Transport in the European Green Deal

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"Transport in the European Green Deal"

This special issue of Network Industries Quarterly is dedicated to the European Green Deal and its implications for the transport sector. In its long-term decarbonisation strategy 'A Clean Planet for All,' the European Commission paints a clear picture of the vast transformations that will have to take place across all sectors of the economy for Europe to become climate neutral by 2050. In its subsequent European Green Deal, Commission President Ursula von der Leyen reinforces this ambition and pledges to enshrine the climate neutrality objective into legislation.

For transport, which accounts for a quarter of the EU's total greenhouse gas emissions, achieving the climate neutrality objectives will require a 90% reduction of the sector's emissions by 2050 compared to 1990 levels, with sizeable contributions across all modes. Our invited contributors take a closer look at the concrete examples of rail, aviation, intermodal transport and Mobility-as-a-Service solutions, as well as at the increasing coupling and interdependence between the transport and the energy sectors.

The first contribution, authored by **van Baal** and **Finger**, introduces the concept of the 'energy-mobility system', underpinned by the electrification of transport services, and discusses the need for an integrated approach to policy and governance, especially for successfully managing the sustainability transition.

Haunold emphasises the need for a level playing field between all modes of transport as a key precondition to the achievement of the European Green Deal objectives. She argues that rail transport ought to be placed at the core all of initiatives undertaken in the transport sector, including capital expenditure, financing, funding and subsidy systems, given that it represents the most climate-friendly mode of mass transport in the EU.

Arnold attempts to provide a legal basis and puts forward some ideas for advancing the propositions of von der Leyen's European Green Deal in relation to the aviation sector. He argues that if there is leadership at the EU level, undisputed priorities and concepts based on the right legal basis and clear information, innovative policies may be developed to meet the challenges we are facing.

Serafimova discusses the current challenges to urban mobility and argues that the Covid-19 pandemic may, in fact, serve as an opportunity for the advancement of the Mobility-as-a-Service (MaaS) ecosystem and the demonstration of its true value in supporting the Commission's Green Deal objectives.

Matthias Finger

dossier

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The converging Energy-Mobility System needs an integrated Approach for the Sustainability Transition

Paul Adrianus van Baal*, Matthias Finger**

Technological and societal advances are driving the energy and mobility systems toward increasingly interdependency ("convergence" or "sector coupling"), so that they will ultimately become what we call the "energy-mobility system". The energy-mobility system will need an integrated approach to policy and governance, especially for successful management of the sustainability transition.

Convergence of the energy and mobility systems

The mobility and energy sectors are subject to the same macro-economic megatrends, which is leading to their institutional and technological convergence into what we will call the 'energy-mobility system'. There are several reasons for this convergence. First, deregulation, here meaning the stimulation of competition in regulated network industries, is a powerful institutional enabler of convergence, by allowing and incentivising companies to innovate with new products, services, and business models. Second, digitalisation is a technological enabler of convergence, by joining the sectors in a 'data layer' on top of their physical infrastructure. Lastly, decarbonisation is an accelerator of convergence, by positing the electrification of all forms of mobility as a solution to this pollution. One of the clearest examples of this electrification can be found in batteries, which are a fundamental technology for the decarbonisation of mobility, but also, an essential technology for integrating and managing more renewables into electricity grids. They can even serve both purposes at the same time, using decentralised electric vehicles as flexible load to balance the electricity grid. Similarly, battery-free electric vehicles that are continuously fed power, such as trains, trams, metros or trucks on so-called 'e-highways' can also be used as an operable load for grid management.

The convergence of energy and mobility is creating a new type of system, where electricity demand itself will become mobile. This will represent a new challenge for the grid: conventional electricity load is mostly static. Flexible supply and demand will become very important in order to maintain a balanced grid and prevent (local) bottlenecks. Transportation services will make up a considerable part of the load on the electricity grid, which, in turn, will change the way electricity and mobility networks are planned, built, and operated. The electrification of mobility will make it difficult, if not impossible, to manage the electrical grid unless the load can be actively modulated.

Coherence of policies and institutions

The coherence framework (see: Crettenand & Finger, 2013; Finger et al., 2005, 2015) tells us that institutions (policies, regulations) and technology co-develop and argues that institutions should, therefore, remain relatively aligned with the technological advancements, if they are to be enable rather than impede the efficient functioning (performance) of a socio-technical system. However, some degree of incoherence between technology and the prevailing institutions can also spur innovation as the associated problems of the misalignment allow for or require companies to find innovative solutions. Ultimately, however, only the alignment of the physical system with the institutional regime will lead to optimal performance. If one is to follow this coherence framework, it would be logical to develop institutions that are in line with the recent technological developments in matters of energy and mobility sector coupling, especially for the sustainability transition. Indeed, only a certain coherence between the new technological potential of such sector coupling on the one hand, and aligned institutions on the other, will contribute to decarbonisation and the sustainability transition, more generally. In other words, in order to effectively govern this converging energy-mobility system, policies should focus on broad social, economic, and environmental efficiency, rather than on optimising each sector individually.

Cross-sectoral policy ambitions

There are five broad policy ambitions that we can identify for such a sustainability transition. First, the reduction of energy consumption through efficiency and sufficiency measures. Energy use is the main cause of emissions in our economy and any reduction in energy use is a direct gain

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for climate change mitigation. Second, the electrification of energy demand currently met by fossil fuels. Electrification remains the only realistic option for immediate action in sectors such as transport. By changing the use of fossil fuels to electricity, immediate reductions in carbon emissions are rapidly attainable. Third, the decarbonisation of electricity generation. This obviously reduces the emissions of the electricity sector but becomes more beneficial and necessary in combination with the second policy area. Indeed, using electricity to replace fossil fuels only contributes to reducing overall greenhouse gas emissions if the electricity comes from a low-carbon source. Fourth, the promotion of resilience and security of supply. This is sometimes relegated to the peripheries of sustainability policy debates, or even forgotten altogether, but is absolutely necessary in order to securely and safely manage the first three policy ambitions (Sinn, 2017). Grid management and operational practices need to be reconsidered and made more resilient where necessary to manage the required new infrastructure facilities, assets, and loads in the energy and mobility sectors. Promoting the digitalisation of the demand-side can significantly contribute to increasing grid resilience. Fifth and last, the integration of green infrastructure management. Green infrastructure (agricultural land, forests, meadows, soils) next to mobility and energy infrastructure is generally managed for the purpose of reducing the natural hazards that can impact the system: falling trees, avalanches, mudslides, etc. Integrating green infrastructure management focused on stimulating natural carbon sinks (Wiesmeier et al., 2019) and biodiversity into the overall management of the energy-mobility infrastructure could provide a key contribution to the sustainability transition.

These five policy areas will, in their combination, lead to a successful energy transition. The ensuing policies and regulations should be applied to the converging energy-mobility system, ideally in a manner that favors an integrated governance of this system. Besides integrated policy and regulatory solutions, the convergence of the energy-mobility system will, at one point, require a system operator with intimate knowledge of both systems. We will now present the case of the Swiss national rail company, an integrated energy and mobility operator, which could further develop their system role if corresponding policies and regulations were to be put into place. Their successful advances in the sustainability transition showcases the potential for an integrated approach.

Swiss Federal Railways

The Swiss Federal Railways (Schweizer Bundesbahnen, SBB) was founded in 1902. Previously a branch of public administration, SBB has been a limited company since 1999, regulated by public law and fully owned by the Swiss state. SBB is not the only railway company in Switzerland but is, by far, the largest, retaining a legal monopoly on passenger transport on most long-distance domestic connections. SBB's railway network is almost entirely electrified, making the company the largest consumer of electricity in Switzerland, good for about 4% of the national electricity consumption.

The Swiss railway system operates at a frequency of 16.7 Hz, one third of the frequency of the main electricity grid. For this reason, the system has its own separate electricity grid, including nine hydro-electric power plants operating at 16.7 Hz and eight frequency convertor stations connecting it to the 50 Hz grid. About 90 percent of the electricity comes from renewable sources. The Swiss railway electricity infrastructure is owned and operated by SBB itself, making SBB the largest prosumer in Switzerland, vertically integrating power supply, transmission, and distribution up to and including power demand. SBB also provides electricity to the other railway companies in Switzerland and is regulated to provide its electricity activities at fair and competitive prices. In addition, SBB supplies some auxiliary services to Swissgrid, the TSO of the main 50 Hz grid.

