FRANCE22

# Decarbonising mobility
# The future of transport infrastructure financing

EUROPEAN CONFERENCE

**22 FEBRUARY 2022**
**MAISON DE LA CHIMIE, PARIS**

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# SOMMAIRE

# AFIT FRANCE- UNIVERSITÉ GUSTAVE EIFFEL

With the development of active mobility, the electrification of cars, the boom in rail and river freight transport, as well as the relaunch of night trains, the transport sector has embarked on a major transformation, which now needs to be further accelerated. These changes are essential if we are to respond to the climate emergency and meet the ambitious goals we have set ourselves (55% reduction in GHG by 2030 and net zero emissions by 2050). Achieving the decarbonisation of mobility, which is one of the major issues of the next few years, means addressing multiple challenges, including: how can we construct transport infrastructures that are more sustainable, produce low emissions and use a minimum of natural resources? Which drivers should be given priority to encourage a modal shift? What adaptations are required to take account of the changes in our lifestyles and transport requirements? How can we ensure social and regional equity in mobility? What arrangements need to be put in place to promote active mobility and shared mobility ?

The considerable scale of the transformations envisaged, imposes a need for careful consideration upstream, particularly in order to find adequate funding.

Given the issues concerned and the complexity of the responses required, we felt it essential to have an overview of the views of the European infrastructure funding agencies and political decision makers – with the input of researchers – in order to elicit the most relevant solutions. With this in mind, during the French Presidency of the Council of the European Union, and in partnership with Cerema and TDIE, we held our European conference: "Decarbonising mobility: the future of transport infrastructure financing" on 22 February 2022, at the Maison de la Chimie, in Paris.

Offering the opportunity to explore perspectives, this conference allowed a fruitful exchange of views and highlighted the importance of all forms of innovation (in technology as well as governance) in decarbonising mobility. We now wish to share this with you by publishing these proceedings.

**Christophe BECHU**
**President of AFIT France**

**Gilles ROUSSEL**
**President of Université Gustave Eiffel**

The goals set by the European Union and its Member States in the fight against climate change represent a significant challenge for the world of transport.
While a consensus seems to be emerging in the converging calls from civil society and economic and political actors to define proactive policies, the implementation of the ecological and energy transition for transport gives rise to much discussion on the modalities, the drivers, the resources to be allocated, and the distribution of efforts between the public sector and economic actors.
Transport is a service industry in which the quality and efficiency demanded by the users are very closely linked to the performance of the infrastructure networks. Whether it relates to persons or goods, the decarbonisation of mobility thus requires a clearly defined infrastructure policy, designed to link the long-term vision of carbon neutrality (2050), medium-term planning (ten to twenty years) and short-term programming (five to ten years).
The key drivers determining the action have been identified. They are already included in policy documents or shared strategies being used by the European Union and the Member States to set out their plans and common intentions: modal shift (development of alternative services to single occupancy car use, increased mass use of rail and waterways for freight), modernisation and adaptation of infrastructure to cater for new forms of motorisation and of use, or regulation and pricing of the use of infrastructure (user-pays and polluter-pays principle). At the same time, the now frequent indications of climate change have demonstrated the need for resilience in infrastructure networks and transport systems.
At a time when the institutions of the European Union are discussing the legislative proposals set out in the Fit for 55 package presented by the Commission in July 2021, just a few weeks after the presentation of the proposed revision of European regulations on TEN-T, the initiative taken by AFIT France and the Université Gustave Eiffel during the French Presidency of the Council of the European Union was exceedingly well timed. Working together with Cerema in the preparation and implementation of this project, the TDIE think tank which we represent is delighted to take this opportunity to share the twofold observation that the decarbonisation of mobility is a central issue in the infrastructure policies and funding strategies of the future, and that this collective pathway should be considered at European, regional and national levels.

**Philippe Duron and Louis Nègre,**
**Co-Presidents of the think tank TDIE (Transport, Development,Intermodality, Environment)**

Decarbonisation. This is one of those concepts that has not yet been completely integrated into our digital environment, as evidenced by the red line that appears below it when one types the word [in French], as if it were an error. Yet it has become an everyday concept for decision-makers in the field of infrastructure investment as a prerequisite for the short, medium and long term viability of this infrastructure; likewise, its resilience, which is another concept that now challenges the convictions of our predecessors in the construction of these same infrastructures.

The present conference, organised in partnership with Cerema under the French Presidency of the Council of the European Union (PFUE), gave the opportunity to a range of actors in the system to present their views on and their experiences of the subject, based on one certainty: climate change will require us to consider decarbonisation as a prerequisite and a crucial criterion for choices related to the decisions on investment, improvements or replacing infrastructures that are a fundamental element of mobility. We will thus have to adapt our decision-making process to the demands of this decarbonisation. Something we have been doing at Cerema for some years now, bringing together fundamental research, expertise and public policies, as was also done by the various panellists during this productive day.

We are well aware that we are living through a period of history in which the stakes are increasingly global, and the corresponding solutions increasing local. We therefore need to find a way to reconcile these extremes on the same stretch of road or railway line; to adapt vehicles, fuels, behaviour and routes; to develop resilient infrastructures or to decide to find ways of eliminating movements, or at least limiting their length and frequency, as the concept of compact cities is encouraging us to do following years of urban sprawl, anarchic development of peripheral areas, and desertification and dereliction of city centres. Cerema is actively involved in many of these areas, however we need to work together to envisage and implement fitting solutions, with Europe as our driver and European construction as our compass.

A number of promising directions have been put forward by the speakers at the conference and I would like to thank those who initiated the event, AFIT France and the Université Gustave Eiffel. Everyone has fully understood that the question of decarbonisation is at the heart of adapted and sustainable investment decisions for transport infrastructures. Selecting this topic as the major thrust of this event, which has proved to be enlightening, useful and energising, has placed France at the heart of European thinking on this subject.

I hope you will enjoy reading this publication.

**Pascal Berteaud**
**Executive Director of the Cerema**


# INAUGURATION

## OPENING OF THE CONFERENCE

**Sandra MOATTI, Director of the Ihédate (Institute of higher regional development planning studies)**
This European conference on the future of mobility and the challenges facing transport infrastructure financing is organised by the Transport Infrastructure Financing Agency (AFIT France), with Gustave Eiffel University, in partnership with Cerema and TDIE, a specialist transport think tank.
It falls within the ambit of the French Presidency of the Council of the European Union and is part of the series begun at the annual Gustave Eiffel University conference, the FUTURE Days[1] , with a special session on decarbonising mobility in December 2021 and a hackathon organised with students at Gustave Eiffel University and its partner universities in Europe.

**Jean-Bernard KOVARIK, Vice-Chancellor of Gustave Eiffel University**
We stand at a particular moment in time in which, in the wake of the Covid pandemic, the countries of the entire world are developing economic recovery strategies. Infrastructure investments feature prominently in this. The question is how to undertake projects that will not just strengthen, maintain, and develop networks but also accelerate the transition to decarbonised economies. That is the challenge facing this conference! The ambition of its organisers is to extract us from "silos" and to get communities talking on a multidimensional level:

- A European and international dimension, crucial for subjects that require coordination between the various parties.
- A forward-looking dimension because infrastructure requires long-term thinking.

Throughout this conference, there will be two recurring themes running through our discussions: how to finance infrastructure? How to generate and prioritise investment choices?

It is our pleasure to welcome more than 120 participants, many of them from other European countries. This participation testifies to the interest in this initiative, accredited by the French Presidency of the European Union, which aims to entrench the dialogue between European transport infrastructure financing agency counterparts and to encourage the exchange of experience and good practice rooted in common objectives.

It is my pleasure to welcome the two organisers of this conference, Christophe Béchu, mayor of Angers, and President of AFIT France, and Gilles Roussel, Chancellor of Gustave Eiffel University.

1, The FUTURE Days are an annual event that brings the scientific community together around the subject of the cities and regions of tomorrow. The fifth such event was held on 30 November and 1 December 2021. https://www.futuredays.fr/

# OPENING ADDRESSES

**Christophe BÉCHU,** President of AFIT France

AFIT France, the "armed wing" of long-term infrastructure investment thinking, is delighted to welcome fourteen of its European counterparts, occasionally which different strategic approaches because, in some countries, investment is by transport mode, whereas in the French system, a share of road revenues is invested to encourage the modal shift to other transport modes.

This day would not have been possible without our partners.

The first of them is Gustave Eiffel University, with which we prepared this day. We also collaborate with two other important partners: Cerema and TDIE. Cerema provides both expertise and a support capability, especially for our country's local authorities. TDIE is a think tank co-chaired by two elected representatives, Louis Nègre and Philippe Duron, who occupy different parts of the political spectrum. This symbolises the fact that transport is not a right or left issue, but concerns all of us.

These challenges are both very numerous and differ little from one country to another. The reality of these common challenges is far more important than their differences. Infrastructure is a long-term undertaking. Indeed, our European procedures mean that it takes time between an infrastructure decision and its delivery to ensure that citizens' rights are respected, land is found, and the necessary authorisations and finance obtained.

But when it comes to decarbonisation, time is not on our side. Without summarising the IPCC report, I will remind you that 30% of greenhouse gases in France and 22% at European level emanate from the transport sector. There will be no carbon neutrality nor will the Fit for 55 plan succeed if we cannot bear down hard on this sector's emissions. However, it is not certain that reducing mileage and transport demand by itself will cut the transport sector's share of emissions, all the more so as, on the contrary, we can expect mobility demand to increase.

Emissions will therefore fall because of the modal shift, primarily driven by modernised infrastructure to enable part of the automotive fleet to change engine type.

These two issues are not confined to our country alone. If we have hydrogen or electric ambitions, it is inconceivable that each country will equip its own territory with recharging points or a network of stations without regard to what is going on in other countries.

The European Union, which, by definition, is where our collaborative ventures occur, cannot stand aloof from these debates. This is why we are happy to welcome European parliamentarians and European Union representatives.

I have high expectations of this precious day, both for what we will be saying but also for the habit we just might acquire of comparing strategies and seeking a united approach to a challenge that exceeds our national capabilities.

## **Gilles ROUSSEL,** Chancellor of Gustave Eiffel University


I am happy to be sharing a platform with Christophe Béchu, President of AFIT France, having coorganised with him a special session of our annual FUTURE Days conference and initiated the first European hackathon. I hope we will continue this series, which is important in several respects.

It is important for Gustave Eiffel University and its mission to support public policies. As such it embodies the dialogue we are attempting to develop between research, training, and decision makers. Our ambition is also to move beyond silos to compare our thinking, and share it with decision-makers, those who task it is to deliver infrastructure projects, and with future mobility professionals.

It is also important to join forces in light of the challenges facing the transport sector. Transport represents around one quarter of greenhouse gas emissions in Europe. Decarbonising mobility is therefore, beyond question, one of the major challenges of this decade. At a time when every country in the world is developing post-Covid economic recovery strategies, with infrastructure investments playing a major role, we need to undertake projects that will create and strengthen networks while supporting more sustainable forms of mobility and accelerating the transition to the decarbonisation of our societies.

Finally, it is important to position ourselves at both the European and international levels. As Christophe Béchu has pointed out, we cannot think about transport at national level alone. Which is why this conference has been accredited by the French Presidency of the European Union.

We have therefore sought the close involvement of European infrastructure financing agencies and of our academic partners, in particular those within our network of European universities involved in urban development, from which the hackathon students were drawn. We want to use this conference, in an open-minded spirit of seeking innovative solutions, to engage in debate with leading decisionmakers in the transport infrastructure sector, while also sharing scientific findings and thinking, highlighting the principal conclusions from research activities, giving prominence to what lessons they teach us, and how to apply them. It is one of the University's societal missions that is dear to my heart.

# KEYNOTE SPEECH : ECOLOGICAL TRANSITION, THE CHALLENGES FOR TRANSPORT INFRASTRUCTURE AND PUBLIC ACTORS

**Jean-Bernard KOVARIK**

This first presentation will broaden our horizons on one of this day's challenges: delivering the ecological transition. The major challenge is to secure a smart ecological transition towards a sustainable mobility system spanning at least the next 30 years. We need to design and be proficient in a transport system that is efficient, uses renewable energies, facilitates multimodality, and takes account of all technological offerings, both now and in future.

What European policies and what European tools will enable us to deliver this transition ?

It is my pleasure to welcome Herald Ruijters, Director of DG MOVE's Directorate B, Investment,Innovative and Sustainable Transport.

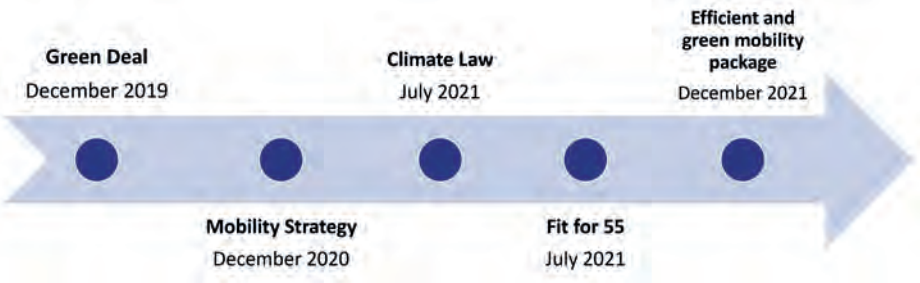
**Herald RUIJTERS, Director Investment, Innovative and Sustainable Transport, Directorate General for Mobility (DG MOVE), European Commission**

Today is 22 February 2022. There are approximately one hundred months to go until 2030, and 10,000 days until 2050. There is therefore not a single day to waste if we are to achieve our goals.

