifts the debate by expressing concern about the current stagnation in EV demand, particularly in markets like Italy, where the share of the market for pure EVs is still below 5%. While some countries like Norway and the Netherlands have made great strides, he points out that even in these regions, the growth has plateaued. He attributes part of the slowdown to the uncertainty in the market, which has led certain governments, including Italy, to propose a review of the regulations ahead of the 2025 target. This uncertainty, he notes, has created a difficult environment for automakers to plan effectively and could potentially delay the transition to electric mobility if not addressed. He asks how automakers are practically reacting to this situation, balancing the pressure to meet 2025 emission rules with the challenge of sluggish EV demand.

Becker (BMW) – Charging Infrastructures and Reducing EV Costs

Becker responds by highlighting two key factors that are driving market differences: the availability of charging infrastructure and consumer perceptions of the total cost of ownership. He explains that in countries like the Netherlands, the charging infrastructure is no longer an issue; consumers there are confident in their ability to charge their vehicles wherever they live. However, in other markets, the lack of infrastructure is a major barrier to EV adoption. Furthermore, Becker discusses how it is the perceived cost advantages of EVs, especially during the purchase phase. Consumers often overestimate the upfront cost savings and underestimate the total cost of ownership over time. Becker stresses that consistent and stable government policies - such as lower taxes and cheaper electricity - are crucial to making the transition to EVs more appealing. Inconsistent policies or a lack of infrastructure can undermine efforts to encourage EV adoption.

Hinrichsen (Stellantis) - Role of Government Incentives in Driving EV Demand

Hinrichsen agrees with Becker and uses the example of Germany, where a government purchase incentive scheme for EVs helped drive significant demand for BEVs. However, he highlights that once these incentives were reduced or eliminated, the demand for EVs dropped dramatically. This illustrates the critical role that government incentives and clear, consistent policies play in fostering consumer confidence and driving demand. Without such support, even the best regulations may not be enough to drive significant market change.

Chair - Government Actions Beyond Incentives

Piovaccari asks Hinrichsen whether there are other actions governments can take, beyond offering incentives and improving infrastructure, to make the transition to electric mobility more feasible. He recognizes that cities have different challenges, with some urban centres being more equipped for EV infrastructure than others.

Hinrichsen (Stellantis) – Three Key Actions for Accelerating EV Transition

Hinrichsen responds by laying out three key actions that he believes are essential for ensuring the success of the transition to electric vehicles. First, he advocates for country-specific purchase incentives, wondering if these could be bolstered by a potential EU fund. These incentives would help bridge the perceived price gap between BEVs and ICE vehicles, making EVs more accessible to a broader range of consumers. Second, he reiterates the need for accelerated development of charging infrastructure, particularly fast-charging stations. He argues that the pace of infrastructure expansion must align with the growth of the EV market to ensure that charging is never a barrier to adoption. Lastly, he stresses the importance of reducing the cost of electricity for EV owners, especially for public charging stations. The cost of charging on highways, for example, is often significantly higher than at home, which could deter potential buyers. Lowering the cost of electricity at public stations is therefore a critical component of making EVs a more attractive option for consumers.

Three

Chair - Consumer Barriers to EV Adoption

Piovaccari challenges the panel by raising a critical point about the gap between what customers want and the real challenges they face when it comes to adopting electric vehicles. He highlights that although there are many studies showing that consumers are willing to buy electric cars, the barriers like high product costs, energy costs, and the stress of recharging (which he refers to as "charging stress") are significant deterrents. He asks panellists what, in their opinion, are the main obstacles preventing customers from shifting to electric cars.

Prof. Baglieri (SDA Bocconi) – Opportunities in the EV Market Transition

Baglieri responds by explaining that consumers are inherently opportunistic, and while there are no significant objections to electric vehicles, the value proposition needs to be clearer. He breaks down the issue into two key factors: mobility needs in urban environments versus long-distance travel, and

the logistics of goods versus people. Baglieri suggests that the electric vehicle market must distinguish between city cars (which are more suited to short-range, urban use) and long-haul vehicles (which may need more robust technological solutions). He further explains that the logistics of goods has seen more substantial electrification progress, particularly in freight transport, where electrification could be implemented faster than in consumer vehicles. He highlights that consumer vehicles are often seen as “unsustainable” products because they remain parked 95% of the time, with limited use. In contrast, Baglieri envisions EVs as part of a larger, interconnected system, where electric cars could potentially serve as energy storage units that are connected to the grid, offering new business models that could generate value not only for car owners but also for automakers and utility companies. He concludes that innovation should not only be focused on the product itself but also on these new, service-centred, business models.

Becker (BMW) – Consistent Incentive Systems and Advanced Energy Infrastructure

Becker elaborates on Baglieri’s point by providing a practical example from the Netherlands, where customers receive push notifications from electricity utilities offering free charging during periods of excess wind energy. This incentive encourages consumers to charge their EVs during these times, thus making EV ownership more attractive. Becker argues that this kind of incentive system is crucial for encouraging adoption and explains that this is possible in countries like the Netherlands because of their advanced energy systems. However, he points out that this kind of incentive structure is not available in every market, such as in Germany or Italy. Becker emphasizes that utilities must provide such incentives more consistently to make EVs a more compelling choice. A good proposition that highlights the benefits of EVs - such as lower costs, environmental benefits, and convenience - will be much more effective in winning over consumers.

Chair – The role of Utilities

Piovaccari turns the discussion toward whether utilities in other European countries, such as Italy or Spain, are doing enough to support EV adoption. He contrasts the Dutch model with the situation in other countries and asks Becker if he believes utilities in these countries should be doing more to incentivize EV adoption.

Becker (BMW) - Value Proposition to Boost EV Adoption, Emphasizing the Role of Energy System Structure and Consumer Incentives

Becker responds by noting that the structure of the energy system is key to understanding why countries like the Netherlands can offer such incentives while others cannot. He explains that in Germany, there is a separation between the producers of renewable energy (like wind), transmission networks, and the final electricity providers (often municipal utilities). This system, according to Becker, lacks the incentives needed to make electric vehicles an attractive choice for consumers in the same way that the Netherlands has been successful in promoting EV adoption.