Being a state-owned company, SBB is expected to be a role model of the sustainability transition and it has been successful during the past years in aligning its internal activities with the ambitions of the Energy Strategy 2050. It has set the internal goal to reduce its emissions by 50% by 2030, and by 92% by 2040 (SBB, 2020), which is more ambitious than the national target. SBB is active in all the five above described policy areas that contribute to climate change mitigation. It has implemented energy efficiency measures that have reduced its overall energy consumption in 2018 by about 10% as compared to forecasts in 2011, and aims to double these savings by 2025 (SBB, 2020). It has furthermore committed itself to electrifying the remainder of its fossil fuel consumption, including the heating of its buildings and replacing the remaining fleet of diesel locomotives. It has committed to having 100% of its electricity generated from renewable sources by 2025 (SBB, 2020). SBB is also investing significantly in the resiliency of the grid on the demand side so as to accommodate the significant capacity increases expected in the future. Here, SBB has the unique possibility to manage power demand from the power plant all the way down to the train. For instance, the company has implemented a demand response solution that can modulate train heating systems to prevent local bottlenecks in power supply and is developing a similar solution for the traction power of the trains. Another program similarly signals trains to slow

down when needed to prevent forced stops of trains, reducing the overall energy consumption and increasing the punctuality of the trains. A little known fact about SBB is that it is also the largest manager of forests and green infrastructures in Switzerland, considering that it oversees about 16'200 hectares of land consisting of forests and meadows adjacent to its railway infrastructures, of which it directly owns about a third (SBB, 2020). They have recently started considering the promotion and conservation of biodiversity in their management of these green lands.

Transport over rail is generally recognized as being the most efficient type of transport (Wee et al., 2005) with the least amount of emissions. Together with the advances described above, SBB is actively and successfully becoming one of the country's champions of the energy transition. The company is in a unique position to take on a more comprehensive role in the Swiss energy transition, on two accounts: on the one hand, SBB can provide the energy-mobility infrastructure that will be required for the electrification of road-based transport; on the other hand, SBB has the potential and the capabilities to become the system leader for this integrated energy-mobility system.

SBB already provides the electricity infrastructure for Switzerland's railway sector. However, as we have seen above, not just rail, but the entire mobility sector and, in particular, road-based mobility will need a dedicated electrical infrastructure to operate, namely a charging infrastructure as well as overhead lines for grid-connected electric vehicles. Mobile assets like cars, and trucks pose particular challenges, and SBB has many years of experience successfully operating such a system for the case of rail. SBB is also the only actor with the required scale to effectively integrate mobility and electricity at the Swiss national level. By providing the electricity infrastructure for rail-based and road-based mobility, SBB will be able to harness their synergies.

One of the largest potentials of electrifying mobility is not in marginal improvements of the already electrified railway sector, but by encouraging a modal shift-to-rail, both potential passengers and cargo. The railway electricity infrastructure will need to be upgraded to allow for the increased load, new infrastructure will need to be built, and new digital solutions and service offerings will need to be developed to integrate the various modes of transport so as to entice consumers to make the switch. Should SBB take on the role of energy-mobility infrastructure operator, the company will be in the unique position to optimize the entire energy-mobility system to become more sustainable. It would not only be infrastructure manager but also the largest consumer. Since sustainability-related activities have become clearly articulated inside the company, SBB has achieved remarkably fast results in implementing solutions. Because it owns and operates the entire value chain SBB can pilot and scale many technological innovations rapidly. Using its dominant position of infrastructure provider, it can standardise these innovations and the related operational knowledge. There is indeed a large potential for energy efficiency and system resilience, notably as a result of linking rail and road, energy and mobility, electrification of road-based transport, decarbonisation measures and land-use management.

Being the provider of the energy-mobility infrastructure, SBB can implement measures to reduce the energy consumption of the mobility sector as well as to promote the electrification and decarbonisation of road transport. SBB's demand-side innovations also contribute to the resilience of the mobility and energy systems simultaneously. The company can take their innovations and offer them to other companies on their network. The company can show a similar ambition to pilot and implementing new green infrastructure management practices, which can serve to promote such practices in adjacent green areas as well.

An energy-mobility system operator

We can derive several concrete recommendations for policymakers so as to allow a company like SBB to realize this new potential. In a first step, it should be given the role of managing the electricity infrastructure for roads as well as for rail. Road-side electricity infrastructure will include charging stations but also overhead cables for electric trucks on so-called 'e-highways'. The railway electricity grid is already conveniently located adjacent to the main highways in the country, and the operational expertise of powering moving assets is already developed at SBB. It should be encouraged to physically link the electrification of road and the electrification of rail, to harness the synergies between the planning, operation, and maintenance of the infrastructure. Building charging infrastructure next to stations will also somewhat ease the integration of private and public transport. Once such a system is built, SBB should be encouraged to further spearhead the development of an integrated mobility and energy management system, one that allows other mobility companies (other railway companies, charging operators, urban mobility companies, etc.) to join so that the overall system can be managed efficiently and optimised for resiliency and sustainability. In this new role, SBB should be empowered to accelerate the sustainability transition of this energy-mobility system by piloting and standardising its innovative

solutions and by providing them to the other mobility actors. It should be given the possibility to encourage, facilitate, and even incentivise a modal shift, prioritising rail for long-distance passenger and freight transport and electrified vehicles (cars, trucks, etc.) for short distances.

In a second step, the currently fragmented regulation of energy and the various transport modes of road and rail should evolve into a more coherent regulation of this integrated energy-mobility system. The regulatory competences for rail transport, road transport, and electricity are currently attributed to different offices in Switzerland. An integrated energy-mobility system requires a new and more innovative approach to regulation. In an ideal future scenario, a single regulatory authority will have the sole authority to govern the entire energy-mobility system. For now, to ensure that the interdependencies of the energy and mobility systems are adequately regulated, the regulatory authorities of road, rail, and electricity should at least work together and develop a common approach for dealing with the technological and societal developments that are leading up to this convergence and that must be put to work for the energy transition.

In a third step, also the national Energy Strategy 2050 should be revised: not only must the transport sector – rail and road – become an integral part, but so must the entire energy-mobility system. The role of SBB as a leader in fostering the energy transition in these two integrated sectors must also be acknowledged and made explicit.

Conclusion

This article introduced the concept of the energy-mobility system and the interdependent parts of the socio-technical systems of mobility and energy that are a result of convergence or sector coupling. Electrification of transport services provides the physical underpinning of the energy-mobility system. Electrified transport services represent significant electricity demand and storage and are increasingly being operated as flexible assets in the electricity grid. This demand-side inclusion is not only economically attractive but necessary for the resilience of a decarbonising, decentralising electricity grid, especially once electricity demand becomes mobile. Policymaking and governance have to evolve with the changing technological reality and can no longer treat mobility and energy as completely separate sectors. Effective governance of this new energy-mobility system requires assigning a system operator, in much the same way as such system operators already exist for the electricity system, for instance. In Switzerland, SBB is well on its way to becoming such an energy-mobility system operator. It is one of the few national rail companies in the world that is vertically integrated from the power plant down to the train, managing its energy and mobility infrastructure together for itself and other companies on its network. The Swiss case is unique but can serve as an example for other countries looking to develop their regulatory approach to the energy-mobility system.

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Decarbonisation: Railways and the European Green Deal

Veronika Haunold*

The European Green Deal must create a fair and level playing field for all modes of transport to ensure that the European Union can reach its goal of climate neutrality by 2050. Shifting the majority of inland freight road traffic onto railways requires a true commitment to railway transport.

On December 11, 2019, the European Commission (EC) presented a roadmap for the European Union's (EU) future growth strategy, *The European Green Deal*, which aims to transform the EU's current economic model by decoupling economic growth from the use of resources (European Commission 2019a: 2). Climate change and other environment-related challenges are recognised as 'this generation's defining task' (European Commission 2019a: 2).