It is crucial to act, to coordinate with one another and to move forward. Transport is not just infrastructure and financing; it is also the public and the economy. The population must be able to move, freight as well. We saw this in the Covid crisis: when there is a breakdown, our factories no longer have the logistics that enable them to function.

This mobility sector infrastructure is also a cultural and social expression.

The political deadlock in finding the necessary financing has everything to do with the fact that it was not realised that infrastructure and transport are far more than infrastructure made of concrete and steel. This Green Deal puts us in a very strong position to achieve this together and I will touch on how we got ourselves in this position in four stages.

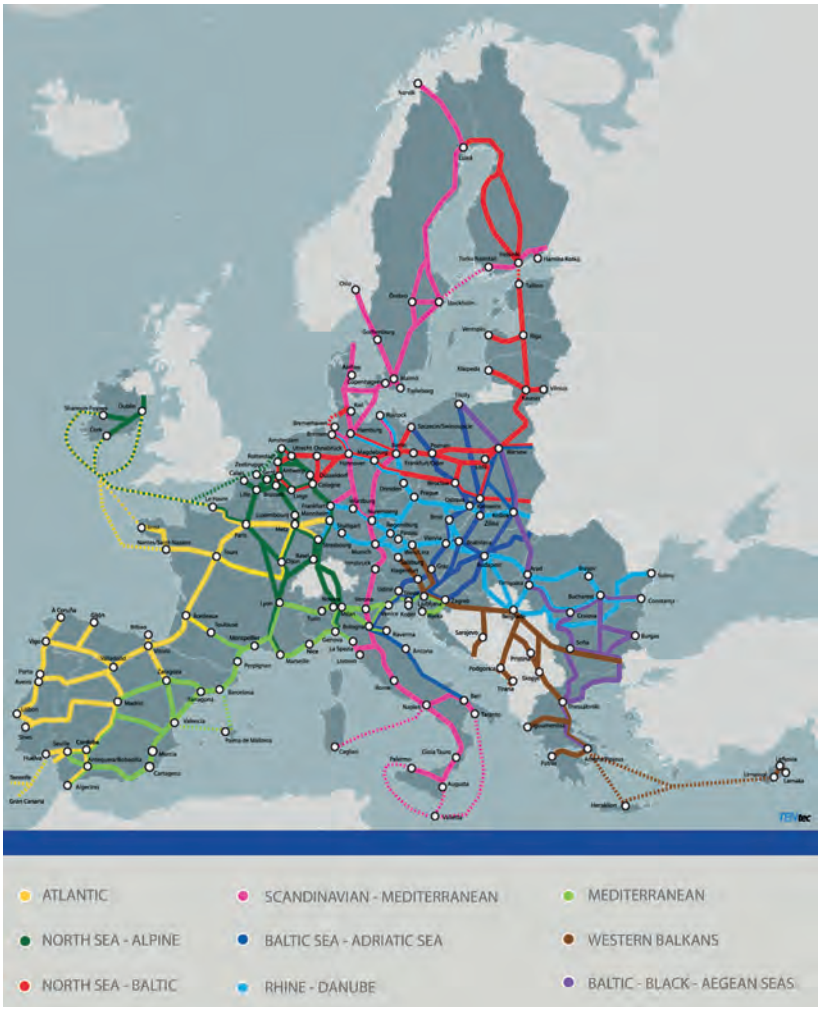



**European agenda of decarbonization**

The Green Deal launched in December 2019, the new mobility strategy adopted in December 2020 and the climate legislation adopted on 29 June by the Council and Parliament, which came into force in July 2021, are a positive platform now in place with the goal of achieving -55% in 2030 and net zero emissions in 2050. Two important packages of proposals followed with Fit for 55 and the sustainable and efficient mobility package of December 2021. These four stages have prompted us under French presidency to find common approaches in the transport arena, if possible on 2 June during the Council meeting under the French presidency. I will outline the subsequent stages in the rest of my speech out to 2030 and 2050.

Among the key proposals are the TEN-T Regulation and the Alternative Fuels Infrastructure Regulation. Infrastructure is required to comply with a whole raft of criteria between now and 2030, 2040 and 2050. These criteria have been tightened as compared with current regulations to achieve the Green Deal. All the impacts have been quantified in very thorough modelling (energy, climate, environment, transport) to target the necessary measures to achieve the objectives.

First of all, transport electrification. Achieving this requires a greater use of rail and the tightening of contributory criteria. These include train length and the P400 gauge. Without these criteria, French ports such as Le Havre, Calais and Dunkirk are not in a favourable competitive position to achieve the modal shift. Europe can contribute financially, for example the Paris bypass northern part. For rail passengers, the objective has been set of doubling, then trebling high-speed line use, and the Commission has proposed a minimum speed of 160 km/h for the entire main network. All these criteria are needed for the modal shift to rail, the most environmentally friendly transport mode.




**Trans-European Transport Network (TEN-T)**

The TEN-T proposal also envisages introducing enhanced criteria for roads, air travel, ports, airports, terminals. But the crucial factor is transnational coordination. If France, Italy, Spain, and Germany invest billions in a high-speed network but there is no connection between these countries, we will not benefit. In France especially, there is a terrible shortage of rail links between Bordeaux-Dax-Biarritz and Hendaye, between Perpignan and Montpellier and between Lyon and Turin. Likewise, it is absurd that France and Germany are connected by only five railway lines, two at Saarbrücken, two at Strasbourg and a single line at Mulhouse.
Investments therefore need to be coordinated and the new regulation is a step forward towards better planning. If this regulation comes to fruition, coordinators will draw up working plans with Member States, regions, and cities that will then be applied via implementing regulations. Instead of high-level dates, 2030, 2040, 2050, we will have a detailed investment plan for each of the nine corridors: for example, for Bordeaux-Dax, there will be studies taking place until 2027, with work starting in 2028 and completion by 2032. Then there will be Dax-Hendaye

as well, etc. This will create certainty for national, public, and private investors. Four years from now, we will be able to plan as far ahead as 2040 and 2050 and to achieve a level of investment certainty comparable to the Swiss, who have already planned their expenditure out to 2035, or even 2038.

*« The ultimate objective is to know precisely, based on the knowledge and expertise at everyone's disposal, what is being planned in which country and by when, and then to align this in the implementing regulations. »*

The ultimate objective is to know precisely, based on the knowledge and expertise at everyone's disposal, what is being planned in which country and by when, and then to align this in the implementing regulations. This is necessary for major projects such as the Brenner, Lyon-Turin, SeineEscaut, and the Lyon and Paris bypasses.

I would also like to emphasise the importance of the text on alternative fuels. The directive dates from 2014 and we proposed modernising it in light of the Green Deal to create a framework enabling investors to invest in these new technologies, especially electric technology, recharging infrastructure, refuelling, green hydrogen, and biofuels. In the absence of a unified legislative framework, members of the public who purchase these vehicles cannot currently be certain that they will be able to drive as far as Greece or the Baltic states, and industrialists lack the certainty of being able to invest in these technologies, notwithstanding them being within our grasp.

*« We need very strong European cooperation and a touch of boldness. »*

We will no longer have a directive but a regulation with very detailed objectives both in terms of the size of the fleet and for countries. The TENT-T Regulation is therefore closely related to the Alternative Fuels Infrastructure Regulation (AFIR Regulation). The latter says that 150 W per 60 km is required for light vehicles and 350 kW for heavy goods vehicles, and the TEN-T Regulation enables you to see where.

Moreover, the EU has various subsidy programmes. The most important one for infrastructure is the Connecting Europe Facility (CEF), which is very targeted on infrastructure, more than three quarters of it on cross-border infrastructure, but also on interoperability and intermodality programmes, last mile connections, etc. There are also the cohesion funds and the ERDF, the new Recovery and Resilience Facility RRF, research (Horizon Europe), and the Innovation Fund. These are both subsidy and financing mechanisms. These various subsidy funds currently total 80 billion, to which can be added around 15 billion in CEF1 that has not yet been spent, as well as cohesion fund budgets that have not yet been spent. There is therefore around 125 billion that remains to be spent for the period 2021-2027, which with 50% co-financing on average represents 250 billion.

Finally, the aim of this detailed programming is to programme, now, a CEF 3 and CEF 4, which could result in a large budget, perhaps approaching a total envelope of 750 billion for the entire period ending 2040. This being so, it is important that we start planning the 2028-2034 and 2035-2041 periods. If we can achieve such a work plan, we will also be able to approach other sources of finance, based on the EU taxonomy for sustainable activities, green bonds and private investors and pension funds. Various large Norwegian and Dutch funds are asking us if we have a portfolio of stable, longterm projects in which they can invest.

Coordination and this regulatory framework we are setting up will enable us to put this debate to rest, but this therefore means we need very strong European cooperation and a touch of boldness. In the 1980s, the Swiss were in the same position as us. We have already come far but what we now must do, under the French presidency, is to take a further step forward towards making this Green Deal a reality.

**Jean-Bernard KOVARIK**

We now welcome MEP Fabienne Keller. You were previously Mayor of Strasbourg and a senator for the Lower Rhine. You are active, influential, and passionate about transport and mobility. I give you the floor to moderate the discussion of these issues, together with Mr Ruijters.

# DISCUSSION

**Fabienne KELLER,** Member of the European Parliament


When I was a young Mayor of Strasbourg, the TGV was the first line financed by the authorities, with an oversight committee encompassing the heads of the SNCF, the ministry, the 22 local funding authorities, and chaired by the prefect of Lorraine.

We had a shared will to build this line well, to manage the swelling clays around Reims, but above all to unite in inventing connections, in imagining stations, in fighting for the bridge on the Rhine, to give meaning to this East-West communication axis in the heart of Europe. There is still work to be done for some border crossings, especially between Germany and Austria, but this is how Europe progresses.

Paradoxically, these issues of voltages, safety standards, train weights, or consistency between finance facilities are first and foremost a human issue. Transport movements are about people's lives: the transport of freight that makes food security, for example, possible, the transport of people for the economy, for coming together, for students, for discovering this Europe so dear to our hearts. We share the challenge of decarbonising these transport movements and making them more sustainable, not forgetting the issue of the use of rare resources.

We are therefore united in addressing multiple technical and governance challenges. Few areas are so complicated and fragmented, and we also have the joys and rigidities of European diversity. The rail sector, for example, was built on national industries and operators. We can still see the consequences of this with these border crossings, safety standards, voltage changes.

Finally, the financing challenge is the "crux of the matter". We have heard 80, 120, 250 billion euros... The stuff of dreams! You reminded us of how essential it is to align programmes, because this is a highly delicate task of stitching together the patchwork of disparate systems. If Switzerland forges ahead and other European countries do not, there is no efficiency: for example, it will not be possible to allocate night trains, of which we are very fond, their traffic movement authorisation timeslot

**Christophe BÉCHU**
Mr Ruijters, you are without doubt among those with the longest experience of these matters. In light of your experience, are you optimistic?

**Herald RUIJTERS**
I'm afraid so because there is no alternative. The climate legislation has been adopted and now needs to be imple-

mented. The cost of the floods in Belgium and Germany on 14th July last year was put at 41 billion, namely the equivalent of almost two CEFs. This is a cost we need to avoid, as we do the cost of the storms and floods in the Tende Valley and in Languedoc-Roussillon, railway lines cut for weeks. We can no longer ignore the fact that every day counts, at the risk of failing. The parties involved are sometimes very tough on competition, especially in the rail sector in France. France has fallen a long way behind, whereas the situation in Italy and in Spain is on a positive trajectory. But you have to be optimistic because there is no alternative.

**Philippe DURON, co-Chair of TDIE**
Much of the challenge of decarbonisation will be played out in European towns and cities, but European policy is largely focused on long-distance interurban services. We understand the network effect you are looking for in Europe, but is there not something missing from European policies, namely acting where this will have the biggest quantitative effect ?

***« The climate legislation has been adopted and now needs to be implemented. »***

**Herald RUIJTERS**
I proposed clarifying two of the legislative proposals, but they are part of a package. In my own directorate, in July we had the alternative fuel infrastructure legislation and in December proposed legislation on the digitalisation of transport and a regulatory framework for urban mobility. I agree entirely with what you say. Until now there has been no European urban mobility policy because of the principle of subsidiarity. Everyone does what they can and as they see fit beyond the best practice framework. We want to break with this: we proposed including towns that are required to implement a sustainable mobility strategy in proposal TEN-T 424. The Sustainable Urban Mobility Plan (SUMP) [2] requires each town to comply with certain criteria, such as pollution, road safety, connection with hubs, each town is required to have a passenger hub and a freight hub. Each town with more than 100,000 inhabitants will have to implement these criteria by 2025 for the SUMP, by 2030 for the indicators, and by 2040 for the hubs. The urban dimension in long-distance transport is undeniable, but how do we also create granular transport links with suburban and rural areas given that, increasingly, that is where the problems are coming from? Towns and cities will be very well served by high-speed networks, intermodal hubs, last mile connections, etc., but the rural context should not be neglected. We therefore proposed that the principal network criteria be extended in two stages (2040 and 2050) to the entire network. For the time being, the Council is opposed to this. Everyone is telling us that this is going too far, that it is too expensive and too ambitious. It is not too ambitious, and we must go even further still to achieve a granular pump-priming.