He advocates for a more positive approach to encouraging EV adoption, focusing on creating a compelling value proposition. Instead of relying solely on regulations that push people away from conventional vehicles, Becker emphasizes the need to convince consumers that electric vehicles are a better choice - cheaper, greener, and smarter. The key, he argues, is to make the adoption of

electric cars an easy and attractive decision, rather than forcing people to choose between an option they perceive as beneficial but potentially inconvenient or costly.

Four

Chair - Dual Technology Investment

Piovaccari shifts the focus to the practical issues that automakers face in terms of balancing investment between electric and internal combustion engine technologies. He asks how car manufacturers can afford to run both technologies simultaneously, especially given the increasing competition from China and Tesla, which are pushing hard on the electrification front. He challenges the panel to explain how automakers are managing the cost and resource allocation involved in developing both electric and traditional vehicles.

Becker (BMW) - The Costs of Dual Production Lines

Becker responds by acknowledging that having multiple drivetrains - petrol, diesel, hybrid, and electric - on the same production line comes at a significant cost. He explains that the flexibility to produce multiple types of vehicles is expensive, and it would be much cheaper to focus on a single drivetrain if there were certainty about the future direction of the market. This uncertainty drives BMW to continue investing in flexibility, preparing for a range of possible scenarios, including trade conflicts that could affect the supply of raw materials or shifts in government policies. Becker emphasizes that the unpredictability of markets, technological developments, and regulatory landscapes forces companies like BMW to keep spending money to remain adaptable, rather than committing to a single technological path.

Hinrichsen - View on Stellantis' Strategy

Hinrichsen, agreeing with Becker, shares that Stellantis is also facing similar challenges, but his company has committed to full electrification as part of their "Dare Forward" strategy. He emphasizes that Stellantis is focused solely on electrification and is not pursuing alternative technologies like internal combustion engines or hybrids. He believes this is the right strategy, despite the competitive pressures from Chinese automakers, who are ahead in battery production. He points out that Europe's current battery production capacity is far behind that of China, and the region will need to catch up to remain competitive. He concludes that Europe must overcome these challenges to stay competitive in the global automotive market.

Five

Chair - Proposal for European Cooperation on EV Platforms

Piovaccari introduces a suggestion from Renault about European carmakers coming together to share platforms and technologies in specific segments of the market. This cooperation could help European automakers increase scale and competitiveness, especially when facing competition from China. He notes that Stellantis and BMW are not particularly enthusiastic about this idea but believes it is worth discussing. Piovaccari points out that platform costs are crucial for automakers,

even for premium brands like BMW, which usually focuses on high-end offerings but still needs to remain competitive on cost.

Becker's (BMW) - View on Collaboration Across Car Makers

Becker responds by acknowledging that collaboration between automakers already exists in the industry. For example, BMW has a longstanding partnership with Toyota on fuel cell technology and joint platforms to reduce costs. However, Becker questions whether a single, unified European platform for electric vehicles would be the best solution. He emphasizes that automakers' strategies vary, and while cooperation can help lower costs, a universal solution may not work for every market or company.

Hinrichsen on Stellantis' Approach to Collaboration

Hinrichsen adds that Stellantis, following a recent merger, already cooperates internally across its 14 brands, which include Fiat, Peugeot, Maserati, and others. He mentions that collaboration is not unusual in the industry but notes that Stellantis is currently focused on its own strategies and has not made decisions about joining a single platform initiative. He underscores that cooperation, when it aligns with the company's goals, is common, but he is unsure about the specific proposal being discussed.

Chair still on Industry Cooperation and Technological Assets:

Piovaccari then questions whether such cooperation among European automakers is strictly necessary or whether it should depend on the technological assets and convenience of the collaboration. He asks if it would be beneficial to have broader cooperation across different regions, beyond just European carmakers.

Becker (BMW) on Collaborations Like Ionity and Charging Infrastructure

Becker provides examples of existing collaborations, such as Ionity, a joint initiative where several automakers come together to operate fast charging stations across Europe. He notes that similar collaborations also exist in the U.S. and China. He believes that cooperation should be based on the specific issue at hand, such as charging infrastructure, and not necessarily require uniformity across all areas.

Prof. Baglieri's (SDA Bocconi) Perspective on Platform Cooperation and the Future of Mobility Services:

Baglieri shares his perspective on the future of the automotive industry, emphasizing the shift from product-centered thinking to a service-oriented model for mobility. While carmakers have historically collaborated on technological platforms, he argues that it's unlikely they would agree to develop a single, unified electric vehicle product under one umbrella brand, due to their competitive nature. Instead, Baglieri suggests that a more realistic form of collaboration in Europe could be seen in services, citing the example of Ionity, where German carmakers have successfully worked together to create a supercharger network.

Baglieri highlights that the future of mobility is not just about electric cars, but about meeting various mobility needs through a range of solutions. These needs may vary depending on the context - whether it's urban driving, long-distance travel, or different terrains. He proposes a platform for

services that allows carmakers to cooperate in providing tailored mobility solutions, rather than focusing solely on producing a single product. For him, the car industry needs to embrace a shift from selling products to offering mobility as a service.

Becker (BMW) on the Emotional Aspect of Car Purchases

Becker responds to Baglieri's comments by pointing out that purchasing or not a car is not always a rational decision and that emotions play a big role.

Hinrichsen on Innovative New Business Models

Hinrichsen argues that the focus on potential fines and deadlines, like the 2025 targets, is detracting from the more exciting and innovative aspects of the automotive transformation. He acknowledges the pressure surrounding compliance but emphasizes that the industry should be looking ahead to new business models and technological solutions, like *Free2Move*, which aligns with the shift towards seeing cars as commodities. He suggests that the future should be about embracing innovation, flexibility, and new ways of thinking about mobility rather than being consumed by fears of competition and regulatory hurdles.