The EC aims to achieve this goal by designing policies, which profoundly transform the EU's economy, and by mainstreaming sustainability in all policies. *The European Green Deal* raises the EU's greenhouse gas (GHG)'s reduction target for 2030 to a minimum of 50% and possibly to even 55% (European Commission 2019a: 4), and sets a goal of climate neutrality by 2050 (European Commission 2019a: 2). The European Parliament states even higher ambitions, and demands a fixed GHG emissions reduction target for 2030 of 55% as well as an interim target for 2040 to ensure that the EU stays on track to reach its climate goals (European Parliament 2020).

The EC plans to design policies which accelerate the shift to sustainable and smart mobility, as approximately a quarter of the EU's greenhouse gas emissions are caused by traffic, and emissions in the transport sector are still growing. The EU can only achieve its goal of zero net emissions by 2050, if emissions in the transport sector are reduced by 90%. The EC recognises that, while transport users must change their current mobility habits, alternative mobility options must be affordable and accessible to encourage the adoption of mobility choices which emit fewer greenhouse gases (European Commission 2019a: 10). One of *The European Green Deal's* guiding principles is that the 'price of transport must reflect the impact it has on the environment and on health' (European Commission 2019a: 10).

Shifting 75% of inland freight road traffic onto rail and waterways is considered a priority to reduce GHG in the traffic sector (European Commission 2019a: 10). However, *The European Green Deal* does not yet contain specific ideas as to how this goal could be achieved. The EC plans to propose specific initiatives to increase and better manage the capacity of railways at a later stage, in 2021 (European Commission 2019b: 3).

Rail transport has reduced its CO_2 emissions almost continuously since 1990 while increasing its transport volumes. In 2016 rail transport accounted for only 0.5% of CO_2 emissions of all modes of transport in the EU and for approximately 2% of transport energy consumption (European Commission, Directorate-General for Mobility and Transport 2019: 75ff; European Commission 2020b: 1). In Austria, Austrian Federal Railways (ÖBB) saves 3.5 tonnes of CO_2 emissions each year by transporting goods and passengers by rail (ÖBB-Holding AG 2019a:1). More than 90% of ÖBB's trains run on electricity (ÖBB-Holding AG 2019b: 3). Additionally, since mid-2018, those trains have been powered exclusively by electricity from renewable power sources (ÖBB-Holding AG 2019b: 3).

In 2016, rail transport accounted for 11.2% of all freight and 6.6% of all passengers in the European Union (European Commission, Directorate-General for Mobility and Transport 2019: 75ff; European Commission 2020b: 1). While rail transport emits few CO_2 emissions and consumes little energy compared with other modes of transport, its freight volume actually decreased in the EU since it peaked in 2011 at 19% and passenger volume only increased slightly from 7.0% to 7.6% between 2007 and 2016 (European Commission 2020b: 1). The European Commission therefore proposes to declare 2021 the 'European Year of Rail' (European Commission 2020b: 2) to promote rail transport. The proposal was welcomed by the Community of European Railway and Infrastructure Companies (CER), whose Executive Director, Libor Lochman, calls it 'the perfect occasion to showcase rail's unbeatable advantages when it comes to modernising and greening Europe's mobility sector.' (Community of European Railway and Infrastructure Companies 2020).

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In Austria, the transport sector needs to cut an additional 8 million tonnes of GHG emissions to fulfil the country's GHG reduction commitment. A doubling of the performance of Austria's railway companies would cut almost 4 million additional tonnes of GHG emissions (ÖBB-Holding AG 2019a: 1). However, a fair and level playing field is necessary to ensure that railways in Austria can compete with other modes of transport and increase their freight and passenger volumes.

The EC recognises that the European Union's transport system and transport infrastructure will need to be adapted, increased and invested in to enable EU-wide sustainable mobility services; this includes a capacity increase of railways as well as the implementation of automated and connected multimodal mobility (smart) management systems (European Commission 2019a: 10).

Apart from a general commitment to these initiatives, *The European Green Deal* introduces few specific measures which would create a fair and level playing field between rail, road, air and waterway transport. This is, however, a prerequisite to achieving the EC's stated goal of reducing three quarters of freight road traffic by shifting it onto railways and waterways. The EC intends to 'look closely' (European Commission 2019a: 10) at various fuel tax exemptions, including tax exemptions for aviation and maritime fuels, and suggests an end to fossil fuel subsidies. It also wants to include the maritime sector in the European Emissions Trading System (ETS), and reduce free ETS allowances to airlines (European Commission 2019a: 10f).

Ending tax exemptions for aviation and maritime fuels as well as ending all fossil fuel subsidies is a step in the right direction. However, opening up the European ETS to the maritime sector would be a step in the wrong direction, as it would increase the competitive imbalance between various modes of transport and put rail transport at an even greater disadvantage than it is now. Reducing – but not eliminating – free ETS allowances to airlines will not create a level playing field between all modes of transport: it would only achieve a slight improvement of the current competitive conditions. A fair and level playing field between all modes of transport requires ending tax exemptions for aviation and maritime fuels, the introduction of an EU-wide kerosene tax, harmonised pricing/taxation of CO_2 emissions (including the introduction of CO_2 duties on imports into the EU), and permitting no free ETS allowances to airlines (or to the maritime sector).

Another prerequisite to achieve *The European Green Deal's* goal of accelerating the shift to sustainable and smart mobility is the introduction of an overall GHG balance sheet to enable a fair and transparent competition between all modes of transport. Without transparency and comparability of CO_2 emissions, the EU can never meet its target of no net emissions by 2050. Binding and measurable CO_2 emissions targets must be specified for all sectors governed by the European Climate Law, which would write into law the EU's stated goal of climate neutrality by 2050 (European Commission 2020a). On March 3, 2020, the EC presented its *Proposal for a Regulation of the European Parliament and of the Council establishing the framework for achieving climate neutrality and amending Regulation (EU) 2018/1999 (European Climate Law)* (European Commission 2020c).

The EC's ideas for accelerating the shift to sustainable and smart mobility as put forward in *The European Green Deal* focus primarily on road traffic: increasing the number of recharging stations for electric cars, or stricter emissions standards for combustion-engine vehicles (European Commission 2019a: 9f). In other words, it focuses on making modes of individual transport cleaner and more energy efficient than they are now. However, if consumers only slightly adapt their current mobility habits by switching to electric cars instead of using public transport, this will not reduce the number of cars produced, nor will it reduce traffic or traffic accidents. Moreover, millions of batteries must be produced and recycled to power these electric cars. Producing, operating, and disposing of electric cars is no doubt more environmentally damaging and more expensive than travelling by train – at least it should be, as the 'price of transport must reflect the impact it has on the environment and on health' (European Commission 2019a: 10). True-cost pricing is required across all modes of transport, as Andreas Matthä, Chairman of the Board of Management, and Arnold Schiefer, Member of the Board of Management of the ÖBB-Holding AG, point out in their foreword to ÖBB's climate protection strategy 2030 (ÖBB-Holding AG 2019a: 1).

True-cost pricing requires a switch to the polluter-pays principle, so the external costs of road transport are no longer paid by the tax-paying public (ÖBB-Holding AG 2019a: 58). Marginal social-cost pricing, which includes a polluter-pays principle as well as a user-pays-principle, is necessary to ensure that railway companies have a fair chance to compete with other modes of transport (CER, 2019: 2), as 'Rail is today the only motorised transport mode to nearly cover its marginal costs' (CER, 2019: 2).

A polluter-pays principle also requires an alignment of financing, funding and subsidy systems to climate-friendly mobility (ÖBB-Holding AG 2019a: 58). Specifically, all

financing, funding and subsidy systems in the EU should be aligned according to their impact on the CO_2 balance. Capital expenditure should be prioritised according to its effect on climate, which would result in a prioritisation of capital expenditure on rail infrastructure instead of further investments in motorways and airports. Capital expenditure should not focus on high-emission transport sectors, but rather on rail transport as the most climate-friendly mode of mass transport in the EU. Capital expenditure for innovations, research and development in the railway system must be doubled, as must be the funding for the effective expansion of the capacity and quality of the European railway network. Incentives must be created for a significant expansion of renewable energy, so railway companies across the European Union can power their trains with electricity from renewable power sources, as Austria's ÖBB already does. The EU must ensure that railway companies have sufficient energy available for renewable sources in the future.

