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Decarbonising Transport in the European Union

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Abstract
In its emerging role as a climate leader, the European Union is aiming to become the first carbon neutral continent by 2050 (European Commission, 2019). This involves ambitious measures to decarbonise by i.a. reducing emissions in the transport sector. However while other EU sectors have decreased emissions since 1990, transport has experienced an increase. It seems unlikely that reduction rates will be reachd with the currently proposed solutions. Further action and policy change will be required to achieve these aims.

Keywords: EU, Transport policy, emissions, decarbonisation

The European Union (EU) has emerged as a climate leader in recent years, swiftly adopting measures to decarbonise, with the aim of Europe becoming the first carbon neutral continent by 2050 (European Commission, 2019). However, efforts to reduce emissions in the transport sector face numerous contemporary and interlinked challenges. Whilst other EU sectors have decreased emissions since 1990, transport is the only one that has seen an increase (European Environment Agency, 2021). Currently proposed EU solutions are predicted to be unable to decarbonise transport at a rapid enough rate, necessitating quick action to create further solutions that will be able to reduce emissions at an appropriate rate.

Before discussing the challenges and solutions concerning the decarbonisation of transport within the EU, it is crucial to understand the importance of rapid decarbonisation, both within the transport sector and more generally. Without significant changes to current emissions the current effects of climate change will only continue to worsen. According to the European Commission (n.d.-a), climate change will bring more frequent extreme weather events to all of Europe, including flooding, higher temperatures, and droughts, as well as negative impacts on health, infrastructure and biodiversity. Even with the necessary changes to limit warming to 1.5 to 2^{O}C, as recommended under the Paris Agreement (United Nations, n.d.), many of these problems will worsen throughout Europe. In addition to these imperatives, the invasion of Ukraine by Russia is also incentivizing decarbonising action within the transport sector. Previously, the EU had been importing approximately 25% of its oil from Russia (Horton et al., 2022). Within the EU, 95% of fuel used by light vehicles is liquid fuel, with the majority of this being from oil (de Blas et al, 2020, p. 1). Therefore, alongside the environmental benefits, the decarbonisation of transport would also reduce reliance on Russian imports.

Despite the importance of reducing greenhouse gas emissions through decarbonisation, the decarbonisation of transport has continued to be a struggle for the EU. Whilst EU greenhouse gas emissions were down 24% in 2020 compared to 1990 levels (Petrequin, 2020), transport emissions had increased by 28% in the same timeframe (Danielis et al., 2022). Much of this comes down to the complex and numerous challenges surrounding transport decarbonisation. Population and real per capita GDP have been shown to have a direct link to greenhouse gas emissions in the EU from transport. (Andrés & Padilla, 2018). As EU populations have grown since 1990, alongside GDP growth, higher demand for goods and services to be delivered has resulted in increased freight transport. Alongside this, a higher GDP per capita has resulted in a larger population with the means and desire to travel more frequently (Brand, 2021).

Additionally, the contribution of transport to the EU economy should not be understated. With 5% of GDP coming from transport and over 10 million workers in the sector (European Commission, 2020) the large part that transportation plays within the EU has hampered progress in decarbonisation due to desires to maintain the status quo. Many EU transport directives intended to decarbonise transport and tighten emissions performance standards were weakened by lobbying from European car manufacturers, and organisations such as the European Automobile Manufacturers' Association, due to the large amount of power that is held by these lobbying groups (Haas and Sander, 2020). Due to the established nature of fossil fuels, highly optimized production processes and supply chains are already in place, giving the newer technologies necessary for decarbonisation, such as electric vehicles and biofuels, an immediate disadvantage in entering and growing within the same market (Rajendran et al., 2019). The status quo also affects decarbonisation through existing infrastructure. General recharging infrastructure necessary for plug-in electric vehicles and battery electric vehicles to recharge during longer journeys is often not currently available, despite public and private investment (European Academics Science Advisory Council (EASAC) 2019, p. 29). Existing transport infrastructure is also not swiftly replaced, with it taking a minimum of 15 to 20 years for all EU cars to be replaced with newer ones (Brand, 2021). During the time that these carbon-emitting vehicles are being replaced by lower and no emission vehicles, carbon emitting vehicles will continue to produce greenhouse gases.

Finally, many limitations remain concerning decarbonisation technologies. Within the EU, biofuels are currently highly dependent on imports of raw materials; within Spain, 84.8% of feedstocks used in the production of biodiesel were imported from outside the EU (Danielis et al., 2022, p.6). Serious concerns about land use have also been raised surrounding the growth of crops for the production of biofuels. A high level of global biofuel usage could require up to 390 million hectares of cropland by 2050 (Gross, 2020, p.13). Alongside this are economic concerns, as biofuels with high potential to decarbonise are currently unavailable in large quantities, or not commercially viable because of the cost required to produce them (Ortega et al., 2021, p. 14). Other concerns have been voiced surrounding how realistic future technological developments are for decarbonisation, including in heavy transport, aviation and shipping (Gross, 2020; Brand, 2021). Overall, the challenges that the EU faces concerning the decarbonisation of transport are wide ranging and numerous without any clear or easy solutions to solve them.