Prof. Baglieri (SDA Bocconi) on the Urgency of Change

Baglieri agrees with Hinrichsen but stresses the urgency of speeding up the transition. He points out that if traditional automakers don't innovate quickly enough, companies like Apple or Google could enter the market, capturing the attention of younger generations. He highlights how Tesla has managed to become a more attractive brand for younger consumers, largely due to its appeal as a "gadget" more than just a car. Baglieri stresses that this shift in consumer behavior is critical for carmakers to understand.

Hinrichsen on the Appeal of Tesla to Younger Generations:

Hinrichsen humorously adds that his young son likes Tesla for its ability to make fart noises (illustrating how Tesla's appeal to younger generations is partly due to its modern, tech-centric image, which resonates with younger consumers more than traditional car brands, NdR).

Becker final remark on Diversity of Consumer Preferences:

Becker takes a word by highlighting the diversity of car buyers. He uses the example of the electric Mini, which succeeded despite having a smaller range, showing that the type of car and its features need to align with the customer's specific needs. Not all consumers are looking for the same thing - some prioritize range, while others may prioritize different factors like size, design, or brand.

Six

Chair - Challenges in the Automotive Industry from 2025 to 2035

Piovaccari asks Becker and Hinrichsen about the main challenges they foresee in the automotive industry over the next five to six years, particularly focusing on the period between 2025 and 2035. He asks them to identify key issues regarding supply chains, regulation, and government support as the industry prepares for the 2035 deadline, which involves full compliance with emissions regulations.

Hinrichsen (Stellantis) - Balancing Affordability, Competitiveness, and Innovation

Hinrichsen highlights that for the industry, two key priorities are reducing the cost of production to make vehicles more affordable and closing the competitiveness gap with Chinese manufacturers. He acknowledges the challenges of the supply chain and stresses the urgency of addressing these issues. Additionally, he suggests that there's a need to reserve capacity for creative thinking about how the transformation of the automotive industry can offer new opportunities, beyond just meeting regulatory demands.

Becker (BMW) - A Balanced Path to Automotive Emissions Reduction

Becker emphasizes the need for a comprehensive, fact-based approach to achieving the Paris climate targets. He advocates for expanding the tools available to address emissions, considering not only the average efficiency of new vehicles but also the entire European fleet, including older vehicles. He argues for a framework that makes electric driving more attractive and accelerates voluntary consumer adoption, but also stresses the importance of including factors like geopolitics, raw material availability, and the carbon footprint of energy. Becker highlights the role of e-fuels in reducing emissions from internal combustion engines and calls for a careful, non-ideological discussion to address these issues. The ultimate goal, he stresses, should be reducing the overall carbon emissions, rather than simply focusing on specific technologies.

Asked by Piovaccari whether hybrids are merely a transitional technology or if they have the potential to play a significant, long-term role in the automotive landscape Becker says that he sees hybrid vehicles as a more permanent part of the automotive landscape, not just a temporary solution. Drawing from the example of the Chinese market, where both battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) are widely adopted, Becker suggests that hybrids can be an effective solution for many consumers. Hybrids offer the flexibility of an electric vehicle for daily commutes—avoiding the use of a combustion engine—while retaining the long-range and refueling convenience of traditional vehicles for longer trips. In this context, Becker emphasizes that hybrids are a practical solution that can contribute to reducing carbon emissions. He mentions the Californian framework, which also acknowledges the role of hybrids suggesting that hybrids aren't just a stepping stone toward full electrification.

Hinrichsen (Stellantis) - Transition to Full Electrification

Hinrichsen acknowledges that while Stellantis' ultimate commitment is to full electrification, hybrids will remain an important part of the company's strategy in the intermediate period. He also notes that hybrids will play a role in the transition toward full electrification, as they offer a practical solution for consumers during this transitional phase.

Prof. Baglieri (SDA Bocconi) - Beyond Electrification: Rethinking the Future of Sustainable Mobility

Asked by Piovaccari to wrap up, Baglieri emphasizes that the transition to more sustainable mobility is a complex issue that requires a broad approach, including technological, business, and pricing innovations. He stresses that while the goal of addressing climate change through electrification is important, it cannot be achieved by focusing solely on technology. The impact of electrification

should be viewed within a broader context, which includes market needs and customer expectations. He argues that carmakers must evolve beyond traditional manufacturing approaches, which may no longer be the most effective strategy in the modern, increasingly sustainability-driven business environment. He suggests that the future of mobility may involve not only electric cars but also new business models, pricing strategies - such as charging users based on CO2 per mile rather than traditional fuel metrics - and even rethinking how carmakers engage with customers.

END OF PANEL DISCUSSION

Q&A

In this final part of the conference, the Chair is taken back by Prof. Di Castelnuovo (SDA Bocconi) that introduces some **questions** received from the public following the conference by remote about the environmental impact of electric vehicles and specifically about: **i)** The source of electricity used to recharge EVs and **ii)** The life cycle analysis of electric vehicles.

Becker (BMW) explains that BMW's strategy for reducing carbon emissions takes into account not only the entire lifecycle of their vehicles but the overall corporate carbon footprint, including emissions from raw material extraction all the way to the electricity used to power the vehicle. Their goal is to reduce their total emissions by 40% by 2030, compared to 2019 levels.

Hinrichsen (Stellantis) shares that their team has weekly calls with their Carbon Net Zero team, aiming for ambitious carbon reduction targets. They have set a goal to achieve carbon neutrality by 2038, instead of 2040, but the challenges they face remain the same. He emphasizes that the key goal is to ensure the availability of decarbonized energy that is also affordable, highlighting the importance of balancing sustainability with cost-effectiveness.

Prof. Di Castelnuovo (Bocconi) expresses appreciation for the confirmation of the commitment on these issues and introduces a new question from the audience, that focuses on consumer behaviour, specifically asking what companies and governments can do to support the change in purchasing behaviour.

