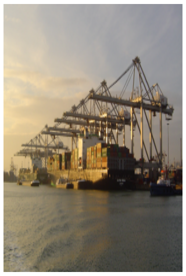
1. **Opinions**



Mobility and Environment : the European ambiguity

Yves Crozet

Under the COP 21 UN Framework Convention on Climate Change, the European Union has committed itself to significantly reducing CO2 emissions, in particular from transport. By 2030, transport, which accounted for 60% of the EU's emissions in 2014, is expected to reduce its emissions by 30% when compared with 2005 levels. However, this objective seems very ambitious in the light of recent developments. Although emissions fell in 2009-2011 due to the economic downturn, they subsequently picked up again as economic growth resumed. Thus, in 2017, France's transport emissions were only slightly lower than in 2000.

This means that even if emissions growth can be avoided, any reduction is much more difficult. We will demonstrate this by highlighting the failure of the modal shift that has been a central objective of public policy for the last 20 years. As the limitations not only of the modal shift but also of pricing have become clear, what other options are available (see Box 2)? Will lower unit vehicle emissions and higher occupancy rates suffice? Or will mobility and thus economic growth also have to be curbed?

Four key ways to reduce greenhouse gas emissions

The overall objective of reducing greenhouse gas (GHG) emissions in the transport sector can be broken down into a few key variables. For each type of transport (passengers or goods) and for each mode of transport (road, rail, water, air, etc.), total emissions depend on a share of traffic – in passenger-kilometres (pkm) or tonne-kilometres (tkm) – multiplied by unit emissions per pkm or per tkm. These unit emissions are calculated by taking into account the unit emissions of the various vehicles and the occupancy rate. This gives the following formula:

GHG emissions =(Trafic x Unit vehicle emissions)/(Occupancy rate)

With the formula provided in Box 2, the reduction in total emissions is easy to calculate. For each mode of transport, the solution entails:

1. reducing traffic (passenger-kilometres or tonne-kilometres);
2. lowering unit vehicle emissions; or
3. increasing occupance rates;
4. In terms of overall mobility one can also organise a vast modal shift, i.e. a progressive reduction in the traffic generated by modes of transport that structurally emit the most pollutants towards those that emit the fewest because they consume the smallest quantities of fossil fuels. This fourth way – the modal shift – has been prioritised by the EU since the 1990.

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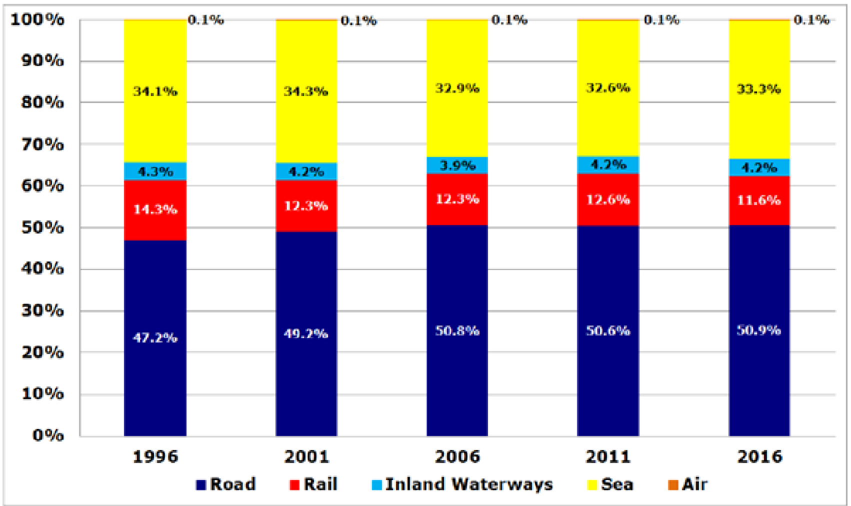
1. The limitations of the modal shift

The modal shift was central to the EU's 2001 and 2011 White Papers on Transport. This was particularly the case for goods, which were supposed to switch from road to rail and water on a massive scale. To this end, the European Union identified corridors along which transport infrastructure – mainly rail – needed to be built or improved so as to create a genuine trans-European transport network (TEN-T).

Evolution of the modal shares for freight transport in Europe



Source : Modal shift in Europe, a way forward p. 29.

For passengers, high-speed rail projects had the same objective, i.e. to offer an alternative to intra-European air travel. With its emphasis on the development of public transport, the modal shift also concerned passengers in urban areas.

As the end of the decade approaches, the results of the modal shift are far removed from the original objectives, as a report recently submitted to the European Parliament makes clear [1]. The introduction to the report stresses that: 'the modal share of road, rail and inland waterway transport remained substantially unchanged between 1996 and 2016, both for passenger and freight transport, with road transport showing a slight increase. Looking at future projections, road transport is expected to keep its predominant position both for the passenger and freight sectors.'