With these challenges in mind, the currently proposed EU solutions can be seen as rather vague and idealistic. Broadly, the European Commission highlights three areas for action in the decarbonisation of transport; increasing the efficiency of the transport system, speeding up the deployment of low-emission alternative energy for transport and moving towards zero-emission vehicles (n.d.-b). Some of the strategies the European Commission is currently acting on include the setting of binding CO_2 targets for new cars and vans, increasing fuel quality and biofuel usage, and the inclusion of aviation in the Emissions Trading Scheme, as well as the promotion of electrification (n.d.-b). Alongside this, funding has been made available from a range of existing programmes to allow for rapid decarbonisation (European Commission, n.d.-b). Specific targets are also noted within the Sustainable and Smart Mobility Strategy, including having at least 30 million zero-emission vehicles on EU roads, the introduction of zero-emission vessels, and having 100 climate neutral European cities by 2030. Further targets include zero-emission large aircraft being ready for the market by 2035 and nearly all cars, vans and buses being zero emission by 2050 (European Commission, 2020). However, these goals have been criticised as rather idealistic. In particular, the development of zero-emission maritime shipping and aviation is seen to be an incredibly difficult task, due to the need for the vehicles to have a relatively low weight. This results in difficulties in the installation of electric batteries able to hold enough charge whilst being light enough, as well as the low opportunities for the refueling with alternative fuels (Gross, 2020; Brand, 2021). Though research is currently being undertaken in these areas, and regulations are being drafted (Pape, 2022), there is no guarantee that technology will develop at as rapid a pace as is necessary. In addition, many of the goals and strategies do not have concrete plans behind them at this time. This can be attributed to two reasons. Firstly, the steps within the Sustainable and Smart Mobility Strategy Action Plan only began to be implemented in 2021 and will continue to be implemented until 2025 (European Commission, 2020). Secondly, transport as a policy competency is not conducted entirely at the EU level, with member states having large roles to play. Though member states acknowledge the same priorities in decarbonising transport, they each have their own individual action plans, with different emphases on electric vehicles, alternative fuels and public transport (Danielis et al., 2022). The European Commission has recognised this, acknowledging the important role that cities and local authorities have in ensuring transport decarbonisation (n.d.-b). The final criticism offered of the EU's transport decarbonisation goals is that they do not go far enough. Research from the International Council on Clean Transport (ICCT) found that even based on the most ambitious scenarios proposed, the EU transport sector could emit the equivalent of the EU's entire carbon budget by 2050, assuming the goal of limiting warming to $1.5^{o}C$ (Buysse & Miller, 2021). Research from the European Academics Science Advisory Council (EASAC) also highlighted that with current decarbonisation plans, the EU is unlikely to be able to reach the Paris Agreement's goal of limiting warming to $2^{o}C$ (2019). With these challenges in mind, the European Green Deal's goal of reducing transport-related greenhouse gas emissions by 90% by 2050 certainly seems difficult (European Commission, n.d.-c).

Though the above problems with current EU solutions are varied, the most crucial one to tackle in decarbonising the transport sector is committing to adequate goals, as current EU goals do not go far enough. Currently proposed ideas, such as the introduction of an Emissions Trading Scheme for road transport, would not be adequate in targeting greenhouse gas emissions, with ICCT research indicating that such a policy would not produce significant greenhouse gas reductions (Miller, 2016;

IRU, 2022). With road transport making up 72% of transport related emissions (European Environment Agency, 2021), action there needs to be particularly rapid and direct. Research from Krause et al. (2020) indicates that to reach a fully zero-emission fleet by 2050, by 2030 50% of new light duty vehicles will need to be electric. In addition to this, improvements in vehicle efficiency and driving conditions, alongside the introduction of hydrogen powered electric vehicles and a major reduction in kilometers travelled are all necessary to reach, by 2050, a 90% reduction in emissions from road transport compared to 1990, assuming the primary path pursued is electrification (Krause et al., 2020). Though alternative fuels have not shown quite as much promise as electrification, with many challenges having already been mentioned, they are important nonetheless, with research by Miller (2016) indicating that with new and more efficient biofuels, the introduction of additional carbon taxes, stricter emission standards and faster electrification, emission levels equivalent to 1990 could be reached by 2030. Crucial to this is the introduction of strict emission standards on traditional internal combustion engine (ICE) vehicles. Though there are no specific estimates of the number of ICE vehicles likely to be sold in the EU before 2035, the time which the European Parliament has proposed to end ICE vehicle sales (Nedelec, 2022), globally up to 2 billion ICE vehicles are likely to be produced before 2050 (Kodjak, 2020). Due to this, the introduction of emission standards as close to $0gCO_2$/km within the EU by 2030 is essential to ensure that ICE vehicles produced in the period before the banning of their sale are emitting as little CO_2 as possible (Buysse et al., 2021). Minor technical improvements in vehicle weight, rolling resistance and aerodynamics could also assist in reducing ICE emissions (EASAC, 2019).