Hinrichsen (Stellantis) emphasizes that one of the most effective ways to encourage people to adopt electric vehicles is to experience driving one firsthand. He suggests that the sensation of driving an electric car is far superior to that of a traditional internal combustion engine vehicle, particularly in terms of acceleration and propulsion, which he describes as extraordinary. He recounts his personal experience driving an electric BMW i3, even before he worked at Stellantis, and recalls how the experience left a lasting impression.

Becker (BMW) highlights that while the likelihood of consumers choosing an electric vehicle increases after they've tried one, the real challenge lies in the consideration phase - before people even consider trying the car. He points out that confidence in electric vehicles is a key factor, and this is where various stakeholders, including carmakers, governments, electricity utilities, and others, need to collaborate. The aim is to demonstrate that EVs are a viable and worthwhile option.

Beker also underscores the importance of corporate customers, especially European fleet operators, in driving EV adoption. He notes that in countries with strong EV adoption, such as the UK and Belgium, favourable tax treatment for corporate cars plays a significant role and contribute to the growth of the electric vehicle market through second hand choices.

Prof. Baglieri (SDA Bocconi) agrees with the importance of driving electric cars, but he suggests that the focus should also shift to buying fewer cars in general. He advocates for thinking beyond just owning a car and considering whether the goal is car ownership or mobility itself. He emphasizes that the goal should be to create future leaders who can balance value for stakeholders—including shareholders—while also addressing sustainability concerns. Baglieri also proposes that the model of consumption should evolve, with customers and markets rethinking the concept of mobility. Instead of just selling cars, he envisions a broader shift in how mobility is delivered.

Prof. Di Castelnuovo (SDA Bocconi) agrees with the idea that carmakers and energy companies can align their goals. He also points out that utilities are trying to decouple their revenue from just selling electricity. Instead, they are focusing on becoming Energy Service Companies, offering services beyond just providing energy, such as maintenance and future mobility solutions. He suggests that carmakers could follow a similar path by not only selling vehicles but also expanding into mobility services. By doing so, they could generate revenue from various services connected to the car, like maintenance, charging, and potentially even shared mobility services.

Prof. Di Castelnuovo (SDA Bocconi) gives the floor to another question from the public in presence that is about clarification on BMW's strategy in competing with China in the electric vehicle (EV) market. The question highlights Stellantis' clear commitment to 100% electric vehicles and how they plan to tackle challenges like infrastructure and consumer perception. In contrast, BMW seems to be diversifying its approach by investing in both electric vehicles and more efficient internal combustion engines (ICE). The questioner is curious whether BMW expects to compete with China on electric vehicles directly, or if the company anticipates competing on the broader landscape of mobility solutions, such as by improving ICE technology or focusing on other aspects of automotive innovation. The concern is whether BMW's diversified approach can successfully compete with China's aggressive push into the European EV market.

Becker's (BMW) response highlights BMW's strategy of pursuing both electrification and continued development of internal combustion engine (ICE) vehicles in parallel. He emphasizes that BMW is rapidly growing in the battery electric vehicle (BEV) sector, becoming the third-largest producer of BEVs globally in the first half of the year, despite having a relatively small share of the global car market. This shows that the company is aggressively pushing for electrification and expanding its EV portfolio. However, Becker stresses that BMW does not see electrification as the only solution. The company believes that it is possible to pursue multiple strategies at once, without completely excluding the option of ICE vehicles. He uses China as an example, where there is no ICE ban, and where BMW sells both electric and combustion engine vehicles. Additionally, Becker points out that the Chinese market is still growing with both BEVs and plug-in hybrids, and that the car industry is expanding globally with combustion engine vehicles in markets like Africa and Asia.

Finally Becker highlights that cars have a long lifespan, with an average fleet age in Europe growing steadily and that instead of pushing for a complete shift to electric vehicles right away efforts should also be made to accelerate the replacement of older cars with more efficient, newer combustion engine vehicles, especially where infrastructure for EVs may be lacking.

The last **question** from the public in the auditorium concerns if self-driving vehicles could play a key role in driving the adoption of electric vehicles by shifting the model from ownership to usage. The questioner suggests that if cars are self-driving, people may no longer feel the need to own a car but instead use a vehicle as a service. They ask whether regulations around self-driving cars, potentially pushed by the European Union, could help accelerate the shift to electric vehicles.

Hinrichsen (Stellantis) acknowledges the potential of autonomous driving but also expresses caution about its short-term impact. He acknowledges that while autonomous driving is an exciting development for the future and may play a role in the broader shift towards electric vehicles, he is uncertain about its ability to significantly influence demand or accelerate the transition in the immediate future.

Becker (BMW) highlights that while there are increasing levels of driver assistance systems available in cars, particularly for tasks like highway driving, we're still far from a point where cars can fully navigate complex city environments like Florence autonomously. He suggests that while these systems work well in controlled environments (like highways), the technology is not yet advanced enough to trust completely for city driving, reflecting the current limitations in autonomous driving technology.

Piovaccari (Reuters) intervenes by sharing his perspective as an observer, noting that while autonomous driving is an exciting area, it doesn't seem to be the top priority for automakers in Europe right now. He suggests that both the development and regulatory focus are not particularly centred on autonomous driving at the moment, emphasizing that there are other more pressing issues on the industry's plate.

Becker (BMW) take the floor to mention the earlier discussions from 2015 regarding the future of autonomous cars and ride-hailing services like Uber, which were predicted to replace private car ownership. He notes that, despite these predictions, Uber has become integrated into the transportation network but has not replaced the private car. He emphasizes that the core business of automakers is still focused on private vehicles although acknowledges that car-sharing is valuable in urban areas where people own underused cars that incur parking costs, providing a flexible alternative. However, he stresses that car-sharing is just one part of the overall transportation ecosystem, not a complete shift toward digital or shared mobility

Prof. Baglieri (SDA Bocconi) suggests that while any car could theoretically become autonomous, the key questions are when and for what specific needs. He thinks it might make sense for people to use self-driving taxis, but questions whether people would want to buy cars they don't drive. He notes that much of the appeal of owning a car lies in the sense of control and personal expression it provides. He admits that this view might be due to his generation's attachment to car ownership as

a symbol of status and identity. However, he acknowledges that younger generations may think differently, seeing cars more as services rather than personal assets. He foresees a future with self-driving, electric, shared cars integrated into a broader service-based mobility system in general.