The European Green Deal is a valuable roadmap for the EU's future growth strategy. However, it can only succeed in transforming the EU's current economic model to become more sustainable and resource-efficient, if the EU creates a level playing field for all modes of transport. Therefore, rail transport has to be put squarely in the centre of all initiatives undertaken in the transport sector, and capital expenditure as well as all financing, funding and subsidy systems in the traffic sector focus on promoting rail transport as the most climate-friendly mode of mass transport in the European Union.

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The Aviation Value Crisis: Sustainability, Mobility and Economic Growth

Iván László Arnold*

Aviation, considered a strategically important sector of the European economy, is facing a value crisis. The parallel pursuit of diverse policy objectives such as mobility, economic growth and addressing climate change has arguably resulted in a regulatory standstill. Will one impact of the Covid-19 crisis be the emergence of a new perspective which mandates better policy-making and regulation?

Context

The European Commission considers aviation both a key sector of the European economy and an important asset for the society, securing the benefits of mobility and global connectivity for EU citizens. Aviation, at the same time, is responsible for considerable negative externalities, that include noise, CO_2 emissions and non-CO_2 impacts, such as cloud effects. Aviation is one of the most polluting transport modes and its environmental impact had been steadily increasing before the Covid-19 outbreak. Changes to the resources that fuel planes and especially to the way the aviation industry functions could have a significant impact on climate change. Its CO_2 impact is usually estimated to be around 3%. While taking the non-CO_2 impact and growing traffic levels also into account may result in a much higher percentage of 5-10%, there are scientific uncertainties involved. According to the European Commission, flying is responsible for 3% of the EU's direct emissions and 2% of global output. The International Civil Aviation Organization (ICAO) forecasts that, in the absence of additional measures by 2050, these percentages could grow by over 300%

While there are regulatory efforts both at the EU and the global level to address the environmental impact of aviation, so far these schemes have not delivered tangible results. Only intra-EU flights are included in the EU's Emissions Trading Scheme (ETS) and airlines still receive considerable free allowances under the scheme. The International Civil Aviation Organization's (ICAO) global Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) is in in its infancy, and its potential benefits are widely disputed by promoters of a more environmentally responsible transport system. The non-CO_2 effects of aviation are usually overlooked by policy-makers; they are neither included in the ETS, nor in CORSIA. Furthermore, kerosene is exempt from taxation and there is only scant introduction of other taxes on air travel.

Besides the core values of economic growth, mobility, connectivity and the protection of the environment, aviation-related policies are also influenced by industrial lobbies and other interest groups such as environmentalists. The latter has been less successful in shaping policies and regulation, since aviation's contribution to the economy and the mobility of EU citizens have so far taken precedence over the protection of the environment.

Meanwhile, on the 28th November 2019, the European Parliament (EP) passed a resolution on the climate and environment emergency. The EP had taken into consideration 'the latest and most comprehensive scientific evidence on the damaging effects of climate change' provided in the Intergovernmental Panel on Climate Change's (IPCC) special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, as well as 'the massive threat of loss of biodiversity'. On the 11th December 2019 the European Commission published its ambitious program, The European Green Deal. The Commission, also referring to the IPCC special report, acknowledged its responsibility and confirmed its 'commitment to tackling climate and environmental-related challenges' using dramatic language rarely encountered in policy documents. The communication defines the objective of achieving climate neutrality by 2050. The proposed measures include the revision of the Single European Sky initiative and taxing aviation fuels.

This already difficult and complex situation has been further complicated by the outbreak of the Covid-19 epidemic. The epidemic has caused an unprecedented, complete disruption of the whole aviation industry. The consequences did not stop at airlines; airports, air navigation service providers and manufacturers were all affected by the sudden halt of air traffic. Furthermore, the policy-focus was shifted from capacity and Green Deal objectives to financing air carriers and cutting costs of infrastructure providers. In March 2020 air traffic has fallen by ap-

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proximately 90% compared to 2019 levels. Interestingly, what the virus has achieved in terms of reducing aviation's harmful impact on the environment in a matter of weeks, far exceeds the achievements of the past decades of the environmentalist movement and the European Commission combined.

The policy problem before the epidemic

Today, the aviation market is operating in a sub-optimal manner. Markets are legal constructs that operate within the context of the legal framework designed by the sovereign. In case markets function in a suboptimal manner, regulatory intervention may be needed. This is the case in particular, where preventive action needs to be taken in order to avoid potentially catastrophic outcomes, such as the consequences of climate change. If this is so obvious, why has it not happened?

Concurring policy objectives

While liberalisation of the aviation sector has opened competitive markets, facilitated the evolution of new business models such as low cost airlines and an unprecedented degree of mobility for EU citizens through affordable airfares, the environmental impact of aviation is still considerable and on the rise. Beside a growing demand for affordable air travel, at least part of the reason for this is the fact that the regulation of aviation is driven by concurring policy objectives.

According to the European Commission's 'An Aviation Strategy for Europe'[1], 'aviation is a strong driver of economic growth, jobs, trade and mobility for the EU. It plays a crucial role in the EU economy (…) The EU aviation sector directly employs between 1.41 million and 22 million people and overall, supports between 4.83 million and to 5.54 million jobs. The direct contribution of aviation to EU GDP is €110 billion, while the overall impact, including tourism, is as large as €510 billion through the multiplier effect.' The same aviation strategy underlines the need to 'strengthen' the sustainability of the EU air transport value network. One of the Commission's priorities is to reduce capacity constraints to accommodate more flights and enable the growth of the sector. At the same time, a wish is expressed to minimise aviation's environmental footprint and to achieve carbon neutral growth from 2020. There is also mention of powerful regulatory tools such as the EU ETS and green technologies that will make this possible. The Single European Sky policy initiative[2] and regulatory package defines similar competing objectives for air traffic management (ATM).

The main problem is that these policy objectives are sometimes directly contradicting each other and the achievement of one may only be possible to the detriment of the other. For example, 2018 and 2019 were the years of the 'capacity crisis' in the aviation sector. There was more traffic than what the infrastructure could handle. In order to accommodate more flights, ATM measures were introduced which resulted in a deteriorating environmental performance. In fact, emissions were increasing faster than traffic. Clearly, this trade-off has been the result of a value choice. The need to accommodate traffic growth (more mobility and economic growth) took precedence over the objective of protecting the environment.

As it was acknowledged even by industry stakeholders at the Single European Sky High Level Conference on the 11th September 2019, we do not currently possess the technological solutions that would make it possible to maintain or increase 2019 levels of aviation traffic and, at the same time, reduce the environmental impact of aviation.

Regulatory passivity in delivering public goods

While public goods such as clean air and a habitable Earth are highly desirable, they will usually not be delivered by markets alone. Business entities operating on markets are not responsible for the provision of public goods. On the other hand, the EU and its member states do have such responsibilities.

Today, the aviation sector is enjoying numerous privileges that help to keep airfares low and allow carriers to expand their business operations. Meanwhile, it is the broader society that bears the environmental cost of increased air mobility and aviation-related economic growth. Current policy and regulatory initiatives such as the ETS, CORSIA or the odd aviation tax cannot resolve this problem. Neither can promises of unmaterialised green technologies and planting future forests. Such plans and promises are often characterised as unrealistic and even misleading. Michael J. Sandel proposes that carbon offsets can easily be understood as conferring a moral licence to pollute[3]. Julian Allwood, professor of engineering and the environment at Cambridge University suggests that dreaming of electric planes and planting trees will not save our planet[4]. Neither will regulatory passivity in respect of the delivery of the public goods related to the protection of the climate and the environment.

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[1] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, An Aviation Strategy for Europe, Brussels, 7.12.2015 COM(2015) 598 final

[2] https://ec.europa.eu/transport/modes/air/ses_en

[3] Michael J. Sandel: What Money can't Buy: The Moral Limits of Markets, Farrar, Straus and Giroux; New York, April 24, 2012, p. 78.

