Smart Mobility

Why today's degree of mobility is limited, and how our approach to transport needs to develop in order to achieve a more sustainable mobility.

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Developing lifestyle in the past 30 years shows an increasing focus on spatial flexibility, and a major success factor of economies in this period has been the availability of transport modes, from developed nations by increasing living standards, to China, where economic growth is largely based on mass export. But the question arises if the way transport is conducted has a future, from global cargo flows to individual commuting. With oil prices oscillating widely, infrastructures collapsing and an increasing awareness for ecological issues, our mobility approach we administer today needs to be rethought. A new mix of traditional modes together with steady technological innovation and people who use them is needed to make global mobility reliable, ecological friendly, human and sustainable – or in one word: smart.

Today's Mobility and its limits

The transport sector of the EU alone accounts for over 10 % of the union's GDP and is crucial for economic competitiveness as well as cultural development – however many recent studies express concern over the cost of externalities from the mobility sector, which not only are related to pollution, but also to: 'safety, (…) noise pollution, competition for urban space, balance of payments problems and risks associated with importing oil'. [IEA, p.493].

Growing Emissions, Growing Share

The most pressing issues to solve are the externalities of air pollution and emissions. And there is a long way to go in the mobility sector: worldwide transport is still 97 % dependent on oil, a depleting resource, and a quarter of carbon emissions from fuel combustion origin in the transport sector. Moreover, transport is one of the few sectors, where the shares of total emissions, as well as the absolute amount of emissions are still growing. And the development is not yet peaking: the latest IEA and IPCC projections expect transport emissions to double until 2050. By far the highest contribution comes from road transport, accounting for nearly ¾ of total transport emissions. While emissions over time have been growing slower than economic power, they have developed faster than the world's population.

Edging Capacities

4.2 billion hours. This is the amount of time US citizens last year spent waiting in traffic jams. To set this into relation: almost one full working week for each traveler gets wasted while waiting bumper to bumper. While this might individually be perceived as annoying, the impact in the whole is disturbing, not only on the side of quality of time spent and efficiency of work societies but even more on the side of infrastructural challenges and pollution. Capacity of roads and efficiency of road dependent individual traffic have edged. Accordingly, public spending patterns contain a large amount of road infrastructure investments. This means increasing the system's capacities instead of shifting transport to different modes, giving in to growing individual automotive traffic instead of policing transport as a whole.

While those two issues are only spotlights on the full theme of transport externalities mentioned in the beginning, they demonstrate that a smarter mobility needs to be developed.

Smart Mobility: New approaches to transport

Three main levers that interact together in a chain will lead to Smart Mobility. All levers have to be adjusted to change today's mobility towards a more sustainable one.

Policies and Regulations

Policies are needed to foster behavioral changes as well as to build up incentives for developing and deploying innovative technologies. This means that policymaking often is the starting point of major changes in personal choices or leaps in technology, giving it a critical role. After the recent failure to commit to emission reduction goals in Copenhagen, pressure is growing to translate the goals of the Kyoto Protocol into tangible actions. To rely on changes in personal patterns alone would deny the power of people's and corporate response to incentives (meant are both taxation and subsidies in combination) and would lack common macro goals that can be broken down.

Technology Innovations

Technological innovations and their translation into

smarter mobility offerings form the second critical lever of smart mobility. They function as enabler for personal mobility patterns and they sometimes open up new options for policing. Modal energy intensity and fuel mix are both highly driven by technological development. While mobility inventions in the last decade are impressive, only few have reached market readiness. This largely depends on the incentives policymakers set and on the personal choices of the users in the end.

Individual Mobility Behavior

Individual mobility choice patters are the final lever in the chain. While inventions may be developed self-sufficiently, real technology innovations will only develop if there is a market for end usage. That individual choice or behavior is the most critical go/no-go element towards Smart Mobility. It will respond to and is strongly influenced however, by the right policies and incentive schemes to make the mobility choice a sustainable one. While ambassadors and early adaptors are needed, there is no choice but to focus on policies that generate a critical and broad number of people that show a drastically different mobility pattern individual by individual.

Elements of Smart Mobility

The IEA proposes a simple equation to model the levers that influence emissions from transport. Coming from the idea that individual behavior and policy are the most critical levers for smart mobility and based on this model, we visit some of the factors and highlight possibilities for a smarter mobility. Since the equation is fully multiplicative, several small changes at the same time can lead to a high leverage in transport emissions.

Causative Contribution

Maybe the most powerful and most complex policy lever is the internalization of external cost, so that transport modes, and individual patterns reflect e.g. the emissions they cause in their actual cost. The usage dependent street toll models, or the performance oriented taxation are only two examples of the vast policing options available. The complexity this topic holds however is shown on the various side effects and discussions on fairness. What is needed here much more than hesitant single actions, is the setup of a general strategic and common master plan not only on targets but on the means to reduce emissions – and then its consequent deployment.