***« The Eurovignette is a crucial element: for the first time, a regulatory text is offering the possibility of cross-financing outside mountainous areas. »***

**Fabienne KELLER**
In the suburban and sparsely populated areas, the focus might be more on car sharing and on on-demand services. The idea is to deliver the anticipated outcome, the transport service, rather than infrastructure.
How can Europe bring leverage to bear to ensure that these populations, medium-sized towns, suburban and sparsely populated areas feel involved? Concerning suburban areas, we have 13 express metropolitan network projects that would appear to promote efficiency, especially if the stations are well organised, but it is more difficult elsewhere. What responses do we see in Europe?

**Herald RUIJTERS**
This question is an opportunity to touch on the Eurovignette road tolls and state aid.

The Eurovignette is a crucial element: for the first time, a regulatory text is offering the possibility of cross-financing outside mountainous areas. For Lyon-Turin, the European Commission has even said that the motorway between Marseille, Nice and Vintimille could contribute, and we have quantified what that might mean given the 4 million HGVs crossing the Alps on this coastal motorway as well as via Mont-Blanc or Mont-Cenis. And we could very well do likewise between the A1 and the Seine–Nord Europe Canal. I therefore welcome the ability to introduce the necessary cross-financing, which would enable external costs to be internalised and to create the positive externalities which we do not hear enough about.

The European Commission is behind numerous agreements to grant state aid, for example for rolling highways. The Brenner rolling highway in Austria has already received the European Commission's blessing twice for the granting of state aid.

**Fabienne KELLER**
This is not financing but the right to provide aid at national level.

**Herald RUIJTERS**
Indeed, but the EU will not touch anything that is too close to the market. For example, we are still subsidising recharging infrastructure that is not yet profitable, but at very low percentages, varying from 10 to 50% (for cohesion fund countries) and we will withdraw from this once there is a market. Likewise for services or fleets, we can offer guarantees, but we do not want to offer subsidy financing: we would be too close to the market. Our very limited funds are intended to finance what is least profitable and what Member States do not do, such as cross-border projects, interoperability, the ERTMS, intermodality, the last mile. We will not get involved in services that are provided by industry participants and the State in certain Member States.

2.The Sustainable Urban Mobility Plans ("SUMP") are the European concept, with the PDU (Plan de déplacement urbain, Urban Master Plan) being the French manifestation. To find out more, https://transport.ec.europa.eu/news/10th-sump-award-call-applications-open-2021-06-15_en

**Samia DEQQAQ, Gustave Eiffel University**
What funding is planned to maintain engineering structures? Is it sufficient to ensure sustainable preventive maintenance to avoid accidents?

**Herald RUIJTERS**
We do not co-finance maintenance: Europe simply does not have the budget for this. 80 billion is needed to maintain the German rail system alone over the next 10 years. That is four times the CEF. On the other hand, when new infrastructure is required, as in the inland waterway sector, we replace hundred-year-old locks with all the new energy generating, environmental, etc. technologies.

*« We do not co-finance maintenance: Europe simply does not have the budget for this. »*

National budgets absolutely must take responsibility for maintenance. We know just how the Swiss have perfected this budget: they must invest in maintenance first, at which point an additional budget is available for new projects.

**From the floor**
The modal shift challenge also has investment consequences. We need transshipment platforms in our ports, and multimodal platforms in our inland ports. What is the Commission's vision? What is the Member States' role and what is the role of the private sector in investments in freight transshipment ?

**Herald RUIJTERS**
We proposed amendments to the TEN-T Regulation as currently worded, in particular better last mile connectivity in ports, airports and terminals: too many ports have no last mile rail link (in France, for example) and need upgrading to deliver the modal shift. Above all, their hinterland lacks adequate terminal capacity. Europe is lacking a small number of corridors (we are proposing nine) capable of creating a European hub and spoke system.

Large volumes arrive in the major ports such as Le Havre, Hamburg and Genoa, and are then transported to the 424 towns and cities mentioned. Having a more sophisticated and denser system requires ports to be very well connected with the network. When a large container ship arrives, digitalisation must ensure prior knowledge of where these containers are going to go and by what means of transport. We need to organise ourselves to use rail and inland waterways, with only the remainder by road. Opposition can be seen within the Council to this part of the Commission's proposal, and the creation of terminals is hotly debated.

**Fabienne KELLER**
Anne-Marie Idrac will certainly be talking about the importance of logistics locations connected to waterway or rail. If these centres are created elsewhere, this modal shift will not be possible.

**Herald RUIJTERS**
The proposal also creates eligibility for future funding. The budget is European, and it is very important to create these last mile connections between the ports and terminals. That is currently the sticking point.

**Louis NÈGRE, co-Chair of TDIE**
Europe has really got things moving. Day after day, we see major achievements in our country thanks to European funding. It isn't said often enough.

Mr Ruijters, yesterday you announced an 80-billion-euro contribution in an international conference on rail, this morning you are talking about a 125 billion contribution by the Union to infrastructure project financing, a total of 250 billion euros of investment based on an average European subsidy of 50%. That is a lot of money! You are right to set conditions to ensure this money is hypothecated and really does some good.

You mentioned my region: every year, 600,000 HGVs pass through the Alpes-Maritimes, degrading the countryside and exacerbating air pollution, noise, etc. With the Eurovignette, we could build rolling highways and, in future, maritime highways as well.

Europe is putting 125 billion on the table, but how much will I have in my country? Our country needs hypothecated receipts, or else we will fail. Help us and help yourselves! We are a bit behind the curve: so, let us do what it takes to find this funding, namely sustainable, dedicated and hypothecated income.

***« It is the projects' maturity that prevents European subsidies from being fully used. »***

**Herald RUIJTERS**
I would also be very critical of Member States: these funds were not spent during the previous period, and we are therefore still spending them now. Fortunately, we have the European Climate, Infrastructure and Environment Executive Agency on our side, which with its detailed management capability can manage the use of the funds and redeploy those that are not used as per the existing grant agreements. It is the projects' maturity that prevents European subsidies from being fully used. For the period 2014- 2020, there are billions yet to be paid and CINEA is monitoring this very closely. It is obvious that the funds will still be being drawn down in 2024, namely four years beyond the planned period. For the current period, given the enormous volume of funds to be committed, the aim must be to spend them during the 2021-2027 period to be better prepared when programming the following period. The use of the available budgets is judged by the finance ministries. Before creating funds, you therefore need to excel. We are going to try to create the necessary planning instruments but to do that we need a new culture. It is not only about infrastructure, about steel and concrete. It is also about society.

# ROUNDTABLE Nº. 1

## WHAT FUTURE TRANSPORT INFRASTRUCTURE FINANCING ARRANGEMENTS DOES EUROPE NEED ?

**Sandra MOATTI**
We are going to explore infrastructure issues in more detail by thinking about the innovative and sustainable financing arrangements for infrastructure projects that we can see emerging, and about the implications of the various options, especially in terms of intergenerational fairness.

We will be adopting a two-stage process to clarify these questions. First of all, we will hear the speeches by Philippe Duron, Anne-Marie Idrac and Mr Beckers. We will then have three panellists from the infrastructure financing agencies or bodies, and we will set aside time for your questions.

Philippe Duron is one of the two co-Chairs of TDIE. He is also an AFIT administrator and President of the Institute for Higher Studies in Regional Planning.

## INTRODUCTION AND PUTTING THINGS IN PERSPECTIVE

**Philippe DURON, co-Chair of TDIE**
Efficient transport and mobility presuppose high-quality, well-maintained infrastructure. This is one of the political choices we need to make and have made in France for the past few years.

I also owe Herald Ruijters an apology: in 2013 I chaired the Mobility 21 Commission and we decided, given the finances available in France, to slow down or even halt high-speed links and coordination with the Spanish network in particular. We were fully aware that this was prejudicial at European level, but we had no alternative, short of allowing certain transport networks, rail in particular, to collapse. Much is said about the rail network and its problems, but we could also discuss the non-concessionary national road network in France and the waterways, which deserve far bigger investment. We must therefore make political and strategic choices.

Infrastructure quality is essential to the future of mobility. Infrastructure needs to be built, refurbished, and modernised. When the Mobility 21 Commission was working, the SNCF was planning on refurbishing run-down networks to their original condition but was not contemplating modernising them in terms of signalling (ERTMS) and performance. Any reduction in the infrastructure maintenance budget leads to a deterioration in networks and transport services. Nowadays, thinking on mobility and infrastructure is overshadowed by climate challenges resulting in new requirements and additional costs. One of the most important subjects is of course future financing requirements. Herald Ruijters is optimistic when pointing to the equivalent of two CEF budget envelopes (Connecting Europe Facility), but not all countries have the same financial resources. Each country will have to rise to the challenge of finding solutions to the two deadlines set by the Commission: 2030 for Fit for 55 and 2050 for complete decarbonisation.

***« Nowadays, thinking on mobility and infrastructure is overshadowed by climate challenges resulting in new requirements and additional costs. »***

Previously, targets were set without any deadline or climate constraints. In 2003, the CIADT (Comité interministériel d'aménagement et de développement du territoire, Inter-ministerial regional land use and development committee) itemised 35 major infrastructure projects and decided to allocate revenues and give them to AFIT, which was created in 2005.

The 2003 report was already flagging up the climate issue by reference to the Kyoto protocol. We managed to stabilise transport emissions in France, but at a very high level. We now need to up the pace.

European funding is split between the 27 countries depending on their level of development, especially for cohesion funding. This enabled Spain to build very modern ifrastructure, motorways, and Europe's premier high-speed line network. Certain countries such as Poland, Bulgaria and Romania still have some way to go to attain European standards. European funds are therefore relevant, act as an incentive and often provide access to a funding round. France was unable to finance the Seine-Nord Europe Canal and the Lyon-Turin Eurotunnel. These projects would never have happened without European Union support. The French State receives a great deal of support, especially by the regions and metropolitan areas, which have become important transport players and provide substantial investments, but there is still work to be done. National governments are relatively constrained in their budgets, as was seen during this crisis. In France, we used private money to finance certain projects, especially for high-speed lines and the L2 Marseilles bypass. This is less so now because national governments can borrow at very low rates and the debt associated with these investments is recognised as soon as the infrastructure enters service.

***« We talk about mobility infrastructure for people and freight, but also increasingly for the carriage of data – for new services, and for efficient existing networks and services – and energy infrastructure. »***

Bond issues can be used, as in France with the Grand Paris Express. On the important issues of rail network renovation and modernisation, adopting this solution would be appropriate, and would appear necessary to achieve a 55% reduction in emissions by 2030 and the complete decarbonisation of mobility by 2050.

**Sandra MOATTI**
Anne-Marie Idrac, as President of France logistique, will be addressing infrastructure financing requirements from the logistics industry participants' perspective.

**Anne-Marie IDRAC, President of France logistique**
As Philippe Duron said, there will be no transport infrastructure financing miracle. We have more or less acceptable public and private debt levels, in terms of sustainability and interest rates, taxes that have been hypothecated to a greater or lesser degree in a context of tax aversion, tolls and fees with public-private partnerships, and user charges. I am also surprised that certain people are considering non-payment by users when they don't pay for two thirds of the cost of the infrastructure.

Secondly, we talk about mobility infrastructure for people and freight, but also increasingly for the carriage of data – for new services, and for efficient existing networks and services – and energy infrastructure. Consequently, our scope is broadening, and we need to find new funding sources.

Finally, in the spirit of the European taxonomy, we need to prioritise funding on decarbonisation targets. For travellers, the challenge is to promote massification, and to promote the phased development of engine options for different types of vehicles. Massification implies small investments, to encourage car sharing or creating coach or bus lanes. As concerns the carriage of freight, a truck uses less space and energy than the dozens of vans sometimes used to replace it, for so-called ecological reasons.

French logisticians generally are not requesting any new road infrastructure for freight mobility. On the other hand, contributing to massification and different engines is a priority. The important thing for road transport is to support the electrification of the fleet. The Commission and the various countries note that the electrification of goods vehicles is currently only possible for small vehicles (less than 3.5 tonnes) and for short distances. Other than that, there is no adequate industrial offering, it is in infancy for average size electric vehicles dedicated to urban logistics (short route). Given the amount of electricity required to produce green hydrogen, that is not currently a solution.