[4] Julian Allwood, The only way to hit net zero by 2050 is to stop flying, The Economist, 7 February 2020

Simplified narratives

As Maurice E. Stucke and Ariel Ezrachi observe, 'we often are attracted to simplified narratives', which are sometimes capable of driving policy and regulation[5]. Despite the complexity of the situation surrounding the aviation sector, its regulation does seem to be based on such simplified narratives. 'Aviation is the driver of economic growth.' 'Biofuels, new technologies and offsetting will make aviation a clean transport mode.' As Ezrachi and Stucke point out, such narratives are easy to understand, govern and follow, so society is willing to ignore their limitations. They can also replace an unpleasant reality with an agreeable rhetoric. And when they are backed by powerful industrial lobbies, perhaps the regulator is also less inclined to closely investigate these easy remedies which help to preserve the status quo without imposing the need to introduce complex structural changes and develop innovative policies and regulation.

Complexity

Finally, complexity itself is increasingly becoming a problem. It is obviously not easy to take the European aviation sector and suddenly reshape it into an environmentally clean business, still paying dividends, contributing to both mobility and economic growth. There are a range of diverging interests that need to be considered, including those of the member states, employees and influential industry stakeholders, some of which may be considered too big to fail. Furthermore, aviation cannot be reshaped in isolation. Reforming the industry needs to happen in a manner that is making sense in the wider context of the economy that is supposed to become carbon neutral by 2050. This requires an approach that is much broader than sectoral boundaries.

Policy, regulation and the Covid-19 epidemic

Climate change and the COVID-19 epidemic are both considered global threats. One common feature of these potentially catastrophic phenomena is that the aviation industry is a contributing factor to both. Still, the regulatory response to these threats has so far been very different. While climate change has triggered mild regulatory changes with an extremely limited effect on the operation of the aviation sector, the COVID-19 crisis has resulted in prompt and radical interventions. While mobility has never been restricted for the sake of a more sustainable future, it was halted in an attempt to control the further spread of the pandemic.

The epidemic has created the sense of urgency that climate change never did. Perhaps it was the very immediate threat of the collapse of health systems and whole sectors of the economy that has prompted state intervention. Clearly, the COVID-19 epidemic has shown that in the face of certain threats, mobility and economic growth may become relatively less important. People are ready to travel less for leisure and it is now recognised that video conferencing can significantly reduce the need for business travel.

While many consider the Covid-19 epidemic an opportunity to introduce structural changes, these ideas do not seem to materialise in the transport sector. Despite several member states' initiatives to make state aid to airlines conditional on accepting environmentally-oriented restraints such as reducing short-haul flights, increased multimodality and tax contributions, the European Commission does not seem to follow this approach. In fact, both the Commission and several member states seem to be inclined to preserve the pre-epidemic status quo. Adina Valean, EU Commissioner for transport has declared that 'raising these [green] conditions now is not necessarily something I would support'[6]. Indeed, to many, recovery from the Covid-19 crisis means re-establishing the pre-Covid-19 status quo, even to the detriment of Green Deal objectives.

There are also instances of industry stakeholders cancelling green technology projects under the strain of the Covid-19 crisis[7].

A few legal considerations

All of this has a legal aspect. Beside acknowledging the general responsibility of the sovereign to deliver public goods, perhaps it also makes sense to evoke a few provisions of the Treaty on the Functioning of the European Union for the sake of orientation.

According to Article 119, Union policy on the environment shall contribute to the pursuit of preserving, protecting and improving the quality of the environment, protecting human health, prudent and rational utilisation of natural resources, and promoting measures at the international level to deal with regional or worldwide environmental problems, and in particular, combating climate change. Furthermore, Union policy on the environment shall aim at a high level of protection, it shall be based on the precautionary principle and on the principles that preventive action should be taken, and that the polluter should pay.

[5] Maurice E. Stucke and Ariel Ezrachi: Competition Overdose, Harper Collins Publishers, New York NY, 2 April 2020, p. 126
[6] https://www.euractiv.com/section/aviation/news/austrian-airlines-bailout-to-be-linked-to-climate-targets/
[7] https://www.flightglobal.com/air-transport/airbus-and-rolls-royce-cancel-e-fan-x-hybrid-electric-rj100-experiment/138067.article

In the case that these provisions of the Treaty are to be taken seriously, there is a firm legal basis to drive value choices in European transport policy. While today none of the principles enshrined in Article 119 (the precautionary principle, the polluter pays principle and the principle of preventive action) seem to be observed by the regulation of the aviation sector, it is perhaps not too late to consider this possibility.

The way forward

A sense of urgency

Rising traffic levels in 2018 caused increasing delays and capacity problems in the European airspace. This situation was narrated at the policy level as the 'capacity crisis'. A sense of urgency was swiftly achieved and measures have been introduced to increase available capacity. An even more serious sense of urgency has prevailed in the case of the Covid-19 crisis. Unlike in the cases of the so-called "capacity crisis" and the epidemic, there has been no real sense of urgency with respect to climate change, despite the European Green Deal and the EP declaration of the climate emergency. This situation needs to be rectified by the main policy stakeholders such as DG MOVE and EUROCONTROL[8], if the Green Deal is to be taken seriously. It needs to be acknowledged that the aviation system in its present form is unsustainable and that current traffic levels cannot be sustained.

Furthermore, the Covid-19 crisis should be considered an opportunity to introduce structural changes to the aviation sector. Efforts to restore the pre-epidemic status quo through state aid need to be abandoned. State aid should instead effectively support Green Deal objectives.

Information

It is a prerequisite to any meaningful change in policies and regulation to have a clear view of the situation at hand. Simple facts - such as more traffic means more emissions - need to be acknowledged. Furthermore, at present, the actual impact of aviation on climate change is still not quantified. The non-CO_2 impacts are routinely overlooked, for instance[9]. There is a need for a reliable, transparent fact-base and risk assessment. Obscure promises of green technologies and offsetting by planting forests in the uncertain future should be replaced by genuine measures based on empirical evidence and leading to tangible, measurable results.

The law

Article 119 of the Treaty on the Functioning of the European Union should be treated as a firm basis for policy-making and regulation aimed at the 'greening' of the aviation sector. The precautionary principle, the polluter pays principle and the principle of preventive action should be observed. It needs to be acknowledged that the sovereign has a duty to act on the basis of the Treaty and that regulatory inaction may result in serious consequences.

Value choices

Today, pro-climate efforts are often characterised by industry lobbies as threats to the economy and mobility. Where policy objectives or underlying values collide, value choices need to be made. Values such as short term economic growth, increased mobility and long term sustainability will need to be balanced and prioritised.

Policies and regulation

Policies and regulation need to be designed and enforced with a view to Green Deal objectives. Complexities and the difficulty of developing such schemes do not justify sidestepping these objectives.

A realistic carbon-neutral transformation is only possible through robust and prompt regulatory intervention. There is a need to include the costs of aviation's environmental impact in airfares. Bans of short-haul flights should be considered. Aviation fuels should be taxed and there is an urgent need to introduce environmental aviation taxes. The use of airspace should be limited. Emission thresholds may need to be introduced. The limited number of available flight routes may need to be auctioned. Intermodality and multimodal solutions need to be pursued.

Conclusion

For the past few years, aviation has been operating in crisis mode. During the 'capacity crisis' demand for airspace and ATM capacity has often exceeded supply. During the Covid-19 crisis, that excessive demand has fallen by 90%. All the while, no tangible results have been delivered in addressing the climate emergency. In that respect, the real sense of urgency still seems to be lacking, despite the

[8] The European Organisation for the Safety of Air Navigation, commonly known as EUROCONTROL, is an international organisation working to achieve safe and seamless air traffic management across Europe. It carries out the management of the European ATM network on behalf of the EU. Its mandate includes minimising, where this is feasible, inter alia, in operational, technical and economic terms, any adverse environmental impact.[6] https://www.euractiv.com/section/aviation/news/austrian-airlines-bailout-to-be-linked-to-climate-targets/

[9] Answering a question in the European Parliament, executive vice-president Timmermans has stated in February 2020 that the Commission services have mandated the European Aviation Safety Agency (EASA) to conduct a study addressing the latest scientific developments related to non-CO2 aviation emissions resulting in climate impacts. Due to the scientific complexity of the issues at stake, the fact that new findings are still expected, and the limited pool of experts specialised in this field, the Commission expects to present the analysis in the second quarter of 2020.