Concerning non-road transport, though it is much more difficult to decarbonise, there are still some possibilities, particularly in the maritime sector. Improved operations, alongside general technology based improvements and the introduction of zero-emissions technology are all crucial in reducing ships' emissions. Currently, the manufacturing of large numbers of zero-emission ships is impractical, with the long lifespans of existing emitting ships adding to this problem (Brand, 2021). The retrofitting of ships with hydrogen fuel cells as well as the introduction of additional refueling stops could greatly assist in reducing maritime emissions (Kodjak, 2021). Aviation technology necessary for decarbonisation is not as developed as the technology of many other sectors (Brand, 2021). Therefore, ongoing research into the installation of hydrogen fuel cells and alternative fuels is crucial in decarbonising aviation (Kodjak, 2021), given that aviation currently emits 13.9% of all transport emissions (European Commission, n.d.-c)

However, the most important change required to decarbonise transport is a major modal shift away from conventional motorized transport, aviation and shipping. In order to limit warming to only 1.5 - $2^{O}C$, the most successful strategy, according to de Blas et al. (2021), would involve a 60% reduction in land and water transport, alongside an 85% reduction in aviation, with individuals moving to light vehicles, such as e-bikes, and public transport. EASAC's report *Decarbonisation of transport: options and challenges* (2019) strongly corroborates this, emphasizing the significant reductions that are possible through the installation of safe cycle lanes and walking zones, the banning of cars from city centres and the incentivisation of low-price public transport by EU member states. The impacts of COVID-19 have been shown to assist in this modal shift, with increased rates of working from home and online shopping contributing to a possible reduction in emissions of up to 44% by 2060. This is dependent on whether COVID-19 related effects which negatively impact

decarbonisation, such as decreased public transport usage, also occur (Zhang & Zhang, 2021). Though the EU has previously indicated that "curbing mobility is not an option" (EASAC, 2019, p. 2) when it comes to transport decarbonisation policy, the extremity of the climate crisis necessitates a movement away from this way of thinking if the EU wishes to reach their decarbonisation goals.

To conclude, transport decarbonisation is a critical contemporary issue for the EU, with the transport sector's continual increase in emissions representing a major obstacle to EU climate policy. The challenges presented are numerous and complex, with the status quo working against decarbonisation efforts, and currently proposed EU action not being enough to meet Paris Agreement goals. In order to reach zero emissions by 2050, reducing the transport sector's current emissions by 90%, the EU needs to take drastic and wide-ranging action, rapidly electrifying vehicles, introducing stricter emission standards, retrofitting existing ships and, most importantly, shifting away from traditional transportation and aviation. Though many climate related goals are decades in the future, action today is necessary to ensure that these are met and that warming is limited as much as possible. Without substantial decarbonisation of the transport sector, the EU will struggle to meet its emission targets over future decades.

References:

Andrés, L., & Padilla, E. (2018). Driving factors of GHG emissions in the EU transport activity. *Transport Policy, 61*, 60-74. https://doi.org/10.1016/j.tranpol.2017.10.008

Brand, C. (2021, November 10). *Seven reasons global transport is so hard to decarbonise*. The Conversation. https://theconversation.com/seven-reasons-global-transport-is-so-hard-to-decarbonise-170908

Buysse, C., & Miller, J. (2021, April 9). Transport could burn up the EU's entire carbon budget. *The International Council on Clean Transportation.* https://theicct.org/transport-could-burn-up-the-eus-entire-carbon-budget/

Buysse, C., Miller, J., Díaz, S., Sen, A., & Braunn, C. (2021). *The role of the European Union's vehicle CO_2 standards in achieving the European Green Deal.* International Council on Clean Transportation. https://theicct.org/wp-content/uploads/2021/06/EU-vehicle-standards-green-deal-mar21.pdf