We therefore need to accelerate electrification for personal-use vehicles and light vehicles and - no doubt over the

next 20 years - for other uses, heavier vehicles, and longer distances. Previously, roads were supplied by service stations financed by service station operators. Different regimes now apply. The public authorities will have to ensure that there are no left-behind areas, which presupposes wellconstructed geographical packages with very dense and less dense areas, as is the case with other outsourced services

As concerns ports, I welcome what has been said about connectivity and the main corridors. Port infrastructure in France is of good quality. We need to focus effort on warehouses, compulsory land acquisition powers and the associated regulatory facilitations, urban planning, land-use planning, etc. For logistics, which combines stocks and flows, we need to talk about freight mobility in the same way as we talk about the mobility of people. Floor space, warehouses, inbound logistics and storage areas, outbound logistics areas, etc. cannot be disconnected from the transport links of the different modes of transport, some of them over very long distances, through to the famous last mile. As mentioned in our White Paper, beyond warehouses, the important thing for French logisticians is the hinterland. Investment must yield benefits from massification leveraging rail and water transport and, to a lesser extent, road[3].

As for rail, there are a few bottlenecks to be unblocked, in particular the Lyon bypass, but it is not a done deal. I am struck by the extent to which freight trains, which operate at night, are not well accepted. The essential thing is to have quality, reliable travel movement authorisation timeslots, by regenerating the network. Taxing roads would not switch freight to the train, because trucks, like cars, are more practical than the train. Network investments must provide adequate channel availability, which is essential to ensure the necessary practicality, convenience, and reliability of the rail network for it to be attractive. The same is true of inland waterway transport.

Certain investments will have to take account of questions concerning working conditions and job attractiveness in the transport sector. This is a growing challenge. Logistics jobs also need to develop, taking account of improvements to working conditions.

The continued development of transport infrastructure requires us to highlight the positive externalities, because all too often it is only the negative externalities that are mentioned. Transport is a very high emitting sector, it produces noise and various harms, but it also confers the freedom to come and go, it facilitates trade, and exchanges between people. Our discourse therefore needs to emphasise these positive externalities.

**Sandra MOATTI**
Mr Dirk Beckers is the director-general of the European Climate, Infrastructure and Environment Executive Agency (CINEA). This agency succeeded the Networks Executive Agency (INEA), that Mr Beckers headed for 15 years. CINEA has a budget of more than 58 billion euros for the period 2021-2027.

3, France logistique, Transports de marchandises et logistique au service d'une France performante, 2022
https://www.francelogistique.fr/2022/02/08/transports-de-marchandises-et-logistique-au-service-dunefrance-performante-12-propositions/

### **Dirk BECKERS,** Director of CINEA

To address infrastructure financing arrangements, I would first like to address the complementary nature of European and national financial instruments. INEA became CINEA, the European Climate, Infrastructure and Environment Executive Agency, almost a year ago, with a broader range ofprogrammes being entrusted to it[4]. You mentioned the budget we will be managing during this period. I will outline a few fundamental principles governing the complementarity between programmes, then I will touch on the synergies and dialogue potential between these European and national programmes.

The principal programmes we finance, and which contribute to the funding of transport infrastructure, are the mobility component of the Connecting Europe Facility (CEF), our research and innovation support programmes, the Innovation Fund for projects to reduce greenhouse gases, and the Public Sector Loan Facility that will support the energy transition. Combining them could subsidise a wider spectrum of transport infrastructure, whether conventional or related to sustainable mobility.

We see three points of commonality between these various programmes. First of all, they contribute to the objectives of the European Commission, the Green Deal for Europe, and of the TEN-T network.Next, they are about remedying situations in which the market has failed, for example the inability to impose the investment burden or cost of externalities on users. Finally, they require complementary funding, often both public and private, given the scale of the challenges. For example, completion of the TEN-T will require a total investment of 1500 billion euros, well in excess of the budget that will beallocated by the CEF programme.

I will articulate three propositions on which we can converge:

• The imperatives of climate change are a common challenge for our Member States, for example to finance the migration to more sustainable modes of transport and decarbonised fuels;

• All our Member States are facing these market failures;

• Finally, they have their own difficulties in financing the necessary investment in transport infrastructure and this situation is further exacerbated by cost inflation.

As objectives and challenges are similar between all Member States, the complementarity between European and national financing needs to be examined through our European prism, taking account of initiatives within the TEN-T network. Here are a few factors potentially facilitating the convergence between European and national financing:

• The greatest possible predictability of our calls for projects: several programmes have been initiated on a multi-annual work programme basis. That is the case for the

4. To know more: https://www.youtube.com/watch?v=XE4O1ph7mp4&t=8s

CEF, with its fixed threeyear timetable, for the Innovation Fund, with two calls for projects annually, and for the Horizon Europe programme, with its strategic plan extending out to 2024. Greater predictability of our programmes will enable national authorities to better plan their sources of finance and promoters to better prepare their projects and confirm their funding plans, to present more mature projects in response to European calls for projects.

• The simplification of funding in the form of unitary or lump sum contributions. Accordingly, projects supported by the CEF's alternative fuel infrastructure financing mechanism will receive a unit amount per electric supply point installed, without having to present detailed invoices. Inother cases, the CINEA's support is as a lump sum. The Innovation Fund, for its part, is based on the anticipated overall cost of the project. As concerns the loan facility for the public sector, it will be in proportion to the loan obtained by the public promoter. The use of these simplified and more flexible forms affords numerous benefits: it makes audits less onerous, makes our support more comprehensible, and facilitates the participation of other financiers in the final financial package.

• Certain programmes involve financial partners from the moment of project submission, a prerequisite for obtaining European Union financial support. This is so for the Public Sector Loan Facility, which requires support by the European Investment Bank. The alternative fuel infrastructure financing mechanism requires support either from institutional financial partners approved by the Commission or from other financial establishments. The objective is to catalyse and maximise the inflow of all available finance sources and to accelerate the preparation of project implementation.

Concerning the regulatory framework, several developments are likely to facilitate the complementarity of our support :

• Extending the exemptions provided for by the general block exemption regulation will enable state governments to grant aid without prior notification to the Commission;

• Cross-validation processes enable projects approved by the CEF to receive a contribution from any other EU programme, including funds under shared management;

• The creation of a label of excellence enables projects receiving this label to receive ERDF funds with no other evaluation;

• The regulatory provisions of the Recovery and Resilience Facility[5] permit this Facility to support projects in conjunction with other EU programmes, enabling a more consistent support for covering needs. It should be noted however that it is not possible to combine two European financing sources to cover the same costs.

To conclude, by implementing the new programmes modelled by the European Commission, CINEA is broadening its support for transport infrastructure, while addressing climate and energy transition imperatives and continuing its prioritisation of a more comprehensive integration of trans-European networks.

***« As the financing needs significantly exceed the resources available at European level, true complementarity between programmes is necessary. »***

This diversification produces greater complementarity both between European programmes and between these latter programmes and national programmes. As the financing needs significantly exceed the resources available at European level, true complementarity between programmes is necessary. We are already cooperating on numerous projects, for example the Seine-Nord Europe Canal.

There are many questions, especially concerning the role of transport infrastructure financing agencies in facilitating complementarity between European and national levels and on other factors facilitating this complementarity. Pooling our ideas could help answer these questions and I welcome this discussion.

**Sandra MOATTI**
Mr Vanderhaegen, do you wish to add to Mr Beckers' presentation with a few examples of projects that might benefit from CINEA support ?

5. Article 9 of Regulation (EU) 2021/241 of the European Parliament and of the Council of 12 February 2021 establishing the Recovery and Resilience Facility, "Additionality and complementary funding": "Support under the Facility shall be additional to the support provided under other Union programmes and instruments. Reforms and investment projects may receive support from other Union programmes and instruments provided that such support does not cover the same cost."

**Marc VANDERHAEGEN,** Head of the unit responsible for programme support, coordination, and communication at CINEA

Thank you for your question and for having invited CINEA to this roundtable. Mr Beckers has highlighted the complementarity between the various financial instruments. I will provide a few examples of programmes where this complementarity very much applies.

During the FUTURE Days, Mr Hautière emphasised that both the infrastructure and the fleet need decarbonising. This is what we are doing, for exampl e, in our Horizon research programme with the Hydrogen Mobility Europe projects. These projects, supported by the Horizon 2020 programme and conducted in cooperation with the Hydrogen Fuel for Paris project, aim to stimulate the use of hydrogen fuel cell electric vehicles by supporting the creation of a hydrogen refuelling network and a fleet of hydrogen fuel cell electric vehicles. The Hydrogen Mobility Europe project created a network of 37 refuelling stations and finances more than 300 hydrogen fuel cell electric vehicles. It has been extended to France with the assistance of the Connecting Europe Facility (CEF), especially to Paris with eight additional hydrogen refuelling stations.

Another example is the Greenway project, which aims to electrify the fleet at European level. The concept was validated by a CEF-backed pilot project, which for the first time created an electric recharging network in Poland and in Slovakia, with 80 electric recharging stations. This is supplemented by a European financial facility, InnovFin, managed by the EIB, enabling a step change with more than 500 electric recharging stations in Eastern Europe. This example of complementarity between two mutually supporting programmes also shows how we can begin with pilot projects, then ensure that these projects find market solutions assisted by financial mechanisms. This approach is really helping to decarbonise our economy.

# OVERLAPPING PERSPECTIVES

**Sandra MOATTI**
I propose to tackle the second part of this series with our panellists from the various financing agencies. We will be hearing from Mr Hasselgren from Sweden, Mr Böger from Germany, Mr Blecha from the Czech Republic, and Christophe Béchu of AFIT France.

I would like to give the floor to Mr Hasselgren, who works for the Swedish transport authority where he is a senior consultant to the National planning department.

**Björn HASSELGREN, Senior Advisor at the Swedish Transport Administration**
Let me begin with a few words on the situation in Sweden. The Swedish Transport Administration (*Trafikverket)* encompasses the national public road and rail networks. Our Transport Authority employs 10,000 people and has an annual budget of around six billion euros. Just recently, we submitted a new proposal to the government for a national infrastructure plan for the next 12 years. This plan entails measures of ca 80 billion euros for maintenance and new investment in national transport infrastructure.

We are currently very focused on current prospects in two crucial areas: decarbonising our transport systems and economies, and understanding how digitalisation will affect transport infrastructure and transport flows, two areas where we see profound change, also including in the short termin the short term. On the other hand, transport infrastructure systems develop very slowly, and we are using investments that are up to 150 years old, and are still in service. The changes we make each year to transport infrastructure systems are only marginal adjustments.

This is a point we are attempting to address when we talk about developing transport infrastructure. Our budgets are very large in the Swedish context and have grown considerably: we have almost doubled our total Investment envelope and we are engaged in numerous large-scale projects, bothroad and rail. However, the adjustments we are making are marginal compared with the system as a whole. Sweden being a vast country with a fairly small population, we have a very extensive road and rail network, with small transport flows compared with the Western European average.

In order to enhance decarbonisation measures and other activities we have had numerous discussions on alternative financing mechanisms in addition to traditional government financing. How can we allocate more capital in the sector? How do we become more efficient ?

Seen from an overall financing perspective government-operated transport infrastructure systems are largely financial conversion systems. Our operations are financed out of transport system-related taxes, which are converted into funds for the agencies responsible for these areas, at national, regional, and European level. As mentioned earlier there is a very significant expenditure earmarked for maintenance and for investment in various projects: 6 billion annually at national level, and very significant resources at regional and local level.

Because the Transport Administration works with numerous companies delivering maintenance services and investment projects, most of the funds collected from the private sector are ultimately returned to the private sector as compensation for delivered services and products. We thereforeconvert resources emanating from the private sector in to public resources and then back into the private sector. That means that it is absolutely crucial for the Transport Administration to maintain a close and good relationship with private sector actors. The entire transport infrastructure organisation can be said to consist in a public-private partnership.

This is not specific to Sweden, it holds true for most countries; but, in terms of discussion on the development of the financial arrangements in general in the sector in the long-term, we often tend to forget that we are all involved in a multitude of public-private partnerships.

As concerns alternative financing mechanisms, we have thought about the possible co-financing of certain major projects such as high-speed rail and assets relating to high-speed rail. We have a huge high-speed rail project currently underway in Sweden: some 25-30 billion euros will be spent on highspeed lines over the next 20 years. We are trying to identify a model that will allow us to use cofinancing mechanisms at different levels in that system. The primary policy is to have these investments financed by the government, with the National Debt Office issuing green bonds to a certain extent to cover the government's general borrowing requirement. This offers possibilities for players in the capital markets to participate in the financing of transport infrastructure assets in Sweden.

We are going to build 13 new railway stations in Sweden related to the high-speed rail system, more than we have built over a 100-year period. These are major projects, developed in close collaboration with private landlords and the regions/municipalities concerned. We are trying to find an efficient way of organising this collaboration. It is important to identify a good operational framework to know how to use rail as efficiently as possible, taking account of the nationwide application of marginal cost pricing, while also trying to understand how in practice to use instruments that are more associated with a free market infrastructure, allowed for in the EU-regulations. In those situations when the market is competitive, you also need to ask the government to adopt working practices more akin to the private sector. Collaboration along these lines at the regional and local levels affords additional opportunities for investors in the private sector to participate in transport infrastructure financing.

The development of financing methods also applies to road building. We are attempting to establish close collaborative structures with the construction companies, within the framework of procurementand competition re-

gulations, with the intention of develo ping more effective risk-sharing. We are trying to identify the most efficient procurement and contractual arrangements, and we are lookinginto whether we can employ infrastructure pricing in acco rdance with EU regulations.