Prof. Di Castelnuovo (SDA Bocconi) wraps up the Q&A and the panel discussion, expressing, humorously, surprise that artificial intelligence wasn't a major topic of discussion. He thanks the speakers.

FINAL REMARKS

Prof. Francesco Perrini *Professor of Management at Bocconi and SDA Bocconi Associate Dean Sustainability*

Professor Perrini, delivers closing remarks starting by humorously sharing that he drives a fully electric car and, importantly, that his wife prefers it too. He expresses pride in closing the first annual conference for the Master's in Sustainability Management, set to launch in March. Perrini highlights that sustainability represents four major perspectives for Bocconi University: institutional focus, research, teaching, and experiential learning, underscoring the institution's commitment to values-driven growth.

He concludes by underscoring the global challenges of sustainability, energy transition, and technology neutrality, calling for an integrated approach to sustainability in businesses. He affirmed Bocconi University's ongoing commitment to fostering debate on these issues and training professionals to tackle urgent environmental and social challenges. He sees the new Master in Sustainability Management as a pivotal step toward shaping responsible leaders equipped to navigate the ESG landscape and achieve sustainable capitalism.

ANNEX I

CONFERENCE DISCUSSION PAPER PRESENTATION



**Technology-neutral versus
technology-specific policies for the
transition to zero-emission mobility:
the case for CO2 emission standards**

Dr. Carl-Friedrich Elmer,
Agora Verkehrswende,
Senior Associate Transport Economics

*Annual Conference
Master in Sustainability Management
SDA Bocconi, Milan
16 October 2024*

Focus of this introductory talk



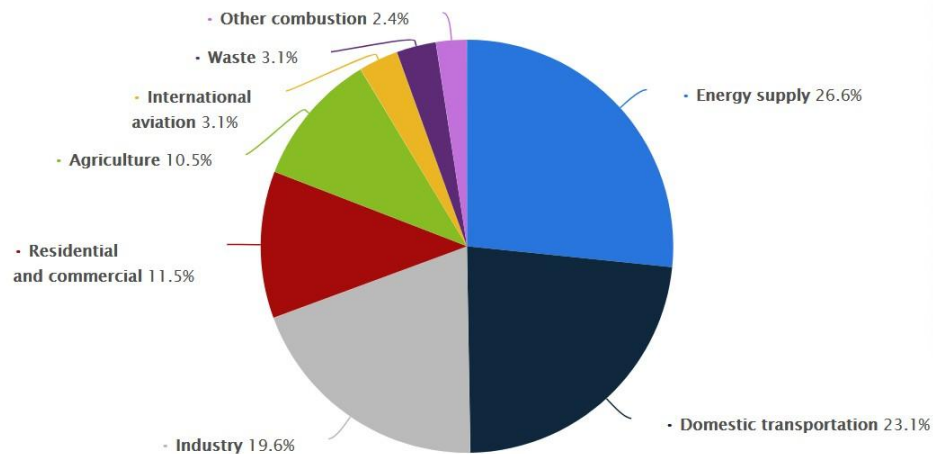
- Aim of this talk: Provide some **background and theses** for the subsequent panel discussion
- Little dispute that the automotive industry must **transition to zero-emission mobility** – for climate and also for industrial policy reasons
- However, the question of **the right set of policy instruments** is far more contested —within the industry, in politics, and in academia
- Fundamental question in this context: Restraining to broad **framework conditions or actively steering the technological transformation** .
- In short: To what extent should regulation be **technology-neutral or technology-specific?**
- Particular focus: What role for **CO2 emission standards?**
- Implications for the upcoming **review** of the CO2 standards

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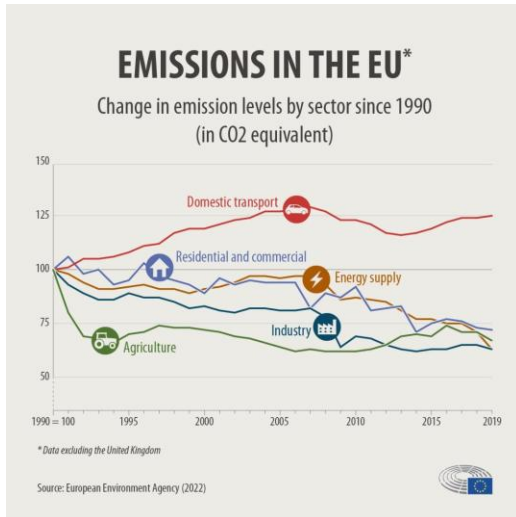
Transport is the second largest GHG emitter in the EU-27



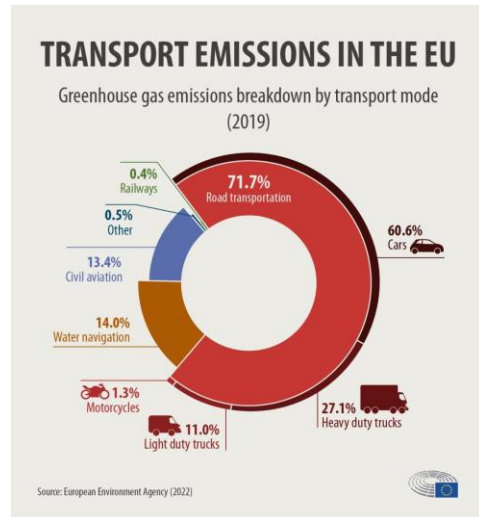
Source: Statista

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Transport emissions on the rise