European Green Deal and the declaration of the climate emergency by the European Parliament. Should it remain like this? If the Covid-19 crisis is causing the Green Deal objectives to be put on hold, what is to be expected if and when the pre-epidemic status quo is restored?

This paper has attempted to provide a legal basis and a few ideas for moving forward along the propositions of Ms. Ursula von der Leyen's European Green Deal. If there is leadership at the EU level and if undisputed priorities and concepts are based on the right legal basis and clear information, innovative policies may be developed to meet the challenges we are facing. The situation need not remain as it is today.

Covid-19: An Opportunity to redesign Mobility towards greater Sustainability and Resilience?

Teodora Serafimova*

The Mobility-as-a-Service (MaaS) concept has recently attracted considerable interest among policy makers and the industry for its potential to improve the overall efficiency of the transport system and to reduce reliance on private cars in urban centers. By doing so, MaaS can contribute to the reduction of both CO2 emissions and pollution, thereby supporting the advancement of the European Green Deal agenda. While the Covid-19 pandemic has brought about unprecedented challenges for the whole transport sector, it has also highlighted the importance of an agile and resilient transport system to ensure an uninterrupted supply of goods and people. This, in turn, may present important opportunities for accelerating the rollout of MaaS. As a direct result of the crisis, we have seen transport users adapt their travel and working habits, companies expand their functions beyond the transport of people to deliver medicine and food, as well as a more systematic effort by companies to share data to help inform governments' response to the pandemic. Building upon this momentum, by means of a rethinking of public authorities' governing approaches, can help to translate these innovative practices into long-lasting and disruptive changes for the sector.

Introduction

With over 70% of EU citizens currently living in urban areas, achieving sustainability of cities has become one of the defining challenges of our times. While urban areas can enable access to important social and economic opportunities, they have also brought about new challenges related to traffic congestion, air- and noise-pollution, and inefficient transport systems. The shift towards smart and more livable cities therefore places a particular responsibility on the transport sector, which accounts for a quarter of the Union's total greenhouse gas emissions and which is a significant contributor to health-damaging pollution in cities. Achieving the European Commission's objective of making Europe carbon neutral by 2050 will require a 90% reduction of transport emissions compared to 1990 levels, with sizeable contributions across all modes. In its Green Deal communication, the von der Leyen Commission underlines that the shift to a truly sustainable transport sector would entail 'putting users first and providing them with more affordable, accessible, healthier and cleaner alternatives to their current mobility habits'[1].

In parallel to its pursuit of the EU's sustainability agenda, however, the transport sector is confronted with unprecedented challenges triggered by the Covid-19 pandemic and the social distancing strategies implemented to curb its spread. These have not only drastically reduced public transport services but inevitably, have also acted to deter the use of public- and shared- transport, at least in the short-run. In fact, according to data from the urban mobility application Moovit, ridership on major public transportation systems in European cities has dropped by more than 80% since the onset of the outbreak in January 2020. In the hard-hit Italy, public transport ridership has seen decreases in the range between 80% and 90% in every major city[2]. In the short- to medium-term the most urgent priorities will therefore be to address the financial viability of the affected businesses across the industry as well as to ensure the safety of the travelling public once lockdown measures have been phased out.

Notwithstanding, it is precisely during times of emergency as we are facing today, that the paramount nature of a resilient and agile urban transport system, based on Mobility-as-a-Service (MaaS), becomes increasingly obvious in enabling access to health care facilities, while safeguarding an uninterrupted supply of food, medical- and emergency goods. This article discusses current challenges to urban mobility and argues that the Covid-19 pandemic may, in fact, serve as an opportunity for the advancement of the MaaS ecosystem and the demonstration of its true value in supporting the Commission's Green Deal objectives.

The emergence of the MaaS concept

It is widely acknowledged that personal and goods transport entail a significant societal and economic cost in the form of environmental and human health impacts, but

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[1] European Commission (2019), The European Green Deal, https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf

[2] Moovit Public Transit Index 2020, https://moovitapp.com/insights/en/Moovit_Insights_Public_Transit_Index-countries, accessed on 17 April 2020

also in the guise of accidents, congestion, and infrastructure wear and tear. In fact, the overall level of transport-related external costs is estimated to be around €1,000 billion annually, the equivalent of as much as 7% of EU28 GDP[3]. Cost-reflective pricing, regulation and behavioral changes will all have a role to play in internalising these external costs and placing the transport sector on a firm path to climate neutrality. The desired changes, thus, cannot be brought about by the development of a single transport mode or by means of a technological-shift only. In addition, a closer integration of the different transport modes and services will be needed, including both public and private solutions, which, in turn, is at the heart of the MaaS concept.

The MaaS concept dates back to the 2014 ITS Europe Conference in Helsinki, where it was first used to describe an entity offering a mobility package as a subscription service. Subsequently, Finland has pioneered research and financed pilots into the concept. MaaS can be defined as the integration of various forms of transport services into a single mobility service accessible on demand. To meet a customer's request, a MaaS operator facilitates a diverse menu of transport options, be they public transport, ride-, car- or bike-sharing, taxi or car rental/lease, or a combination thereof. For the user, MaaS can offer added value through the use of a single application to provide access to mobility, with a single payment channel instead of multiple ticketing and payment operations[4]. As such, MaaS represents a shift towards a more user-centric mobility paradigm which enables users to plan and book door-to-door intermodal and multimodal trips through a single application which provides real-time journey information and takes into account individual preferences in terms of time, comfort and cost of the trip (Goodall et al., 2017).

A combination of societal and technological trends can be credited with the emergence and growing popularity of the MaaS concept. Firstly, continuous population growth and urbanisation are translating into an increasing demand for mobility, which needs to be reconciled with the EU's sustainability and climate objectives. Furthermore, the simultaneous availability of wireless connection, 3G, 4G, and 5G networks and interfaces such as smartphones and tablets, enable ubiquitous access to shared mobility services for consumers (Nikitas et al., 2017). This rapid penetration of ICTs in the transport sector is increasingly blurring the boundaries between the different transport modes and is, in fact, creating an intermediate level between transport modes and their users, notably thanks to a new data layer. For the users the focus is therefore no longer on the transport mode, but rather on the mobility. Society itself is changing and so are mobility patterns. Drivers' licenses and car ownership have seen a downward trend, as it is becoming generally less attractive for citizens to own a car and the motivation for buying one is primarily based on necessity rather than prestige (Finger, Bert and Kupfer, 2015).

The role of MaaS in achieving the Green Deal objectives

Although a relatively novel paradigm, MaaS holds potential to boost both social and environmental sustainability in cities, while enabling cost-savings for local authorities. The environmental benefits stem from the ability to tackle urban mobility challenges, namely traffic congestion and the consequent air- and noise-pollution, given that MaaS encourages more sustainable transport choices and improves overall system efficiency (Audouin and Finger, 2019). It should, however, be noted that the emission reduction potential of MaaS has been met with reservations by some scholars on grounds that it may lead to an overall increase in vehicle kilometers travelled in lower-occupancy vehicles (Pangbourne et al., 2018). In view of this, to ensure the environmental integrity of MaaS, it should be accompanied by data-led regulations which seek to increase average vehicle occupancy and thus reduce the number of vehicles in circulation (Voege, 2018). In parallel, the adoption of bold emission reduction targets and climate policy for transport, is another key instrument to ensure that MaaS contributes to the advancement of the climate and sustainability agenda.

According to a study based on the pilot project of the UbiGo MaaS initiative in the city of Gothenburg, Sweden, a majority of UbiGo users reported that they would want to continue their subscriptions and participate more regularly in shared urban mobility options as well as public transport, and use their private cars less frequently. The study has also shown that the overall number of journeys performed by private cars, decreased in the city, which, in turn, could mitigate traffic issues. MaaS, furthermore, stands to improve social cohesion and inclusiveness by supporting healthier and more active lifestyles. Not the least, smarter and more livable cities tend to attract more investment, thus creating new businesses and employment opportunities (Nikitas et al., 2017).