This is a huge field, and we are attempting to work on alternative financing in numerous ways.

**Sandra MOATTI**
Mr Böger, you are director of the Finance division of Autobahn GMBH, which is responsible for
financing investment in, and the maintenance and operation of, federal motorways in Germany. This structure was created in 2019 following the reorganisation of the financial relationship between the Federation and the Länder as concerns roads.

**Prof. Dr. Torsten BÖGER, Head of the Financing Division of the *Autobahn GmbH des Bundes***
Allow me to give you a brief overview of the current situation in Germany. *Autobahn*, a newly created company, is in charge of the German highway system, encompassing investment, construction, maintenance, and operation. The financing aspect still suffers from a limited budget in Germany but, as you are aware, we have a new government, which is proposing a very interesting programme. There is a plan to overhaul how the upkeep of the highway network is financed. This is a very interesting development because this question of financing has existed in Germany for the past 15 or 20 years. The challenge is to identify ways of integrating funds from the private, financial, and banking sectors.

It is very important for Autobahn to have this type of contract. With infrastructure, it is always very important to have guaranteed long-term financing. For example, we have a 5-year plan for highway infrastructure. On the other hand, we are reviewing the year-by-year funding stream. We have financing from users and from tax receipts, but we need to find the missing link.

Aligning infrastructure requirements and the public purse is very important. We are working on this with the Department for Digital and Transport, and the Finance Ministry. I hope this will open up future opportunities and will serve as an example of how to forge closer links between the economic and financial financing aspects.

**Sandra MOATTI**
Thank you very much. We now have the opportunity to listen to Mr. Tomáš BLECHA, from Czech Republic. Mr. Blecha, you are vice-director of the State Fund for Transport Infrastructure, called SFDI.

**Tomáš BLECHA, Deputy Director of State Fund for Transport Infrastructure (SFDI) in Czech Republic**
I represent the National Transport Infrastructure Fund, the Czech national transport infrastructure financing body: road, rail, and inland waterways. We also finance other areas such as cycle routes, pavements, and multi-modal centres. I represent the only formerly communist country on this panel, so I think I can say that our country is experiencing different problems from those that my colleagues have described.

We genuinely support decarbonisation, innovation, and the digital transformation of the transport sector, but, although more than 30 years have passed since the end of communism, we have still not attained the transport infrastructure standard typically encountered in Western countries. For example, we have 9400 kilometres of railways and, because they are not always in good condition, you can imagine the sums of money we need to allocate to maintaining them. Likewise, the quality of our roads is not really up to standard, and we are short of around 800 kilometres of highways, which would require 12 billion euros for construction alone or to bring the network up to standard.

***« I represent the only formerly communist country on this panel, so I think I can say that our country is experiencing different problems from those that my colleagues have described. »***

Concerning new transport infrastructure areas, the pre-eminent topic today in the Czech Republic is the construction of high-speed lines. Everyone wants it, but the costs are really high. Our current estimate out to 2048 is 33 billion euros and, for this planning period alone, we will probably need an additional 4 billion for high-speed rail. The National Fund's total annual budget is around 5 billion euros, which far exceeds our resources and our limits. We will probably need 2 billion euros between now and 2030. Another important topic is e-mobility: we need to build 16,000 recharging points by 2030 and once again this represents a major financial effort.

We are reasonably successful in using all the traditional subsidies, the Cohesion Fund, the ERDF. Last year, the Commission set up the new Recovery and Resilience Facility. It was a good idea, at least to begin with, because it was a novelty and was results-driven, but we are still finding it hard to work out what will be controlled by the Commission and what by the national authorities as far as each of the projects is concerned. Further clarification is therefore required. The primary source is the national budget, which is some 56 billion annually.

We launched the first PPP project to build a motorway: 32 kilometres of new motorway and 16 kilometres of refurbishment. This is a very important step for us in the Czech Republic. PPP projects did not enjoy a good reputation, so we are hoping to improve this and launch new projects. We are also availing ourselves of a European Investment Bank loan. We are able to identify a PPP, but granting loans to governmental organisations is no longer very common. It makes no more sense to grant them to private companies, for example for the recharging points. We are pleased they can do so, even in return for subsidies, but if we have to tell them that they need to repay

the money later, I don't know if this will lead anywhere.
To summarise my appeal to the representatives of the EU, please take account of the specific situation of certain EU members, and of our very limited financial resources when you come to draw up the next planning period. Should the Czech Republic no longer be able to tap into the cohesion mechanism, we will lose considerable sums of money, and will be obliged to make choices, because we will certainly be unable to finance everything.

**Sandra MOATTI**
After having listened to his European counterparts, I propose we hear from Christophe Béchu of AFIT France.

**Christophe BÉCHU**
Notwithstanding different procedures between countries, we all face identical difficulties. Budgets and funding mechanisms are not necessarily the same, but the issues are similar.

Firstly, our countries cannot expect Europe to do everything. The European Union is there to accelerate certain subjects, but we are also fully aware that there is the matter of allocating funds by country. What share comes from taxation? What share comes from users?

A major subject for all our European countries is completely absent from the debate: a very large proportion of transport infrastructure financing is indirectly based on internal combustion engines and on petrol. 40 billion comes from TICPE (Taxe intérieure de consommation sur les produits énergétiques), the Internal Consumption Tax on Energy Products, but there is also excise duty on fuels. There are even Yellow Vests in Sweden at this moment complaining about excessive price levels and pushing back against fuel prices. It would be nice to have carbon pathways to finance part of the infrastructure but, as engines migrate to electric, we will lose the revenue capable of financing the infrastructure required to decarbonise mobility. This is what is prompting thinking on vehicle discs and on everything that might replace the TICPE.

Certain ideological shortcuts are the enemies of decarbonisation, especially the one that suggests that the most important thing would be to move towards free transport rather than towards increasing public transport frequencies and offerings. Irrespective of country, we have realised since this morning that we are short of money and that we must accelerate investment. In this context, depriving ourselves of revenue, as certain people are suggesting with free public transport, is the wrong good idea. Admittedly, it is an easy promise for citizens to understand, with inflation and the cost-of-living problems we are all familiar with. We can also see in it a sort of ecological ambition but, in reality, free transport will instead promote a modal shift by pedestrians and cyclists to public transport rather than changing motorists' behaviours.

We are very focused on modal shift and investment - because decisions need to be taken as quickly as possible, given the time it will take to produce effects – but we should not forget two blind spots:
In France, the head of the SNCF's ambition is to say: "Let's go crazy and double it!" which would mean a 20% share for rail. But roads will still represent 75% of mobility and we cannot create a decarbonisation strategy that would not include roads.

The second blind spot concerns practices. Not everything is a question of investment. For example, combating car use by a single person is one of the most effective and quickest ways to reduce greenhouse gas emissions. We have not y et tried everything, and we can draw on various examplesfrom abroad, for example lanes reserved for those with at least two occupants per car at certain times of the day.

Other questions are more complex and may relate to more contentious subjects such as urban tolls. Perhaps we should focus not just on price but on the number of users within a vehicle, which would enable us to "escape" from the price mechanism or to add changes in behaviour, to break out of thealternative "prohibit, punish, tax". Combating warming can be conducted without forfeiting our freedoms. These questions are eminently political and some of them bring us together, notwithstanding our divergent views or differences.

**Sandra MOATTI**
Before starting a question and discussion session, Mr Beckers would like to take the floor again.

**Dirk BECKERS**
We have highlighted the shortage of available funding. We need to improve inter-agency cooperation,but it is also important to be aware of what funding is available to choose the best option for the project. CINEA can help you do this,

**From the floor**
I would like to know if there are still institutional obstacles between energy and transport. You talk about integrated energy projects, in the context of transport policy, but what we are seeing with our work in urban areas, is various institutional obstacles, financing silos, etc. It would be interesting to hear your perspective and, perhaps, any solutions to this problem.

**Björn HASSELGREN**
This is a very pertinent question. We encountered exactly the same problems when working on the electrification of the road transport sector in Sweden. In relation to this it is essential to work within the regulatory framework governing the energy, electricity, and transport markets, for example when you are trying to install recharging points for different types of vehicles. We conducted a study of the regulatory framework in Sweden, from which it emerged that the two different areas (electricity and transport infrastructure) are incompatible. It is difficult to imagine a rapid roll-out of recharging infrastructure given the regulation of the electricity market. Among other things the division of responsibilities between the trans-

port agencies and the electricity market players can be problematic. We are working within regulatory structures that were created in earlier times, and for other purposes. The ability to amend regulatory frameworks to provide for climate adaptation is an aspect we really need to focus on, both at national and European level.

**Marc VANDERHAEGEN**

The Connecting Europe Facility (CEF) is an example of how one funding instrument supports various sectors in tandem, especially the transport and energy sectors. CEF supports the transport, energy and digital sectors. Support for these sectors is of course linked. One of CINEA's priorities is to promote synergies, especially between the transport and energy sectors of the Connecting Europe Facility under its mandate, without forgetting the digital component as well. We have entered into discussions with the relevant DGs of the Commission on how to promote these synergies. This is an example of how the European Union can breaks down sectoral silos to achieve a successful, coordinated implementation of the financing of transport and energy policies. This may be a source of inspiration for the national financing agencies, the counterparts of CINEA.

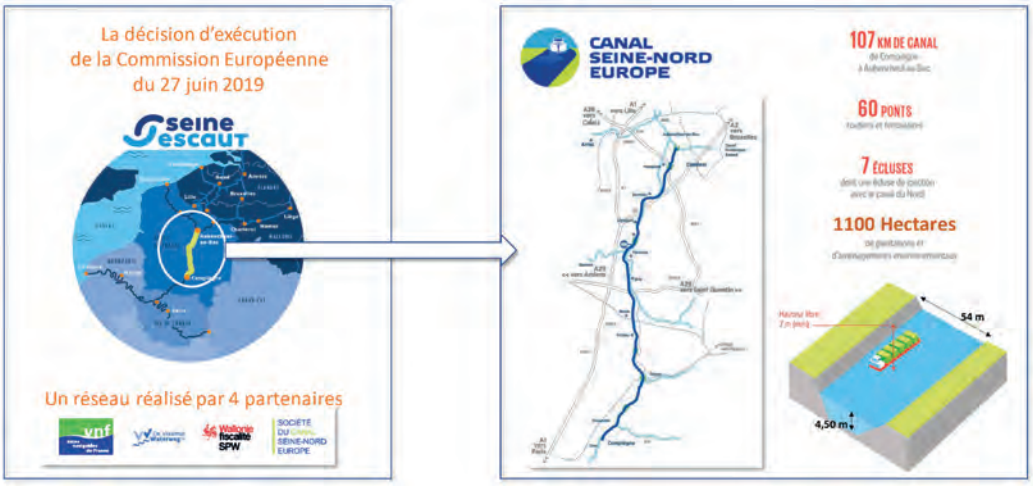
# MODAL SHIFT AND NEW INFRASTRUCTURE : A GLIMPSE INTO THE FUTURE OF DECARBONISED MOBILITY

**Sandra MOATTI**
Now for a session looking to the future at the modal switch and new infrastructure. Between the climate emergency and new digital mobility services, we are on the threshold of a mobility revolution. We need to start thinking about the emerging challenges and about the infrastructure required to cope with them.

To discuss this, we have Jérôme Dezobry, Chairman of Société du canal Seine-Nord Europe, who will be accompanied by Rémi Croix, and, for road transport, Nicolas Hautière, director of the Cosys Department (Components and systems) at Gustave Eiffel University. Finally we will have both as moderator and panellist Michel Neugnot, first Vice-President of the Bourgogne Franche-Comté region and Vice-President of the Mobility and Transport Commission, Régions de France.

Jérôme Dezobry, how do we optimise inland waterways for freight transport? You will be explaining this to us taking as your example the large construction site that is the Seine-Nord Europe Canal.

## VIRTUAL TOUR OF A LARGE CONSTRUCTION SITE : THE SEINE-NORD EUROPE CANAL




**The Seine-Nord Europe canal**

**Jérôme DEZOBRY, Chairman of Société du Canal Seine-Nord Europe**
I would like to share my experience as a project owner. What is this project? Where are we and what are the challenges? As with all major projects, there are challenges to be met: first of all the link between finance and governance; second, acceptability; finally innovation and digital. Rémi Croix, one of the project supervisors, will talk about construction site organisation.

Like a waterway, this project is progressing without making any noise. Inland waterway transport is progressing and massifying. It is a form of transport that emits five times less CO2 and is greening its fleet, discreetly, but extremely effectively.

The problem with inland waterway transport is that it needs to be large gauge to be competitive. But most of the inland waterway transport network in France is on the Freycinet gauge with 380-tonne barges. The TEN-T Regulation aims to move towards barges of 1500, 3000 or even 4500 tonnes, the equivalent of 220 trucks. Massification will decongest the roads, or at least offset traffic growth.