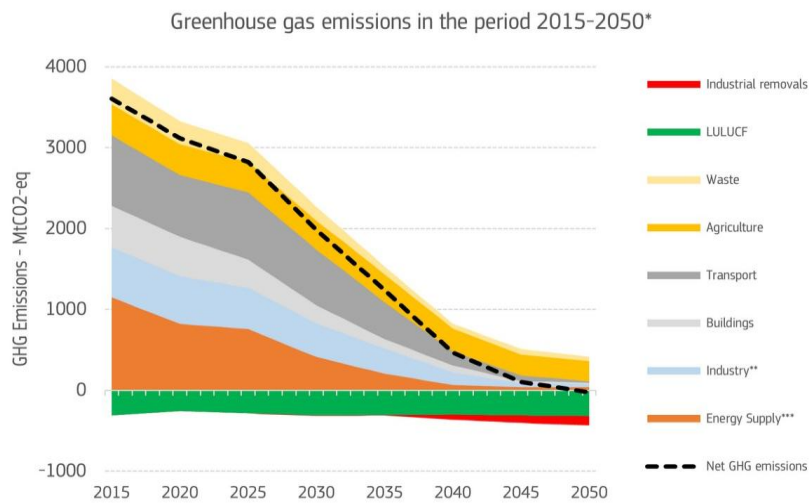


Source: European Environment Agency



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EU climate targets: steep reduction in all sectors needed



Source: EU Commission

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Economic importance of the automotive industry

The automotive industry has been an economic success story for Europe.



Prosperity and growth

> €1 trillion

Contribution to EU GDP in 2022

~7%

of EU GDP



Employment

13.8 million

jobs in auto industry

6.1%

of total EU employment



Innovation

~€60 billion

annual spending on R&D

~30%

of total EU R&D spending

Source: McKinsey and Company

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20 per cent of jobs in direct manufacturing

EMPLOYMENT

The EU auto sector employs more than 13 million across the value chain

1. Provisional
2. Including railways

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EU AUTOMOTIVE SECTOR: DIRECT AND INDIRECT EMPLOYMENT

In thousands, 2022¹



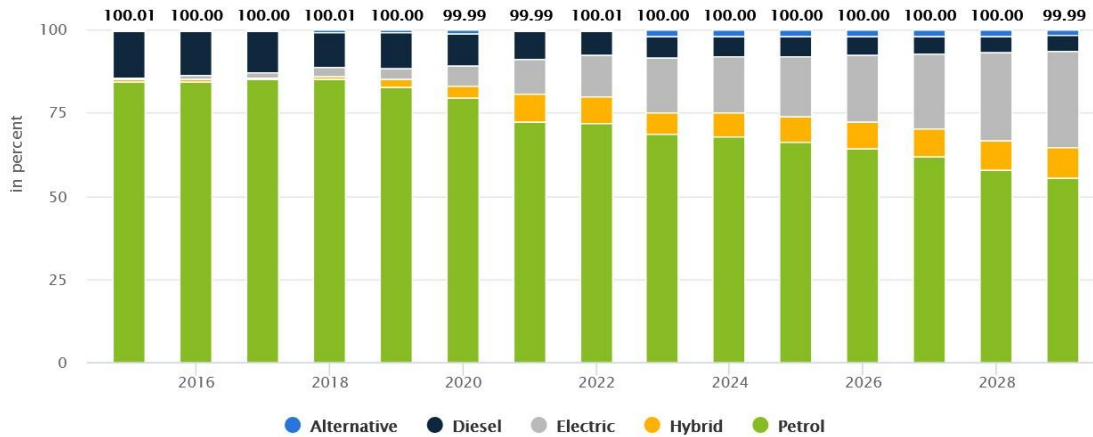
SOURCE: EUROSTAT

Source: ACEA

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Market share of ICE vehicles is expected to continuously shrink

Global market shares by drivetrain type

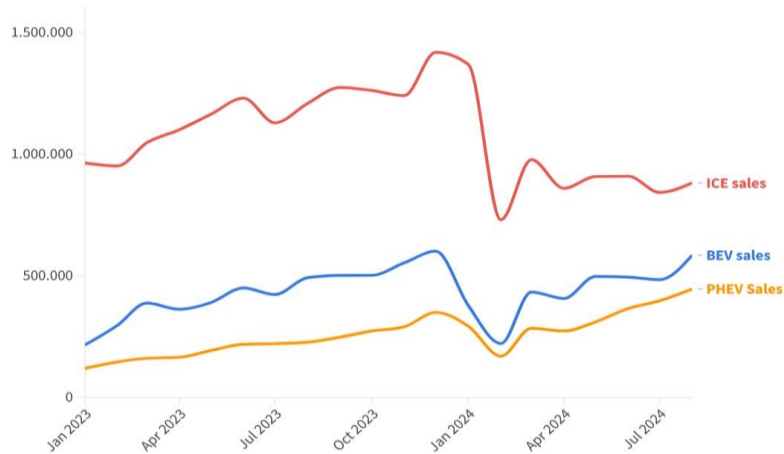


Source: Statista MarketInsights

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Chinese market for EVs soars

Monthly car sales in China by fuel type (January 2023 – August 2024)



Source: The EV Sales Monitor

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Clarifying key terms: Technology neutrality

- Set broad policy goals (e.g., reducing GHG emissions) **without favoring any specific technology**
- Allow private actors to freely choose their preferred technology, **leveraging decentralized knowledge in the market**
- Innovation should be driven by competition and market forces, **free from government intervention** toward particular technologies
- Key assumption: **Market participants are best equipped to make decisions** about which technologies will achieve policy objectives most cost -effectively
- Requirements: competitive and **non-distorted markets as well as informed and fully rational private decision-makers**

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Clarifying key terms: Technology specificity

- Involves regulations that **promote certain technologies** through specific – direct or indirect – support or mandates
- Intended to **steer investments** and development towards technologies deemed crucial (and cost-effective) for achieving policy goals
- This approach comes to fruition when a technology -neutral approach is **not viable for practical or political reasons** or if policymakers believe that **focusing on specific technologies is more (cost-)effective**