Total Mobility

An increasing degree of urban sprawl in the last decades and the development of out of town centers make longer daily travel distances necessary. Urban planning needs to redefine spatial patterns respecting new criteria – policing needs to set the right incentives to decrease commuting and cargo traffic, for example by reexamining the patterns of commuters' tax reliefs or by incentivizing home offices.

Capacity Utilization

An enormous amount in emission inefficiency is originating in the strong individualization of personal traffic, which underutilizes the capacity of most means of transportation. Individual vehicle occupancy also highly contributes to above demonstrated edging of road capacities. There seems to be little incentives besides well meant exceptions in some urban areas.

This being more a behavioral than a utility pattern, the case for cargo looks different: The needs for just in time deliveries, the risen value per tonnage of freight and other aspects have increased opportunity cost for an optimized utilization of cargo capacity. An internalization of external cost can help to make sustainable decisions. Also, pooling of individual transport modes – be it cars, bikes, even private aircraft can lead to an overall smarter mobility: 'at the spot' availability of pooled individual modes via placement at connecting nodes will increase utilization and cater to modal shifts. This way, utility of public transport increases - even if the final destinations are distributed remotely, and not on trunk routes.

Corporate Leadership

Corporate leadership plays a key role in the transition towards Smart Mobility. Offerings such as carbon-neutral transport services demonstrate that corporations no longer wait for environmental or social policy regulation to start acting on sustainable practices and solutions. Sustainability has become a key differentiator factor in nearly every industry, where corporations compete for sustainability leadership position expressed in indices such as the Dow Jones Sustainability Index. Corporations with their financial and technological capabilities, with international reach as well as capabilities for dynamic change play key roles to develop and market the innovations services required for more sustainable mobility.

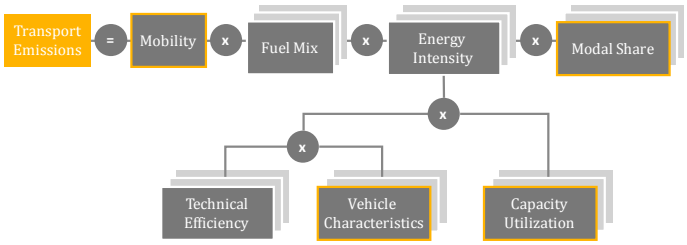
And they own a significant share of demand for transport services. Leading corporations in sustainability systematically measure the carbon footprint in their manufacturing and transportation network and set long-term reduction targets. These measures are embedded in long-term strategies that aim for using sustainability as competitive advantage and key lever for long-term value creation.

Efficiency

Personal Choice plays an important role with long term decisions on transport modes and their efficiency, but it needs to be directed and incentivized by policymakers. While cars got increasingly efficient in the last years per km and kg of car, this effect did get totally absorbed by the weight and performance attributes of cars. This again demonstrates that technology needs to be in line with behavioral changes, or it won't have any effect.

Shift to Clean Modes

"In 10 years, I want to have at least one million electric cars on the road". Those statements by policymakers such as the German Federal Minister of Transport might be proof of the consciousness that a strong shift towards clean means of energy is needed. As long as they do not result in a policy which is even as drastic however, no such development can just be anticipated. Additionally, one million electric cars would be a share of 2 % c.p. - not nearly enough for a sustainable mobility. Many of the above patterns will help towards a better modal distribution. Together with increased investments in public transport, the right political incentives for use of clean transport they will help the most critical part in the chain – the individual's choice – to really change the pattern of mobility to a significant higher modal share of clean transport modes.



▶ *Simple Model for Emissions from Mobility. Noticable are the only multiplicative relations, where small changes in various parts have a leverage in the whole equation. Yellow frames assigned to factors where behavior and choice matter. [IEA, pp. 494]*

Conclusion

Technological possibilities are on their way of being developed: what we need even more now, are committed and structured policymakers on the starting edge – entrepreneurial spirit and corporate initiatives for innovation and sustainability leadership in companies and a broad base of individuals with a long term view that turn their conscience into actions and change their patterns in the end. We highlighted that the degree that transport lacks sustainability is high, and that we cannot reach smart mobility by incremental changes but only by a radical approach, shown at different patterns we introduced. Those patterns are not collectively exhaustive, and rather demonstrate vectors of possibilities.

While mobility itself might represent a value in societies that demand and characterize themselves through dependencies and connections, transport and its means need a revamp towards a less straining, swifter and smoother, and above all: a more sustainable, a smart way.

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