The particular characteristic of this project is that it is cross-border between four project promoters: VNF (Voies navigables de France), the Walloons, the Flemish, and Société du canal, to build a more than 4000-kilometre-long large gauge network between Le Havre, Dunkirk and Antwerp. This network will connect the major European ports, will first and foremost decongest the motorways, the A1 in particular, and will remove a bottleneck between the North and the Seine Basin. Of the 8 billion investment in the Seine Escaut network, 5 billion is earmarked for the canal. This is subject to a European Commission implementing decision setting both the completion timetable

and the geographical scope. This is a very powerful tool for pushing projects through, especially as concerns approval timescales because it sends a strong signal to the departments in charge.

At the centre of the Seine-Escaut network, the Seine-Nord Canal is a technical challenge: 107 km of new large-gauge canal, for barges up to 4500 tonnes, 54 metres wide and 4.5 metres deep. It is also a major challenge in terms of environmental development, with more than 1100 hectares of environmental development, including compensatory measures. To avoid environmental impacts, we are going to cross the Somme Valley by means of a 1330-metre-long bridge canal. We have three very large drop height locks. The vertical walls are almost 40 metres high. This is therefore both a construction and water economy challenge.


**The financing of the canal**

Financing is accompanied by governance. You see it with the high-speed lines. Numerous statutes are planned to create project companies. We have been pretty innovative because the government agency was created in 2016 and Société du canal is now a local public agency. The local authorities, the State, and Europe are on the supervisory board, which sets the direction: those who pay, decide. The status as a local public agency provides flexibility and facilitates the exercise of strong project control.

Governance of the supervisory board mirrors the financing principles: 1 billion euros from the State, sponsored by AFIT, and 1 billion from local authorities. The first distinguishing feature is that this billion euros is the subject of a 40-year loan guaranteed by Société du canal. Each local authority's share is therefore fairly reasonable.

Our main source of finance is Europe, expected to be 2 billion euros. Finally, the financiers wanted to postpone the raising of a project completion loan until the final phase of the project. In accordance with financing convention, it will be financed by a modal shift incentive tax, which will only be possibleonce the canal has been opened.

Project acceptability is assessed in terms of three major dimensions: the civil engineers, namely the infrastructure itself, social acceptability in terms of the "major construction site" initiative, via the creation of jobs and specific employment criteria, and environmental development together with the management of compensatory measures. These three sub projects are important.

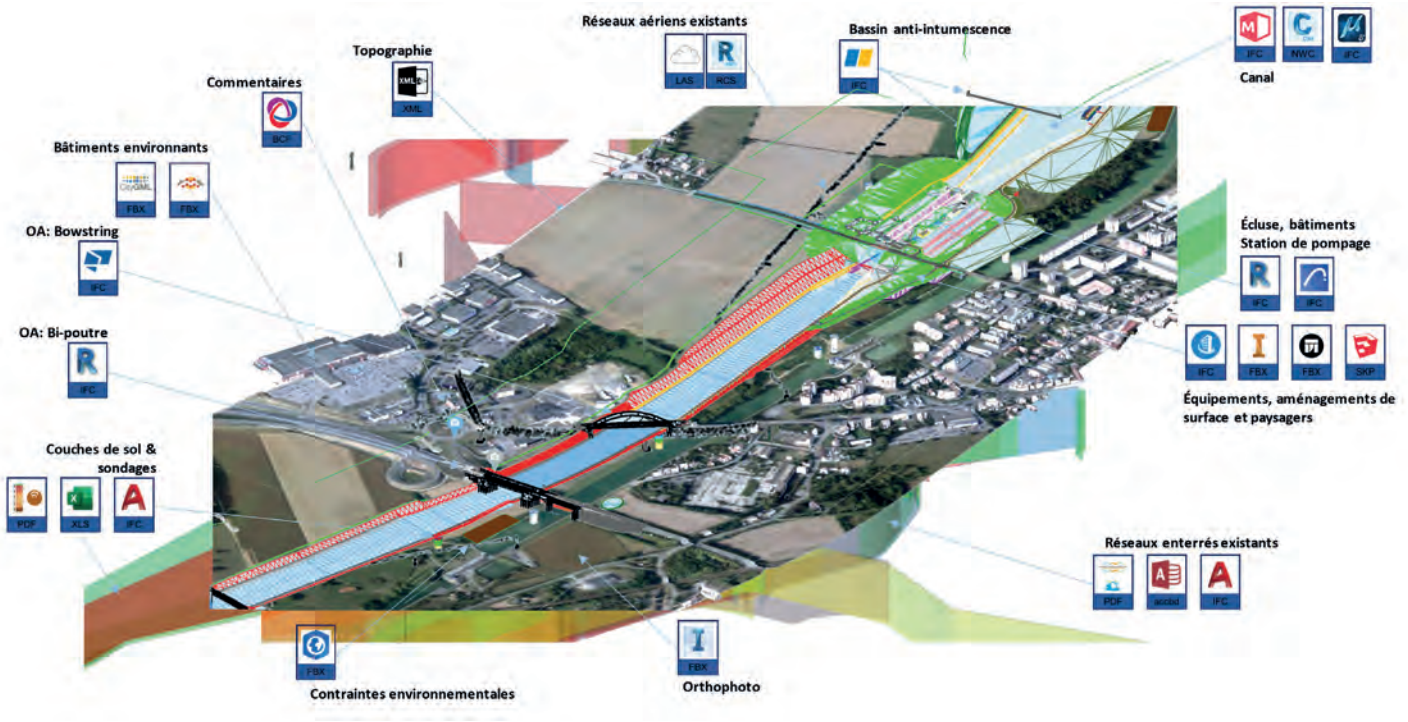
We have two phases, one phase in the North, where we are completing our studies, and a phase in the South, where initial work has begun. The work that is in progress aims, after a protracted consultation phase, to make the project acceptable on the ground by preparatory work that will support construction site logistics without saturating surrounding roads, and by environmental developments. We have also implemented participatory co-construction initiatives on local developments and on the studies.

Finally, the "major construction site" initiative involves everyone. The idea is for the construction site to create jobs, as far as possible. Numerous mechanisms are available via the public procurement code: for example, the Canal solidarity mechanism requires specific employment criteria, including for the study contracts. If we take all the current contracts, around 30 people have already found work thanks to this mechanism, which is very important for the project's local acceptability. The benefits of this are immediately apparent.

Concerning the digital dimension, la Société du canal has set the ambition of having a connected construction site. This is already the case in the study phase: we have 3D models for the consultation and digital models, Building Information Modelling (BIM), will be used instead of plans. In the approval application documentation, we are required to show the infrastructure's CO2 payback period. When it comes to building the construction site, the idea is to optimise it using geolocation assets for the major civil engineering plant to understand how to optimise and reduce movements.

**Rémi CROIX, Egis, groupement One**
I represent the engineering group ONE, which for almost 2 years now has been working on the design and preparation of the construction site for two thirds of the length of the canal and the large locks. We immediately hit on the idea of digital technology to take up the challenges of the design and preparation of the construction sites for this major project.

We are using the tools of the 2020s. The design work is therefore done using the BIM process, which generally refers to a digital model of the works to be built. This smart digital model contains a huge volume of data enabling the information to be structure d and organised, to sure coexistence between the very large number of specialities the design work requires, and to take up the challenges of designing the canal, integrating it with the surrounding land, and of eco-design. The BIM is not just a model, it is a way of working. It is our way of directing and managing the design and preparation of this very large construction site.




**The BIM concept - An example in images : 2 km of canal = 28 softwares**

If you take the example of one of the locks, we started two years ago with virtually a blank sheet of paper. Then, gradually, the BIM came into being, and we designed the lock structure with its wall, namely the vertical walls that define the U-shape of the lock chamber. We started with rough shapes before refining the detailed shape of the lock and finishings, then the equipment, the surface works, and the works access roads. It culminates in the model, which also includes the work's landscaping developments. This is the design that will be given to the future builders running the construction site.

Construction of two kilometres of canal in the vicinity of Noyon requires the canal to be dug, bridges to be built to restore road traffic, a height of 21 metres to be climbed and this elevation gain negotiated by means of a lock, and port facilities built to accommodate the craft passing through the lock. Some 20 specialities are therefore involved in designing two kilometres of canal. 28 software products have been used to create the "entrails" of this model. The BIM is therefore the lingua franca of these 28 software products, it is responsible for their interoperability and enables all the specialists to understand one another, to cooperate, and make asfew mistakes as possible in the various specialities'shared understanding of the project. The digital model also affords an overview of how the canal will be integrated into its suburban surroundings at Noyon.

We are faced with several challenges to achieve an efficiently functioning structure, starting with these 40-metre-high walls and the fact of having a lot of water pass through the locks in a short space of time. When a craft is lowered, the lock chamber is emptied, and 70,000 cubic metres of water are moved. The idea is only to lose very little of this thanks to the lateral water-saving basins The first layer of upper water will be emptied into the upper basin, the second into the second basin, etc. and the last water layer will be emptied into the lower forebay. When a craft is raised, the lock chamber needs to be filled, the first water layer will be taken from the bottom basin as far as the penultimate water layer, which will be taken from the topmost basin and, to complete the filling of the lock chamber, the water will be taken from the upper forebay. An efficient transport system requires craft to be able to pass within half an hour. Taking account of the time to complete the manoeuvres, the time to shut the gate, and safety time, we therefore have 13 minutes to raise or lower the water level. 70,000 cubic metres in 13 minutes is the equivalent of emptying or filling an Olympic swimming pool every 40 seconds. We have extremely large hydraulic flows and the water in the lock chamber must not be excessively disturbed because the turbulence is very uncomfortable or even problematic in terms of boat safety. The system is a perforated raft: the water enters from below, there are three holes, and the ock chamber is filled like a jacuzzi, as to avoid excessive jostling of the craft within.

The hydraulic phenomena are studied using the digital modelling of the turbulence within one of the water-saving basins and a physical 1/12th scale model. The results of our digital models are compared with the turbulence to be observed on the scale models, enabling the results to be consolidated and the design optimised.

The next step is to understand the work involved in constructing these locks. Construction consists in excavating a trench, constructing the concrete works, then backfilling. The BIM model also enables us to work on the

build sequencing, the details and all the technical problems over four or five years of site construction work. Construction will be followed by operation. The BIM model with all its details will be handed over to the future operators who will be able to use it for their own purposes.

Construction will be followed by operation. The BIM model with all its details will be handed over to the future operators who will be able to use it for their own purposes.

# FIFTH-GENERATION ROAD

**Sandra MOATTI**
We emphasised that the road would continue to handle the lion's share of mobility. Nicolas Hautière will show us that it is more than just transport infrastructure but energy infrastructure and data infrastructure as well.

**Nicolas HAUTIÈRE, Director of the COSYS Department, Gustave Eiffel University**
It is my pleasure to give you a presentation on what we have been doing for the past 10 years or so on the 5th Generation Road (R5G). I will touch on everyday mobility and highways, with all the controversies associated with a model that has been successful, but which generates a lot of externalities, in terms of urban spread, heat islands and loss of biodiversity. This urban highway model, which is gradually squeezing individual cars out of town centres, is creating push-back and social movements focused on individual cars.

***« We don't know exactly where we are headed but we do know that transport infrastructure will be influenced by the way in which users and transport companies will embrace these solutions. »***

What is to be done when confronted with the controversy over everyday road and interurban road projects. To begin with, the challenge is to know if we can develop smart, sustainable, and liveable roads that would afford fair access to the town for all. This is a fundamental issue in migrating from the highway of the seventies to the sustainable town. What we do with this heritage, for example the superb infrastructure network of the Île-de-France?

This question links to a raft of societal problems (climate change, increasingly rare resources for construction, inclusion of ageing populations, biodiversity, the financial crisis, urban spread, air pollution, congestion) which points to a new generation of roads and prompts the question whether we should not be travelling differently.

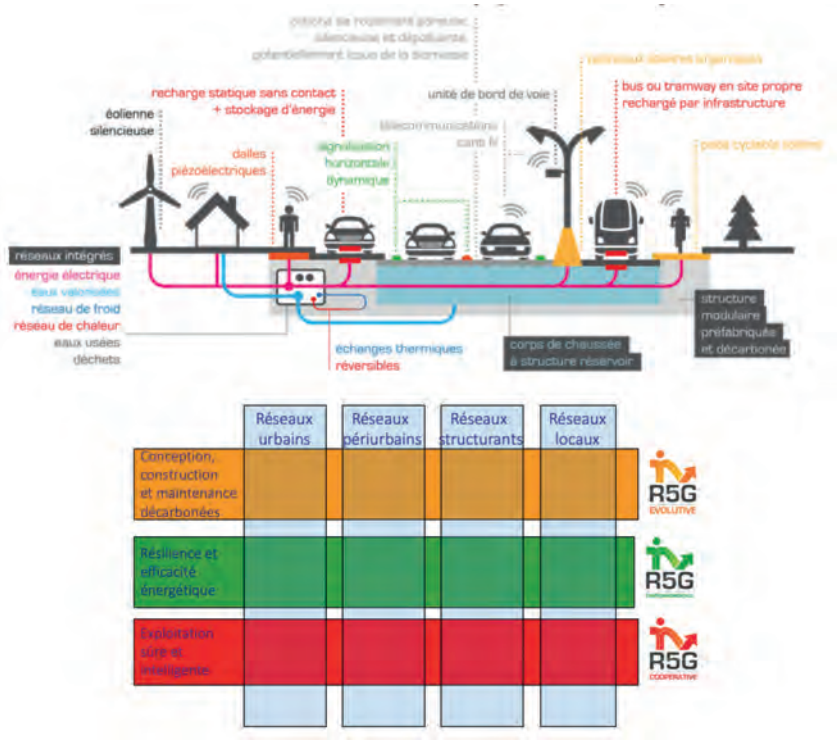
Our solution is safer, more decarbonised, more communal mobility, even multimodal or co-modal mobility based on increasingly smart, connected vehicles, on shared vehicles, self-service, decarbonised vehicles. All this constitutes a mobility solution offering. We don't know exactly where we are headed but we do know that transport infrastructure will be influenced by the way in which users and transport companies will embrace these solutions.