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Clarifying key terms: Technology openness

- Technology-openness refers to the characteristics of the **market environment**, while technology-neutrality refers to a **particular regulation**
→ Technology neutrality ≠ Technology openness
- Technology openness ensures that various technologies compete on a **level playing** field to address a given problem, such as reducing GHG emissions.
- It requires that **all relevant costs and benefits are considered**, and that no technology is constrained by (pre-existing) distortions and market imperfections.
- If there are distortions beyond the primary regulatory goal (i.e., GHG emission reductions) or further policy goals, additional **technology-specific interventions can be warranted**

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The case of CO2 abatement in the transport sector



- **Carbon pricing** is the prototypical example for a technology-neutral policy
- It offers high flexibility in reducing emissions, **theoretically allowing firms and consumers to choose the most cost-effective solutions**
- **ETS 2** will start in 2027
- What market imperfections hinder its cost-effectiveness – warranting technology-specific interventions?

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Knowledge spillovers



- Knowledge spills over to competitors and to other branches, creating a **positive externality**
- Societal R&D returns exceed private returns
→ Effect is particularly large for **green technologies**
- Also applies to production process improvements: **learning-by-doing**
- Knowledge spillovers also on the demand side: **learning-by-using**
- Innovators cannot capture the full value of their investment, leading to **underinvestment in critical green technologies**.

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Network externalities and coordination problems



- Early adopters contribute – without compensation – to the establishment of a **network of complementary services** (e.g., charging stations for EVs)
- “**Chicken-egg-problem**” due to required coordination and commitment between suppliers of complementary goods (EVs and charging infrastructure)
- **Mutual uncertainty** slows down electrification

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- Cognitive biases can lead to **internalities**
- Unlike externalities, which affect others, internalities refer to (adverse) **internal decision consequences**
- Yet, similar to externalities, internalities impose **additional, not sufficiently considered cost** – to the decision-maker herself/himself
- Behavioral anomalies often lead to **consumer myopia**:
 - Disproportionate focus on retail price and highly salient vehicle features (e.g., performance, comfort)...
 - ...and **undervaluation of future energy costs**

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Behavioral anomalies that may lead to fuel efficiency undervaluation

- **Loss aversion & endowment effects** : Having a conventional ICE vehicle as reference point, consumers are (unreasonably) unwilling to bear higher upfront costs and to forego known vehicle attributes (e.g, higher range of ICEVs)
- **Hyperbolic discounting & dynamic inconsistencies** : Time-inconsistent preference for short -term rewards, leading to suboptimal intertemporal decision -making
- **Salience & focusing effects** : Disproportionate decision weight given to vehicle attributes that are well-salient when making the decision
- **Mental accounting & narrow bracketing** : Limited perceived fungibility between “car purchase money” and “fuel money” hampers TCO optimization
- Additionally, **bounded rationality** and **rational inattention** can also result in underinvestment in fuel-efficient technologies
 - Rational behavior under constrained information gathering and processing capacities: use of heuristics and neglect of information

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Further barriers to EV adoption (selection)

- **Information asymmetries & adverse selection** : Intransparency in the used vehicle market about the energy consumption of fuel -efficient and electric vehicles leads to lower prices in both the new and used vehicle market
- **Distortions from company car taxation** : Tax burden (benefit -in-kind) based on the purchase price hinders investments in initially more expensive efficiency technologies
- **Risk-averse firm behavior & managerial incentives** : Principal-agent problems between shareholders and management can lead to focus on short -term profits at the expense of clean technology investments yielding long -term benefits
- **Negative externalities that are insufficiently internalized** , such as pollutant emissions

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Policy mix and the role of CO2 standards

- Given a number of market imperfections beyond the climate externality, a **policy mix is more (cost-)effective** than predominantly relying on carbon pricing or another single instrument
 - To leverage their specific strengths, instruments must be **well-tailored to the identified barriers** , and well-balanced with each other
 - Targeted instruments include amongst others:
 - R&D support
 - initial support for infrastructure investments
 - improved information policies
 - (state-supported) leasing schemes
- The European **CO2 standards** form a **core element of this policy mix**,
- driving technological innovation
 - offering direction, providing planning certainty, and reducing investment risks for manufacturers and infrastructure providers
 - ensuring supply of more fuel -efficient vehicles
- Thereby, they can address – to a certain extent – coordination problems, spillovers, and behavioral barriers – although **not being a silver bullet** .

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Beginning debate about the future and upcoming review of the EU CO2 emission standards

Automotive News Europe
A CRAIN FAMILY BRAND

HOME FEATURES OPINION PHOTOS THE NUMBERS CUTAWAYS RESOURCE CENTER EV

EU car lobby aims for 2-year delay of 2025 emissions targets

EU rules requiring automakers to achieve overall CO2 fleet grams per kilometer by next year would force them to either production of about 2 million cars or be exposed to fines, *Automotive News Europe*

Brussels resists industry push to delay 2025 CO2 reduction targets
By Anne Turner | 18 September 2024

European lawmakers push for alternative fuels past 2035 - report
Provisions for the use of alternative fuels beyond 2035 could be expanded, under a draft plan from Europe's biggest lawmaker group.

EU's largest political group challenges 2035 combustion engine ban

Stellantis opposes any delay in EU's 2025 CO2 emissions target
Stellantis is against a proposal by industry group ACEA for the EU to use emergency regulation to delay its latest emissions target.