Danielis, R., Scorrano, M., & Giansoldati, M. (2022). Decarbonising transport in Europe: Trends, goals, policies and passenger car scenarios. *Research in Transportation Economics, 91,* Article 101068. https://doi.org/10.1016/j.retrec.2021.101068

de Blas, I., Mediavilla, M., Capellán-Pérez, I., & Duce, C. (2020). The limits of transport decarbonization under the current growth paradigm. *Energy Strategy Reviews, 32,* Article 100543. https://doi.org/10.1016/j.esr.2020.100543

European Academics Science Advisory Council. (2019). *Decarbonisation of transport: options and challenges*. https://easac.eu/publications/details/decarbonisation-of-transport-options-and-challenges

European Commission. (n.d.-a). *Consequences of Climate Change*. https://ec.europa.eu/clima/climate-change/consequences-climate-change_en

European Commission. (n.d.-b). *Transport Emissions*. https://ec.europa.eu/clima/eu-action/transport-emissions_en#main-elements-of-the-strategy

European Commission. (n.d.-c). *Transport and the Green Deal.* https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/transport-and-green-deal_en

European Commission. (n.d.-d). *Reducing emissions from aviation.* https://ec.europa.eu/clima/eu-action/transport-emissions/reducing-emissions-aviation_en

European Commission. (2019) *What is the European Green Deal?* https://ec.europa.eu/commission/presscorner/detail/en/fs_19_6714

European Commission. (2020). *Communication from the commission to the Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - Sustainable and Smart Mobility Strategy – putting European transport on track for the future*. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0789

European Environment Agency. (2021, November 18). *Greenhouse gas emissions from transport in Europe*. https://www.eea.europa.eu/ims/greenhouse-gas-emissions-from-transport

Gross, S. (2020). *The challenge of decarbonizing heavy transport*. Brookings. https://www.brookings.edu/research/the-challenge-of-decarbonizing-heavy-transport/

Haas, T., & Sander, H. (2020). Decarbonizing transport in the European Union: Emission performance standards and the perspectives for a European Green Deal. *Sustainability, 12*(20), Article 8381. https://doi.org/10.3390/su12208381

Horton, J., Palumbo D., & Bolwer, T. (2022, May 31). *Russia sanctions: Can the world cope without its oil and gas?* BBC. https://www.bbc.com/news/58888451

International Road Transport Union. (2022, May 18). *Emission Trading System voted by European Parliament: unfit for purpose*. IRU. https://www.iru.org/news-resources/newsroom/emission-trading-system-voted-european-parliament-unfit-purpose

Kodjak, D. (2021, May 7). A strategy to decarbonize the global transport sector by 2050, explained. *The International Council on Clean Transportation*. https://theicct.org/a-strategy-to-decarbonize-the-global-transport-sector-by-2050-explained/

Krause, J., Thiel, C., Tsokolis, D., Samars, Z., Rota, C., Ward, A., Prenninger, P., Coosemans, T., Neugebauer, S., & Verhoeve, W. (2020). EU road vehicle energy consumption and CO2 emissions by 2050 – Expert-based scenarios. *Energy Policy, 138*, Article 111224. https://doi.org/10.1016/j.enpol.2019.111224

Nedelec, C. (2022, June 9). *EU Parliament approves ban on new fossil-fuel cars from 2035*. France 24. https://www.france24.com/en/europe/20220609-eu-parliament-approves-ban-on-new-fossil-fueled-cars-by-2035

Ortega, A., Gkoumas, K., Tsakalidis, A., & Pekár, F. (2021). Low-emission alternative energy for transport in the EU: State of play of research and innovation. *Energies, 14*(22), Article 7764. DOI:10.3390/en14227764

Miller, J. (2016). *Reducing CO2 emissions from road transport in the European Union: An evaluation of policy options*. The International Council on Clean Transportation. https://theicct.org/publication/reducing-co2-emissions-from-road-transport-in-the-european-union-an-evaluation-of-policy-options/

Pape, M. (2022, March 22). *On track to green EU transport?* European Parliamentary Research Service. https://epthinktank.eu/2022/03/22/on-track-to-green-eu-transport

Petrequin, S. (2020, December 1). *Report: EU greenhouse gas emissions down 24% since 1990*. AP. https://apnews.com/article/climate-change-climate-europe-bc73c9bf1beb6675ea7350ca14117d78

Rajendran, K., O'Gallachoir, B., & Murphy, J. D. (2019). The combined role of policy and incentives in promoting cost efficient decarbonistion of energy: A case study for biomethane. *Journal of Cleaner Production, 219,* 278-290. https://doi.org/10.1016/j.jclepro.2019.01.298

United Nations. (n.d.). *The Paris Agreement*. https://www.un.org/en/climatechange/paris-agreement

Zhang, R., & Zhang, J. (2021). Long-term pathways to deep decarbonization of the transport sector in the post-COVID world. *Transport Policy, 110,* 28-36. https://doi.org/10.1016/j.tranpol.2021.05.018Get