To summarise, we therefore have a cocktail of societal challenges, new mobility solutions and perhaps a pivot towards a fifth generation of roads. What would it be? This does not necessarily lead to a specific type of mobility, but this new generation needs to be adaptable, future-proof, depending on the way in which we travel, and therefore very innovative.

The 5th Generation Road project is part of the French manifestation of the European Forever Open Road project. What we have tried to do with R5G is integrate the various components of the Forever Open Road (a future-proof and automated road that is resilient to climate change) within a "system of systems" approach. As the students have demonstrated with Eco Road[6], the road must be connected to the energy network, to users, to the public transport and individual transport network, but also to wind turbines, houses, buildings, etc. And that applies whether we are talking about local, secondary, or suburban networks, etc. We are currently at the post demonstrator phase to see what works and what can be deployed at scale.

What have we achieved in the past 10 years? For example, with the I-Street project, we have managed to convince the civil engineering industry that its future lies in the road system. We submitted this project in 2015 as part of a call for projects by the Ademe (Agence de l'environnement et de la maîtrise de l'énergie, Ecological Transition Agency) for the road of the future, and we ran it using some demonstrators. If you have heard people talking about about photoluminescent paint-based markings, they arose from this project.

6. See annex no. 1




**R5G - A French manifestation of the forever open road**

Infrastructure being the backbone of mobility, automated mobility and the physical and digital adaptation of infrastructure are subjects in their own right. We are working within the "single partnership" entitled CCAM[7] on automated and connected ability. The challenge is to create a level three and four road which would be the mirror image of level three and four automated vehicles, to support new forms of mobility.

***« Nowadays, the infrastructure can produce, store, and distribute energy. »***

Concerning roads' energy integration, roads and motorways were built to accommodate internal combustion vehicles, and therefore the energy carrier was not internalised within the infrastructure's design. Nowadays, the infrastructure can produce, store, and distribute energy. How can roads be used to decarbonise the habitat? How do we use car parks and streets to heat buildings or cool them in summer? This is a broad-based version of transport infrastructure, transcending mobility alone.

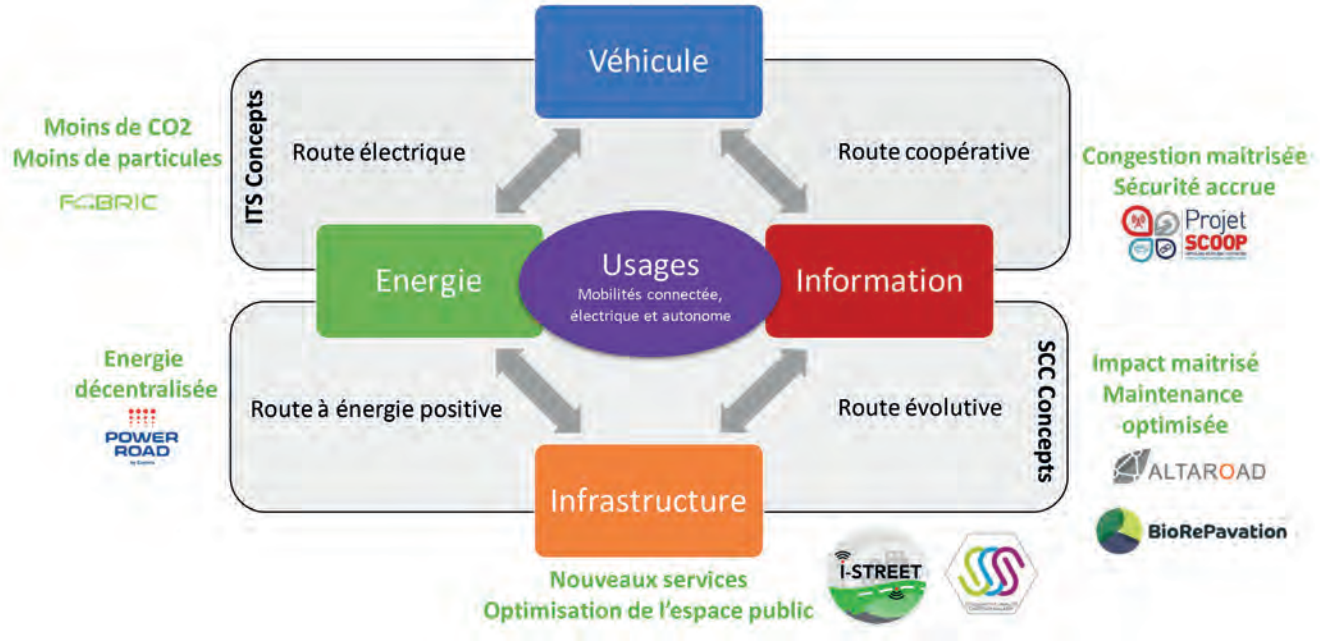
The 4 th Generation Road is designed around the Vehicle-Infrastructure-Driver (VID) triptych, familiar in the road safety context. If the driver is digitalised, if the propulsion system is internalised, for example by electricity, this design model tends to be replaced by the Vehicle-Infrastructure-Information-Energy model (VIIE). Electric roads, positive energy roads that are future-proof and cooperative are the big issues of the moment.
As a national research body, we endeavour to support local government authorities and how they come to terms with these ideas. We have built a R5G'Fac, a 5th Generation Road factory. Metropolitan areas are very demanding, affected as they are by congestion caused by the individual internal combustion car. Many local government authorities are wondering how to operate automated vehicles. What is the road? What are the markings? What performance is expected of the marking? Do the white lines need to be touched up? We do not yet have all the answers.

Four examples illustrate this approach.

• Once the 5th Generation Road has been deployed, coordinated around urban networks, and soft mobility as well, how do we ensure that when public contracts for lighting are renewed (migrating from sodium to LED technology) the contract is based not on energy performance, but on overall performance? If we wish to capture all the value that goes with LEDs, we also need to change the road surface to have a higher albedo (a surface's reflection coefficient). If we want the lighting to be switched on only when traffic is present, the lampposts, etc. need to be connected. We are therefore talking about a system of systems which saves on lighting costs and requires road resurfacing. The biggest overall performance contract is Cielis, in the City of Paris, representing 745 million euros over 10 years.

• What is at stake in transport governance on urban highways? It is about having high occupancy vehicles driving on dedicated lanes, for example car sharing lanes. One could imagine that these vehicles will in future be interconnected and that these dedicated lanes can be

7. Connected, cooperative and automated mobility, https://www.ccam.eu/




**From the VID to the VIIE**

massified to constitute a sort of road RER, not to replace public transport but pending completion of the Grand Paris Express, for example. This is a challenge around governance and the possible transfer of liability and responsibility if we wish to abide by this system approach

• How do we massify the inter-urban network that needs to be promoted for freight transport, not to replace the Seine-Nord Europe Canal, example, but pending its construction? We can practise platooning, massify transport movements by reducing the distance between vehicles, by making heavy goods vehicle trains safer, or else electrifying heavy goods vehicles and enabling them to be recharged while on the move. According to the Pelata[8] report, we have the potential to decarbonise freight by 86% by 2030.

• Finally, is it possible to decarbonise the last mile in rural areas? In Rambouillet, we are experimenting with autonomous shuttles (we are talking about guided transport on roads), but conversely, autonomous road vehicles could use rail. On the Flexmove project, we are supporting the development of a "transmodality" solution aiming to stimulate the rail sector. The money from the stimulus plan will bring small lines back into commission.

As a research body, we are also working on rethinking transport networks as a seamless national network. We are taking account of transport infrastructures and their green dependency, we do not just look at the road but the road and its environment, and onto this we would graft energy production, carbon sinks, etc.

The fifth generation VIIE road is therefore integrated with an ecological corridor and interacts with solar energy, which includes interactions between transport infrastructures, the ecological corridor, and the atmosphere. Automated road safety cameras could thus be used to create a network for observing changes in air quality. They could also be used to study the impact of climate change on vegetation or on fauna and flora. We are also endeavouring to support these subjects at European level via Bison[9], a Coordination and Support Action (CSA) on the synergies between biodiversity and transport infrastructure.

New generation roads therefore possess automation, future-proofness and resilience characteristics capable of responding to the challenges of decarbonising the transport system. For the fifth-generation road project, we have created demonstrators to take us out of the laboratory into different geographical spaces and environments. In the interurban environment, the first challenge is to decarbonise long-distance freight, but also to rethink the connection between town and country by means of overall performance contracts. In the urban environment, the challenge is more about successfully transforming urban arteries into roads with a positive health impact.

8. Décarboner le transport routier de marchandise par l'ERS, enjeux et stratégie, Patrick Pélata, juillet 2021, https://www.ecologie.gouv.fr/lautoroute-electrique
9. Begun in January 2021 for a 30-month period, Biodiversity and Infrastructure Synergies and Opportunities for European transport Network (Bison) aims to produce the European roadmap for integrating biodiversity into the life cycle of transport infrastructure, from design to decommissioning: https://bison-transport.eu/

# DISCUSSION

**Michel NEUGNOT, Vice-President of the Mobility and Transport Commission, Régions de France**
The two presentations and the presentation by the Hackathon prize-winners demonstrate that it is good to be a 20-year-old today. We are in an era in the history of humanity in which the future is being built at pace with, notably, the resolution of multifactorial challenges whereby science and technological progress will enable us to deal with our current problems. Humanity managed to create a vaccine within one year: you can move mountains when you mobilise intelligence and energy!

We cannot do anything in the mobility arena without taking the greatest possible number of people with us. The Framework Act on Mobility puts regions in the position of mobility conductors, by analogy with an orchestra. The overhaul of the SRADDET will also incorporate thinking on logistics (Schéma régional d'aménagement, de développement durable et d'égalité des territoires).

SRADDET (regional development, sustainable development, and territorial equality plans) For freight, we have an intermediate space between major state projects and the local manifestation of these projects, which must also emerge from the local context if smart solutions are to be found. Given this, the challenge is a difficult one, but is achievable.

It would be a mistake to introduce the interconnection issue without doing so for standards. We need European standards that are common to all if we are to be able to travel. The ERTMS was too long prohibited in France, which is now causing considerable delays.

It is high time that Europe got a grip on this to avoid each country going off in different directions, and that we really harness everyone's intelligence to achieve this aim. If only I were a 20-year-old again today, with all my life in front of me to experience the delivery of these transformations!

**Jean-François BELANGER, Mobilités Magazine**
We know for example how much a kilometre of TGV costs. For these roads you are planning on transforming, Mr Hautière, you will of course need to make decisions and find funding. What illustration can you provide?

**Nicolas HAUTIÈRE, directeur du département COSYS à l'Université Gustave Eiffel**
The positive health impact road is not the low-cost route. We are talking about the roadway in the sense of roads and pavements and associated networks for a somewhat different economic model. For example, in Châtenay-Malabry, we are working on the eco-design of a complete neighbourhood. Rather than doing everything in terms of built structures, we could transfer certain shared facilities to roads and pavements. Using the street to create cool areas would perhaps be cheaper, enabling the overall cost to be kept within reasonable bounds. We therefore need to think in terms of the "built structures + roads and pavements" rather than in terms of roads and pavements on the one hand and built structures on the other. Should building requirements, new thermal regulations for example, require the generation of decentralised energy, it would perhaps be cheaper to do it on streets and pavements than on the roof of a building. That is what can put the absolute cost into perspective and put it back in the context of a neighbourhood economic model.

**Hélène JACQUOT-GUIMBAL, co-fondatrice de l'Université Gustave Eiffel**
I am delighted not to hear yet again that every catastrophe is to do with concrete. I would remind you that concrete was used to build the Pantheon in Rome. The hard sciences are very useful in solving technical problems. "Hard sciences bashing" is untenable because without hard sciences, nothing works. But the humanities are also important. If the work that we did with Eiffage on the Lavallée eco-neighbourhood in Chatenay-Malabry appears to us to be emblematic and an example to explore, it is also because we have numerous social studies. We experimented in partnership with the inhabitants so as really to involve them. Towns works if their inhabitants want them to.

**Michel NEUGNOT, Vice-President of the Mobility and Transport Commission, Régions de France**
Indeed, what also needs to be invented is how the project and the decision is prepared. The difficulty the experts face is to communicate in simple terms things that are terribly complex, and which will become even more so. We did a lot of work on this in the social sciences field: how to start with needs and wishes and get people to understand that the technical response involves a gradual learning methodology.