CLEPA
European Association of Automotive Suppliers
News About our industry Policy Priorities Activities Position

Mediaroom

Published on 26.09.2024
CO2 regulation review needs to secure tech-neutrality over the long term | September 2024 Editorial

The debate on the CO2 regulations for cars, vans and trucks is back on the agenda earlier than foreseen with prominent calls for a review already next year. It brings a for Europe's automotive sector: how to reach climate-competitiveness. The relevance of this debate has

September 15, 2024 03:36 PM

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Including fuels in the regulation's scope

- Tailpipe CO2 standards push manufacturers to innovate, particularly by advancing EVs, which generate significant **technological spillovers**, unlike ICE vehicles, even when fueled by renewable fuels.
 - The **problem of consumer myopia may worsen**, as (a) allowing renewable fuels for compliance does not improve vehicle efficiency, and (b) as these fuels are more expensive than fossil fuels
 - Manufacturer strategies that rely on renewable fuels for compliance **increases the risk of CO2 standards being weakened** if it turns out later that the necessary amount of renewable fuels is not available at scale
 - Sustainable biofuels and synthetic efuels will remain **scarce** in the foreseeable future, thus being better directed to **hard-to-electrify sectors like aviation and shipping**, making their use in cars an inefficient allocation of resources
- Integrating vehicle technology regulation with fuel regulation risks undermining innovation, consumer benefits, and effective decarbonization – thus, it is advisable to maintain **separation of regulations**

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Extend regulatory scope to life cycle emissions

- Including life cycle emissions in CO2 standards would require **vast amounts of dynamic data** from global supply chains, covering resource extraction, manufacturing, recycling, and disposal processes.
 - **Using default values** for life cycle emission data instead **does not properly incentivize CO2-reducing innovations** and may lead to legal disputes.
 - Manufacturing and disposal emissions are **fixed**, while operational emissions **vary with use**. Combining them in a single metric risks creating economically and environmentally adverse outcomes, especially in consumer decision-making.
 - With CO2 pricing in place, **consumers already fully factor in CO2-related manufacturing costs** through vehicle prices, but tend to still undervalue future operational energy and CO2 costs. CO2 standards address this by focusing on efficiency during the use phase.
- Life cycle emissions, particularly from battery production, should be improved through other policies, rather than being included in the CO2 standards.

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Flexibility through banking and borrowing

- **Upon careful design**, banking and borrowing mechanisms can offer manufacturers more **compliance flexibility** without undermining environmental goals.
 - **Banking mechanism**: Manufacturers can accumulate credits by exceeding their emission targets in a given year, allowing them to "bank" these credits for future use
 - **Borrowing mechanism**: Borrowing allows manufacturers to meet current obligations by using future credits, with the obligation to make up for the shortfall in later years
 - Banking and borrowing mechanisms must not undermine environmental integrity:
A **gradual—rather than stepwise—tightening of (baseline) CO2 targets**, avoids manufacturers accumulate excess “windfall” credits in interim years between target years.
 - To maintain credibility, firms borrowing credits should provide potential penalties as security or face borrowing limitations, ensuring future compliance and **preventing over-reliance on future reductions**.
- A **well-regulated** banking and borrowing system may provide additional flexibility, encourage early investments in cleaner technologies while maintaining steady emissions reductions.

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Regulating energy efficiency

- As fleet electrification accelerates, **CO2 standards effectively regulate fewer and fewer cars** since EVs emit no tailpipe CO2, regardless of their energy consumption.
- **Risk of inefficient EVs**: Without energy efficiency regulation, the market could trend toward larger, heavier, and more energy-consuming EVs, contradicting the goals of the EU Green Deal and sustainable development.
- Just as with combustion vehicles, consumers tend to undervalue energy efficiency of EVs **leaving significant potential savings untapped** if energy consumption remains unregulated.
- **Health and safety risks**: Besides causing more environmental harm through electricity consumption and material extraction, larger EVs contribute to increased microplastic pollution from tire wear, greater urban space use, and heightened traffic safety risks.

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Regulating energy efficiency

→ Transitional energy efficiency regulation: A new, **additional efficiency regulation for EVs**, based on energy consumption per kilometer, would act as a safeguard against unchecked growth in size and performance of EVs, securing their environmental benefits.

→ Long-term regulatory shift: Eventually, the regulation could **fully transition to energy consumption**

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Political economy considerations: Credibility and time-inconsistency

- **Credibility is key**: Regulatory success hinges on a credible commitment. Time -inconsistent behavior of regulators—where regulations are relaxed over time —poses a major threat to effectiveness.
- **Self-fulfilling prophecies** and strategic non-compliance: Without regulatory credibility, firms may delay investments, possibly betting that regulations will be weakened in the future.
- **Delayed action raises costs**: Postponing early abatement action increases compliance costs, which in turn increases the pressure on regulators to relax standards.
- **CO2 standards vs. carbon pricing**: In the context of electrification and fuel efficiency, CO2 standards appear less vulnerable to time -inconsistency compared to carbon pricing.
- **Double time-inconsistency in carbon pricing**: Carbon pricing (alone) faces a two -fold issue: myopic consumer behavior leads to insufficient demand for EVs, and consequently rising CO2 prices in systems like ETS2 exacerbate pressure on regulators to weaken climate policies.
- **Higher innovation pressure with CO2 standards**: CO2 standards, by pushing immediate technology adoption, therefore tend to face less risks from time -inconsistency compared to carbon pricing alone.
- **Resilience through policy mix**: A diversified policy mix builds resilience: if one instrument is weakened due to political pressures or market changes, others can maintain environmental progress.

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Final remarks

- **Electrification** is essential for the decarbonization of road transport.
- Both environmental and industrial policy considerations demand **swift progress**.
- Due to various market imperfections, **technology-neutral policies**, such as carbon pricing, alone **are insufficient** to achieve the optimal speed of transition.
- A **policy mix** combining carbon pricing and more technology -specific instruments, addressing these market imperfections, is economically justified.
- EU vehicle **CO2 standards** form a well-established **core element of this policy mix**, driving innovation, offering direction, and providing planning certainty for manufacturers and infrastructure providers.
- **Consumer benefits** arise as the standards ensure a steady supply of more fuel -efficient vehicles.
- The upcoming **review** of the CO2 standards must be conducted very thoughtful and **preserve their environmental stringency**, avoiding any dilution of their effectiveness.
- Protecting the integrity of these standards is crucial for maintaining the **credibility**—and long-term (cost-)effectiveness—of European climate policy, **benefiting both the environment and the automotive industry's** future prospects.

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Thank you!

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