The results are not entirely negative, though. In city centres in particular, vehicle traffic and pollutant emissions have fallen, at the same time as public transport and soft mobility (walking and cycling) have developed. However, the further one moves away from densely populated areas, the more difficult it is for rail to compete with road or air. This is illustrated by two examples: road freight transport and long-distance passenger transport.

As far as the transport of goods is concerned, the star pupil in the European class is Germany. In the case of rail, the success of German freight operators (with a 40% increase in traffic between 2000 and 2017) is indeed impressive (at the same time in France, rail traffic fell by 40%). However, this performance is not all that it seems to be, as road transport's share of the market has not fallen. If a modal shift has taken place, it has not been from road to rail, but from water to rail, as the table below shows. This is worrying in view of the ambitions which the European Union set for itself in the 2011 White Paper. The fact is that roads seem likely to retain their dominance in the foreseeable future, for the simple reason that they are the only mode of transport that offers a door-to-door solution for goods – which cannot transport themselves – without the need for offloading. Furthermore, the road network provides access to the country's entire territory, which is not true of the railways.

Evolution of the market share in freight transport in Germany

	2000	2005	2010	2015	2016
Waterways	15 %	12 %	10,8 %	9,2 %	8,8 %
Rail	18 %	18,1 %	18,7 %	19,5%	18,8 %
Road	67 %	69,9%	70,5%	71,3%	72,4%

Source : Eurostat

Another structural limitation of rail freight is the development of supply chains, where warehouses play a key role. The fact is that goods rarely travel directly from manufacturer to customer. Given the large volumes involved, they make several short trips of a few hundred kilometres from one warehouse to another before they reach their final destination. Rail transport is simply not competitive in such cases, not only because warehouses lack line connections but also because the distances covered are relatively small in relation to the scale at which rail is relevant (journeys of over 500 km).

All this means that the various modes of transport do not operate on a level playing field. Indeed, such are the advantages of road transport (i.e. speed, flexibility, reliability, adaptable volumes, and no offloading) that it has become the most obvious solution.

In its special report 19/2018, published in September 2018, the ECA has painted a critical picture of the state of high-speed rail. The European HSR network tripled in size between 2000 and 2016, from 2 708 km to 8 200 km. At the same time, however, traffic only doubled in size to 124 billion pkm. Given this situation, does the network really need to triple in size between 2010 and 2030, as the 2011 White Paper recommends? The question arises because the network has been extended since the beginning of the century at the same time as yields have been falling. After reaching a maximum of 21.9 million pkm per km of network in 2001, the rate of increase dropped by 50% in 2016 [2]. This was the result of lines being brought into service with a potential that was lower than the HSL relevance threshold of 9 million pkm/year. The report singles out three new lines (Eje Atlántico, Madrid-León and Rhine-Rhône) whose traffic is well below this threshold. However, many planned HSLs also fall into this category.

2. Income and substitution effects in the area of transport

The limited progression of traffic on HSR lines contrasts with the success of air transport, where low-cost airlines have made high-speed rail less attractive, not because of direct point-to-point competition – which is relatively infrequent – but because of the incredibly wide range of destinations that customers are offered. These days, when Europeans are deciding where to spend their holidays, they no longer start by choosing their destination, but consult airline websites first to see what is on offer. Increasingly, they also choose a mode of transport before deciding on their destination. This trend is clear in France, where TGV traffic increased by 12% between 2008 and 2017, at the same time as passenger numbers between mainland France and Europe rose by 39%. The fact that more and more airports are connected to a high-speed rail line means that the TGV now serves as a complement to rather than as a substitute for air transport, as the 2011 White Paper stated.

In the area of air transport, EU policies run up against their own contradictions. For decades, transport policies in developed countries have been based on the idea that the external benefits of mobility should be extended to the entire population. Thus, road tolls disappeared in Britain and France at the beginning of the 19th century; indeed, roads are still mostly toll-free in the UK. In France, 99% of the national road network of more than one million kilometres is also still toll-free. Extending transport networks obviously acts as an incentive to increase the number and length of journeys. At the same time, the EU is promoting the development of competition as a key factor in reducing costs and increasing demand, as was found to be the case for air transport. Deregulation of the sector has led to a significant drop in ticket prices. For intra-EU travel, passengers pay around 5 cents per kilometre, i.e. half as much as travelling by train (10 cents) and five times less than travelling by car (around 25 cents). It is therefore hardly surprising that the number of passengers in airports is increasing much faster than rail and road traffic. There are two main reasons for greater passenger mobility:

- The first is the trend towards a general increase in purchasing power: on average, the cost of motorised mobility is falling. Thus, in France, recipients of the minimum wage in 1972 needed to work for one hour in order to purchase three litres of petrol. 47 years later, they can buy six litres, and as their cars consume almost half as much fuel, they can drive four times further per hour worked. As car prices have fallen, the ‘economic speed’ [3] of passenger cars has quadrupled;
- As well as this income effect, there is also a substitution effect caused by the variation in relative prices. Cheaper plane tickets have stimulated demand for air travel, whose economic speed is now five times that of the automobile. For one hour of work, a recipient of the minimum wage can now travel 200 km by air, but only 40 km by car.