[3] European Commission, Directorate-General for Mobility and Transport (2019), Handbook on the external costs of transport, 2019, https://ec.europa.eu/transport/sites/transport/files/studies/internalisation-handbook-isbn-978-92-79-96917-1.pdf

[4] MaaS Alliance (2020), https://maas-alliance.eu/homepage/what-is-maas/, accessed on 19 April 2020

In recognition of these benefits, in its European Green Deal, the Commission promises to develop smart systems for traffic management and MaaS solutions, through its funding instruments, such as the Connected Europe Facility. What is more, provisions stress that automated and connected multimodal mobility will play an increasing role, together with smart traffic management systems enabled by digitalisation. Evidently, the MaaS concept has been elevated as a priority on the EU policy agenda, and discussions on elements crucial to enabling it, such as EU-wide multimodal ticketing and payments systems, are underway. Notwithstanding, a number of regulatory, technological and cultural barriers need to be addressed in order to achieve a truly integrated and multimodal mobility architecture based on MaaS. While the emergence of Covid-19 might be stalling progress on some of these fronts, the paragraphs below argue that the pandemic may unveil new opportunities and act as a catalyst for the deployment of MaaS solutions.

Covid-19: an opportunity for MaaS?

The global economy is projected to contract by 3% in 2020 as a result of the Covid-19 crisis, according to the International Monetary Fund's latest annual World Economic Outlook.[5] Significant reductions in transport usage caused by the pandemic are set to negatively impact many industries in the short- to medium-term, with MaaS being no exception. Companies, governments and individuals are, in fact, already suffering the economic toll of the crisis in the form of loss of sales income, tax revenue and wages. As it is, transport and logistics already account for a significant share of company costs and household expenditures. On average, each person spends €1900 on transport per year, which represents 13% of their spending. In light of this, budget cautiousness will certainly increase in aftermath of the crisis. On the flip side, MaaS and personalised mobility could enable transport users to optimise expenditures. By creating a new service layer, MaaS leads to a more efficient use of existing transport infrastructure which, in turn stands to benefit both public authorities and private companies. From a local administration perspective it means making better use of existing services by connecting them more effectively with their users, which, in turn, offers important cost-savings.

Covid-19 has, in fact, already generated new ways of thinking and of moving both people and goods around. Industry stakeholders have demonstrated a high degree of creativity by reinventing their business models in response to the drastic drop in mobility demand. To name a few, the Italian sports car manufacturer, Ferrari, has shifted production to make respirator parts, while France's national state-owned railway company, SNCF, has been operating 'hospital trains', i.e., high-speed trains transporting Covid-19 patients and medical supplies[6]. Ride sharing companies and taxis are expanding their functions beyond the transport of people to deliverers of food, medicine and other goods.[7] New technologies such as drones and automated vehicles are proving their suitability in carrying out tasks with the minimum human contact that the present situation calls for.[8]

Transport users, too, have changed their usual habits as manifested through the rapid uptake in teleworking and cycling. Consequently, over the past few weeks, numerous studies have indicated improved air quality and reduced emissions in major metropolitan areas around the globe. According to projections by the OECD's International Transport Forum, greenhouse gas emissions from transport are set to be 20% lower in 2020 than under normal circumstances. What is more, a growing share of people are relying on local supply chains and communities, as they take advantage of e-commerce and delivery services. Albeit unintentionally, the implementation of lockdowns has also led to the sudden creation of space, which, in the busy and congested urban areas of today, is a valuable resource. Some cities have gone on to enhance space allocation to cycling, as a greener and more individual way of travelling in line with social distancing regulations.[9]

A rethinking of urban mobility governance models

In order to ensure that these short-term benefits translate into long-lasting and disruptive changes for the sector and city life in general, a careful evaluation of urban mobility governance models is required. Congestion issues coupled with the fact that cars are only used for an average of 5% during their lifetime, have already mobilised support among a growing number of cities for a transition 'from ownership to usership' (Finger, Bert and Kupfer, 2015). Helsinki has gone as a far as planning to make it unnecessary for any of its residents to own a car by 2025, which in turn, is to be achieved not by means of mandates, but rather by rendering the alternative modes of transport more

[5] International Monetary Fund (2020), World Economic Outlook, The Great Lockdown, 2020, https://www.imf.org/en/Publications/WEO/Issues/2020/04/14/weo-april-2020
[6] International Railway Journal (2020), https://www.railjournal.com/passenger/main-line/sncf-to-further-reduce-services-to-combat-coronavirus-spread/, accessed on 11 April 2020
[7] Covid-19: impact on shared mobility, (Movmi Shared Mobility Thoughts, 2020) https://movmi.net/covid-19-shared-mobility/, accessed on 14 April 2020
[8] Kim., Y. T. (2020), Transport in the face of the pandemic, (International Transport Forum, 2020), https://www.itf-oecd.org/covid-19/paradigm-shift-transport, accessed on 12 April 2020
[9] Covid-19: impact on shared mobility, (Movmi Shared Mobility Thoughts, 2020) https://movmi.net/covid-19-shared-mobility/, accessed on 14 April 2020

attractive for residents (Goodall et al., 2017). Covid-19 is an opportunity to act upon this momentum.

Urban mobility policy has traditionally been the responsibility of local authorities. However, our experience with MaaS points to a growing role for the private sector, namely innovative car- and ride-sharing companies as well as e-scooter providers, in driving its development. Therefore, new governance structures involving both the public and private sectors are needed for MaaS schemes to be successful (Audouin and Finger, 2019). The more developed 'service layer' integral to the MaaS ecosystem, also implies a shift of certain powers away from the transport providers to new actors. Yet the network operators need to make the investments as well as to generate the profits to make them. In view of this, it should be noted that the MaaS concept is not fully compatible with (and may even compete against) transport services provided through public service obligations, i.e., services of general interest, which receive state subsidies. Governments would thus need to define the business model of MaaS regarding the role of public transport services. Furthermore, it is well known that employer strategies can be a powerful tool for encouraging the use of public transport, through the provision of subsidies or tax reductions to employees choosing public transport over their private car for their daily commute. The same advantages, however, are currently not guaranteed for commuters choosing MaaS. In view of this, a recognition of the benefits of MaaS by local authorities and the enactment of similar corporate or government subsidies and tax reductions can enable MaaS to be successfully implemented (Li and Voege, 2017).

Given its multimodal nature, MaaS enables alternative ways of moving both people and goods about, from public transport to taxis and rental services to micro-mobility, thus enhancing the flexibility and reliability of the mobility network and the community it services (Sochor et al., 2015). Reaping these benefits calls for, among other things, a strategic integration of physical infrastructure so as to enable the seamless transfer between transportation services, such as bus and rail interchanges, or bike and car sharing spaces at stations. This increased integration of the different transport modes in a MaaS ecosystem raises some important questions relating to passenger rights and liability issues. In a multimodal reality, the insurance status of the traveler varies depending on the transport mode they are using and on the respective passenger right scheme. This can significantly complicate things in the case of interruption at any point of the travel chain for offers that are purchased in packages. Whereas the airline industry has successfully managed to overcome this issue by clarifying liabilities and rights of travelers that book via online platforms or travel agencies, more work remains to be done when it comes to integrating completely different systems such as rail, air taxi and urban public transport (Finger, Bert and Kupfer, 2015).

A catalyst for data sharing?

Transport companies and operators will, furthermore, have to undertake sufficient safety measures (e.g., cleaning, protective screens and spacious seating) with a view to safeguarding the safety of passengers in the transition period towards the 'new normal'. This, once again, presents an opportunity for the uptake of MaaS by enabling access to detailed real-time information on the relative 'safety' of alternative trips (e.g., crowding levels, time-in-transit and frequency of cleaning) in order to guarantee that passengers can make informed travel decisions. Though the need for operators and authorities to share high quality and standardised data has long been acknowledged as a precondition to making MaaS a reality, the arrival of Covid-19 has acted to amplify the requirement for data while facilitating its sharing.[10]

Access to various types of mobility data enhances public authorities' visibility over their territories thereby allowing them to better target policies. The sharing of data across transport service providers is also key to enabling multimodality, allowing passengers to fully benefit from the available public and private offerings, and ultimately reducing infrastructure costs. Thus far, however, an important barrier for MaaS has been the lack of trust and willingness to cooperate and share data among public transport operators, providers of shared urban mobility as well as providers of digital interfaces and electronic applications. In part, this can be explained by the fact that transport service providers have been cautious about their services becoming increasingly 'commoditised', thus diminishing their ability to build a closer relationship with travelers (and to gather data on them). This results in missed opportunities for more efficient pricing (Montero and Finger, 2018).

Interestingly, since the start of the outbreak, we have started witnessing a more systematic effort by private companies to share data with governments. In the UK, for example, the Department of Transport and ITS UK have worked together to collect data on traffic flow, traffic movements,

[10] Witzel, S., (2020), From lockdown to lifeline: how overcoming COVID-19 can kick-start the Mobility-as-a-Service revolution, (Skedgo, 2020), https://skedgo.com/from-lockdown-to-lifeline-how-overcoming-covid-19-can-kick-start-the-mobility-as-a-service-revolution/, accessed on 14 April 2020

[11] Seymour, T. (2020), DfT urgently collects UK transport data to support COVID-19 response, (Smart Transport, Connecting Policy to Solutions, 2020) https://www.smarttransport.org.uk/news/latest-news/dft-collates-transport-data-to-support-covid-19-response, accessed on 14 April 2020

parking, cycling and pedestrian movements to help inform the Government's policy response to the pandemic.[11] This is just one of many examples of public-private partnerships formed to foster evidence-based decisions to help combat the pandemic.[12]

Having said that, outstanding issues remain to be addressed in relation to data sharing. These include the standardisation of data exchange formats, while, at the same time, securing sufficient flexibility to incorporate new systems as they are being developed. Public authorities have a clear role to play in facilitating data sharing by establishing the necessary standards. Standards are key to guaranteeing the quality of data while bringing down the costs linked to its exchange. The increase in the use of ICT-based transport services also carries risks which need to be addressed. Those who have access to the data and thus control the information, have immense power. This, in turn, means that the data and information can be abused, which can result in market distortions, security risks, and diminished privacy protection, among others. This, of course, touches upon the controversial question of who should be entitled to set up digital platforms. To achieve a fully transparent and equal system an independent body would have to be in charge of this task in the future (Finger, Bert and Kupfer, 2015).

While EU action has clear limits in the local and municipal spheres, where the subsidiarity principle safeguards Member States' competence to take legislative actions and decisions, reaping the full benefits of MaaS rollout calls for a coordinated approach continent-wide. In view of this, Sustainable Urban Mobility Plans (SUMPs), as the cornerstone of the Commission's urban mobility policy, can be a powerful tool to aid this by incorporating wider current and future technological developments, such as automation and ITS, MaaS, and shared mobility.

Conclusion

Only an agile mobility system that can serve a diverse set of needs will be resilient and sustain its ability to transport people and goods even at times of emergency – be it a pandemic, an environmental disaster or other. By matching mobility 'supply' with 'demand', MaaS operators can optimise the use of transport infrastructure and the overall efficiency of the transport system. This, in turn, translates into numerous socio-economic and environmental benefits, such as a reduction of congestion, higher productivity, lower emissions and better air quality, fewer traffic accidents, and a smaller urban footprint for parking.

While the Covid-19 crisis has profound implications for the global economy and transport network, it has also resulted in a high degree of creativity in responding to the crisis, as manifested through changes in business models across the industry, altered habits of transport users, as well as the more concerted effort by private companies to share data so as to help shape evidence-based government policies and decisions in response to the pandemic. Building upon this momentum can help to pave the way towards a more sustainable, integrated and reliable mobility system, while contributing to the Commission's decarbonisation and digitalisation agendas. MaaS represents a paradigm shift, and this calls for a departure from the silo-approach in regulating mobility, to reflect the much closer integration between transport modes and services.

[12] Kim., Y. T. (2020), Transport in the face of the pandemic, (International Transport Forum, 2020), https://www.itf-oecd.org/covid-19/paradigm-shift-transport, accessed on 12 April 2020

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IGLUS Executive Master's Programme

What is IGLUS?

IGLUS is an action-research program that seeks to contribute to the better governance of increasingly larger, complex and dynamic urban systems. We have a special focus on the governance of urban infrastructure systems, namely transport, energy, blue (water, wastewater), green, and brown (buildings) infrastructure, increasingly permeated by digitalization. The program has a problem focus as well as a resolutely interdisciplinary and action-oriented approach.

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Network Industries Quarterly, Vol. 22, issue 3, 2020 (September)

"Sector Coupling: How to Regulate Convergence?"

Presentation of the next issue

In the next issue we would like to explore the **link between the different infrastructure sectors, especially in terms of regulating interfaces between the sectors, as well as regulating more integrated and converging sectors.**

Historically most infrastructures have developed independently from one another and constitute self-contained socio-technical systems. This is, for example, the case of electricity, of gas, of telecommunications, of air transport, and also of railways. Consequently, regulation was set up in a self-contained, sector-specific manner.

However, this way of doing things cannot continue into the future, as the different infrastructure sectors are converging. There are several reasons for this. First, the technological and economic dynamics triggered by liberalisation have led to new technologies, often at the interface of the different sectors (e.g., power-to-gas), along with corresponding cross-sectoral business strategies.

Convergence also results from recent developments of digital networks (and, in particular, of the fifth generation of wireless technologies, the 5G) which increasingly act as drivers of convergence between sectors, leading to cross-sectoral and much more integrated infrastructures services (e.g., 'Mobility-as-a-Service' or MaaS). The take-off of the Internet of Things (IoT), based on 5G networks, which is considered to be the next Industrial Revolution, is expected to accelerate this trend.

Finally, climate and other ecological challenges force a direct comparison between different sectors, such as in the case of externalities caused by energy generation (by renewables or by fossil fuels) or by the different transport models.

For all three reasons, a more convergent view of the different network industries is rapidly emerging … but will it translate into converging regulation or even into the regulation of this convergence?

The next issue of the Network Industries Quarterly will be dedicated to **some of the best papers presented at the Ninth Conference on the Regulation of Infrastructures**, organised by the Transport Area of the Florence School of Regulation in June 2020.

networkindustries quarterly

Open Call For Papers

Implementation of the liberalization process has brought various challenges to incumbent firms operating in sectors such as air transport, telecommunications, energy, postal services, water and railways, as well as to new entrants, to regulators and to the public authorities.
Therefore, the Network Industries Quarterly is aimed at covering research findings regarding these challenges, to monitor the emerging trends, as well as to analyze the strategic implications of these changes in terms of regulation, risks management, governance and innovation in all, but also across, the different regulated sectors.
The Network Industries Quarterly, published by the Chair MIR (Management of Network Industry, EPFL) in collaboration with the Transport Area of the Florence School of Regulation (European University Institute), is an open access journal funded in 1998 and, since then, directed by Prof Matthias Finger.

Article Preparation

The Network Industries Quarterly is a multidisciplinary international publication. Each issue is coordinated by a guest editor, who chooses four to six different articles all related to the topic chosen. Articles must be high-quality, written in clear, plain language. They should be original papers that will contribute to furthering the knowledge base of network industries policy matters. Articles can refer to theories and, when appropriate, deduce practical applications. Additionally, they can make policy recommendations and deduce management implications.
Detailed guidelines on how to submit the articles and coordinate the issue will be provided to the selected guest editor.

Additional Information

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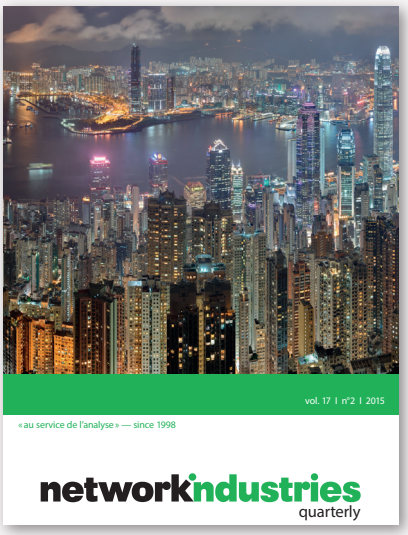

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