The same combination of income and substitution effects has impacted the transport of goods:

- As competition in road freight transport (RFT) began to develop in the 1970s, i.e. more than 20 years earlier than for rail transport, RFT achieved significant gains not only in terms of productivity – a factor in price reductions – but also in terms of quality and reliability. Thus, although road transport remains significantly more expensive than rail, it is rail – which was still dominant in the mid-20th century – that has seen its market share steadily decline because it is less adaptable.
- The substitution effect was amplified by the equivalent of an income effect because the per-tonne value of goods increased. As a consequence the purchasing power of goods is increasing. The cost of transport represents a declining percentage of the value of goods. It is therefore not surprising that a more economical road-based service for goods has been preferred over rail and its attendant constraints.

3. Reduce unit emissions … or growth

It is not just travellers but also goods that are now covering ever greater distances, primarily due to economic growth. This means that purchasing power is increasing more than transport costs. Deregulation and competition are also factors here, as they have helped to lower the relative prices of the modes of transport that rely most on fossil fuels, i.e. road and air. The equation in Box 2 leaves only two means of reducing CO2 emissions from transport: one is technical and the other is economic.

The technical solution entails reducing unit vehicle emissions while increasing their load factor. This is exactly what air transport has achieved over the last 20 years. However, as traffic has grown significantly, CO2 emissions from aircraft – although they have barely increased – still account for 10% of transport emissions as jet engines still consume fossil fuels. In order to reduce unit vehicle emissions, their source of energy therefore needs to change, which is why the emphasis is now on electrifying cars and ¬– to a certain extent – lorries. In order to achieve this, the European Union is envisaging binding standards for car manufacturers so that all new vehicles sold emit less and less CO2 per kilometre. Several countries, including France, are envisaging banning the sale of vehicles powered by internal combustion engines from 2040, the aim being that all cars should be electric by 2050.

However, what are the chances of such an objective being achieved and – even if it can be – what will the actual impact on CO2 emissions be? These two questions are worth asking. First, because announcing the electrification of cars is reminiscent of the announcement of the modal shift 15 or 20 years ago; and second, because electric motors use electricity that may have been generated from fossil fuels. Battery production and recycling are also sources of CO2 emissions. It is therefore highly likely that climate commitments in the transport sector will be difficult to achieve by purely technical means.

There remains the economic solution, but this entails calling into question the very principle of economic growth. This could take the form of regulations and fiscal disincentives that are explicitly designed to reduce economic activity – and thus the flow of people and goods – by curbing income growth. However, such a scenario is not currently on the public policy agenda as it has significant adverse effects, not least in terms of public revenue.

Conclusion

A lucid assessment of the transport sector suggests that it will be very difficult for EU Member States to achieve their commitments to reduce CO2 emissions. The limited results achieved over the last 20 years suggest a need for prudence in the face of optimistic pronouncements. The emphasis has now switched from the modal shift to electrification. However, even if electrification develops, it will be no panacea.

It is therefore highly likely that in a few years we will be faced with a dilemma that will force us to clarify the current ambiguity: either we commit to negative economic growth in order to reduce passenger and freight traffic, or we acknowledge our inability to reduce our reliance on fossil fuels to the extent that we had hoped. Although such an alternative is now increasingly likely, it is difficult for policymakers to accept, particularly when they ponder the well-known aphorism by Cardinal de Retz (1613-1679): “It is to one’s own detriment that one ceases to be ambiguous”.

Notes

1 *Research for the TRAN Committee - Modal shift in European transport: a way forward* , Study requested by the TRAN Committee, Policy Department for Structural and Cohesion Policies, Directorate-General for Internal Policies, PE 629.182 - November 2018, 174 p.

2 The figures for 2016 were 19.2 in France, 17.5 in Italy, 12.7 in Germany and 5 in Spain, a country which has over-invested in HSR.

3 Crozet Y., 2017, "Économie de la vitesse: Ivan Illich revisité", in *L'économie politique* n°76, p. 24-37.

Mobility

For the Mobile Lives Forum, mobility is understood as the process of how individuals travel across distances in order to deploy through time and space the activities that make up their lifestyles. These travel practices are embedded in socio-technical systems, produced by transport and communication industries and techniques, and by normative discourses on these practices, with considerable social, environmental and spatial impacts.

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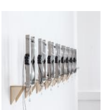

Texel. Suspending time at the train station.

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