Mobility options are never talked about in positive terms. It is always complaints about the train that is late. This conveys a completely negative image, but when you are immobilised, part of your life has gone.

We need to develop intermodality and have the right means of transport, at the right place, at the right time. Each means of transport needs to be set in a given context. There are more solutions than one. How do you explain that just because it will be different does not mean it will be more difficult? We need to experiment with developing the supporting narrative, to avoid having successive pressure groups taking a negative line on every innovation.

***« There are more solutions than one. How do you explain that just because it will be different does not mean it will be more difficult ? »***

**Laurent MIGUET, Le Moniteur**
Are you also optimistic about maintaining our rail network? The report submitted last week by the Transport Regulation Authority[10] highlights the gulf between France and Germany as regards maintenance investment, notwithstanding our network having a significantly higher average age. The first to suffer will be the main regional lines and the local feeder lines. Isn't this a bit discouraging?

**Michel NEUGNOT**
No, because infrastructure funding is a general problem for all networks. On the local feeder lines, the regions will need to ask themselves if the right means of transport is the traditional train, with an historic operator. Could we not think differently about this? We must start with the need, but we also need to agree on the mismatch between the perceived need and the real need. I think that we are going nowhere if we start from the premise that the solution is a conventional train. On the other hand, we need to experiment with the autonomous train and tracks that can be used by road and rail,etc.

There is also the issue of the light train: indeed, the heavier the train and the heavier the traffic, the more stress on the track. We cannot get away with the same one-size-fits-all model for the entire country and only one type of rolling stock. The conclusion the regions are drawing is that everyone needs to think in terms of their own network. One solution should not be held up in opposition to another.

As concerns funding and the share borne by the State, there has been significant progress with 35 billion of debt being taken on by SNCF Réseau (Network SNCF). These deficits are subsumed into the State's debt but cutting finance charges by one billion affords new possibilities. However, the State share is 30% as compared with 80 to 90% in other countries. This subject does not come up for debate in the presidential elections despite progress being possible in this arena. Finally, the regions receive no assistance to lay on more trains. We will have to deal with this when the time comes.

**Jean-Bernard KOVARIK**
We began this afternoon with innovations: they prove that what we spoke about this morning is eminently tangible. We raised the question of Europe with DG Mobility and we moved on to practical works with Seine-Nord Europe. We examined the road issue, because, once 75% of movements are by road in the long term, we cannot only think in terms of rail or think that there is no salvation other than inland waterway transport and rail.

Recent years have been characterised by several realisations in France. First of all, before talking about financial resources, what are the needs? This five-year period began with an Infrastructure Steering Committee (ISC) chaired by Philippe Duron, who put some assumptions on the table and comparative funding levels. The Mobility Framework Act (MFA) was adopted, and every year Parliament has honoured the initial multi-annual programme, which is sufficiently rare to be worthy of mention.

The ISC is getting ready to review future requirements, which are greater than those that have been funded in the past five years.

10. Autorité de régulation des transports, Étude sur l'ouverture à la concurrence des services de transport ferroviaire de voyageurs, 2022, https://concurrence-ferroviaire.autorite-transports.fr/

# ROUNDTABLE N°.2

## HOW CAN SUSTAINABLE DEVELOPMENT CHALLENGES BE INCLUDED IN INVESTMENT DECISIONS ?

**Jean-Bernard KOVARIK**
We have seen that transport represents a very large and growing share of greenhouse gas emissions. That being so, how do we take account of the climate impact on infrastructure, not only in funding decisions, but also in project evaluation ?

This roundtable will be in three stages: first of all three speeches, then the reactions of three panellists or transport industry big hitters. Minister Péter Balázs, Dominique Riquet MEP, and Infrastructure steering committee president David Valence, and finally a discussion session with participants both in the hall and remotely.

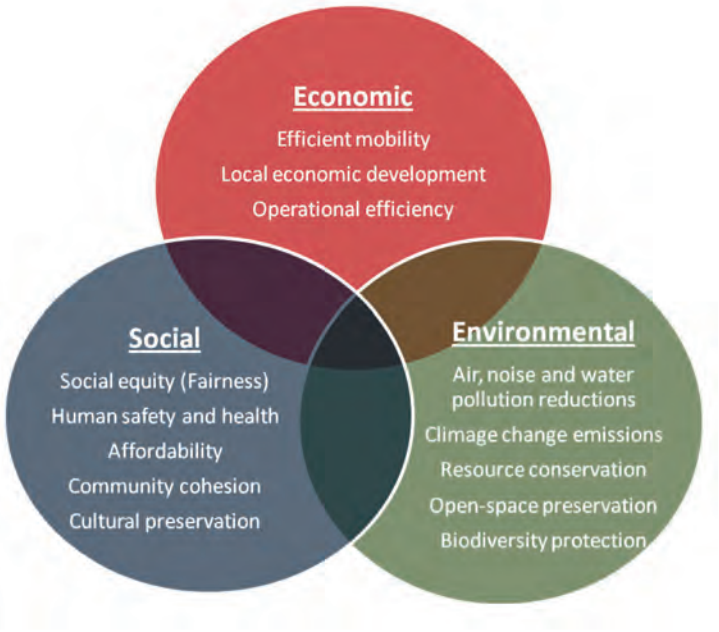
Our first speaker of this roundtable is Professor Todd Litman. He is the founder and executive director of the Victoria Transport Policy Institute (VTPI), an independent research organization dedicated to developing innovative solutions to transport problems. His works help to improve evaluation methods that are used in transportation decision-making, and, very importantly, make specialized technical concepts accessible to a larger audience. I would like to point out that he recently authored the online TDM Encyclopedia, which is a comprehensive internet resource for identifying and evaluating mobility management strategies. Prof. Litman has worked on many continents. His speech will discuss how to incorporate social equity goals into sustainable transportation planning.


14. https://www.vtpi.org/tdm/

# TRANSPORT PROJECTS AND EQUITY

**Todd LITMAN, Founder and Executive Director of the Victoria Transport Policy Institute (Canada)**

I am going to talk to you about justice, about social fairness. Sustainability supposes fairness. When we talk about transport sustainability, we often think about environmental sustainability. But I think that sustainability requires a balance between economic, social, and environmental objectives. A transport system would not be sustainable if it reduced the environmental impact without being fair, or without supporting the economy. It is all a question of balance.




Would our transport system be sustainable if we all drove electric vehicles? An electric vehicle does not reduce the cost of road or parking infrastructure. It does not reduce congestion. It does not spare users the cost of purchasing and using their vehicle. It does not promote the mobility of non-motorists, so does not therefore contribute to achieving certain social fairness objectives. It does not promote physical fitness and public health. It does not boost activity levels. And does it make any difference whether one is run over by an electric vehicle or an internal combustion engine vehicle ?

Let us suppose you could spend 1 billion euros on highway widening. At best, you are going to reduce congestion, although this outcome is only temporary because, within a few years, the additional capacity is typically taken up by the additional traffic it enables. If you spend 1 billion euros on subsidising electric vehicles, you will reduce fuel consumption and pollutant emissions, but you will not achieve the other sustainability objectives: reducing infrastructure costs or the cost for households of owning and using their vehicles, improving mobility for non-motorists, or improving safety.

***« A transport system would not be sustainable if it reduced the environmental impact without being fair, or without supporting the economy. It is all a question of balance. »***

Strategies that reduce total vehicle movements, create more compact and pedestrian-friendly localities, and implement transport demand management incentives help achieve a greater number of objectives.

Let us now turn to social fairness. Social fairness comprises many components or facets. One of these components is horizontal fairness: each person recieves a fair share of public resources, such as financial investments and road space. It also implies that users should pay the cost of their roads, parking areas, and public transport services unless subsidies are specifically justified. Another aspect of social fairness is external costs. When people purchase an automobile, they expect governments to provide roads and businesses to provide off-street parking facilities for their use. Motorists also assume that they have permission to impose congestion, accident risk, noise and air pollution on other people. These external costs are, by definition, unfair: one individual is imposing a cost on another. Reducing the external costs to the maximum extent possible is therefore a social fairness objective.

Another aspect of social fairness is to ensure that everyone can benefit from basic mobility, and be able to access essential services and activities: going to school or to work, shopping, etc.

Accessibility depends not only on mobility but also on how communities are designed, and therefore the distances that people must travel to access services and activities. Land-use planning is therefore an important component of social fairness. For example, an important way to achieve social equity goals is to ensure that affordable housing is located in accessible neighbourhoods, with good services, and which are pedestrian-friendly, where it is easy to get around without driving. Migrating from an internal combustion fleet to an electric fleet takes a long time, around 15 years. If we want to cut our pollutant emissions quickly, we therefore need to concentrate as much on reducing total traffic as on migrating to electric vehicles.

Electric vehicles are expensive. The subsidies committed are considerable. Electric vehicles are less expensive to drive, and their running costs are lower, by around half, compared with fossil fuel vehicles. So, when someone purchases an electric vehicle, he or she tends to travel longer distances. And electric vehicles confer few ancillary benefits.
Strategies for reducing overall vehicle journeys, for example effective road and parking pricing strategies, thereby promoting resource-efficient transport modes, walking, or cycling to public transport, and creating more compact communities, provide a wider range of benefits.

***« Many transport investment projects overestimate the benefits conferred by widening roads in terms of reducing congestion. They prioritise highway projects over alternative solutions. »***

In most countries, transport expenditure is mainly invested in improving highways to reduce congestion. But there is a paradox: motorists are in favour of wider roads provided someone else pays for them. But if they are charged for these improvements with efficient road pricing, the demand for greater capacity often disappears. Using tolls to recover the cost of widening a road generally incurs costs of between €0.5 and €2.0 per kilometre travelled by vehicle in the rush hour. Widening urban highways is very expensive. If a municipality is paying for the highway widening, it turns out that few motorists will be willing to pay this price. Many travellers will be inclined to opt for an alternative solution to driving.
The economic solution, the rational and fair solution is therefore to introduce road tolls to prevent traffic congestion. Urban roads, when they are congested, must be chargeable. This is the fair and effective solution. If we widen roads, within a few years the additional capacity will be filled by induced vehicle traffic. We know this, but many transport investment projects overestimate the benefits conferred by widening roads in terms of reducing congestion. They prioritise highway projects over alternative solutions.
There are more intelligent solutions for countering congestion, for example introducing tolls for existing roads, rather than only doing so once the roads have been widened, then using this revenue to improve resource-efficient transport modes, namely walking, cycling and public transport. This reduces the price to be paid to achieve the objective of reducing congestion. Moreover, motorists need to pay directly for using parking areas so charging for parking is a good replacement solution for road pricing. If you cannot impose road tolls, then ensure that parking is charged for as effectively as possible.

Other types of vehicle-related pricing can also increase transportation system efficiency and equity. For example, vehicle fees that are currently fixed, such as insurance premiums, vehicle registration fees, and purchase taxes, can be made distance-based, so the more you drive, the more you pay and the less you drive, the more you save. This gives motorists a significant new incentive to reduce the distance they travel, but is not a new fee, simply a different way to pay existing fees. Since annual vehicle-kilometres tend to increase with income, this tends to be progressive with respect to income,that is, lower-income households tend to save money overall.

Many towns and cities in Europe are now introducing Sustainable Urban Mobility plans (SUMP) which are a framework for implementing transport demand management.

**Jean-Bernard KOVARIK**
It was really understandable and useful! Thank you very much for your very interesting perspective on the relationship between sustainability and congestion issues.

I would like to give the floor to the next speaker, Professor Jose Manuel Vassallo, professor in the Department of Transportation, Engineering, Urban and Regional Planning at Universidad Politecnica di Madrid, Spain.

# FUNDING AND FINANCING TO ENSURE SUSTAINABLE MOBILITY

**Jose Manuel VASSALO, Professor in the Department of Transportation Engineering, Urban and Regional Planning at Universidad Politécnica de Madrid**

My presentation will focus on funding and financing mechanisms to ensure sustainable mobility. The objective of mobility investment is to achieve the greatest sustainability. At the end of the day, sustainability is about reaching a balance across economic, social, and environmental objectives, as well as between current and future generations for the well-being and quality of life of society. Sustainability requires giving up something now to ensure other objectives for current and future generations. To reach that goal requires thinking with a broader perspective, avoiding focusing only on economic themes that concern the current generation.

The United Nations Sustainable Development Goals have been promoted with the aim of providing specific areas to frame the above-mentioned concept. I want to highlight three of them, relevant to the content of this conference: industry, innovation and infrastructure; sustainable cities and communities; and climate action.

***« Sustainability requires giving up something now to ensure other objectives for current and future generations. »***

Why is decarbonizing mobility so important? Data from the European Environment Agency show that while from 1990 to 2018 most economic sectors have been reducing GHG emissions by between 20 and 30 %, the transport sector's emissions have grown by 30 %. Mobility is actually one of the sectors more difficult to decarbonize given its high dependency on fossil fuels.

Which are the levers available for decarbonizing mobility ? I distinguish between three different such levers: mobility actions, energy actions, and market measures

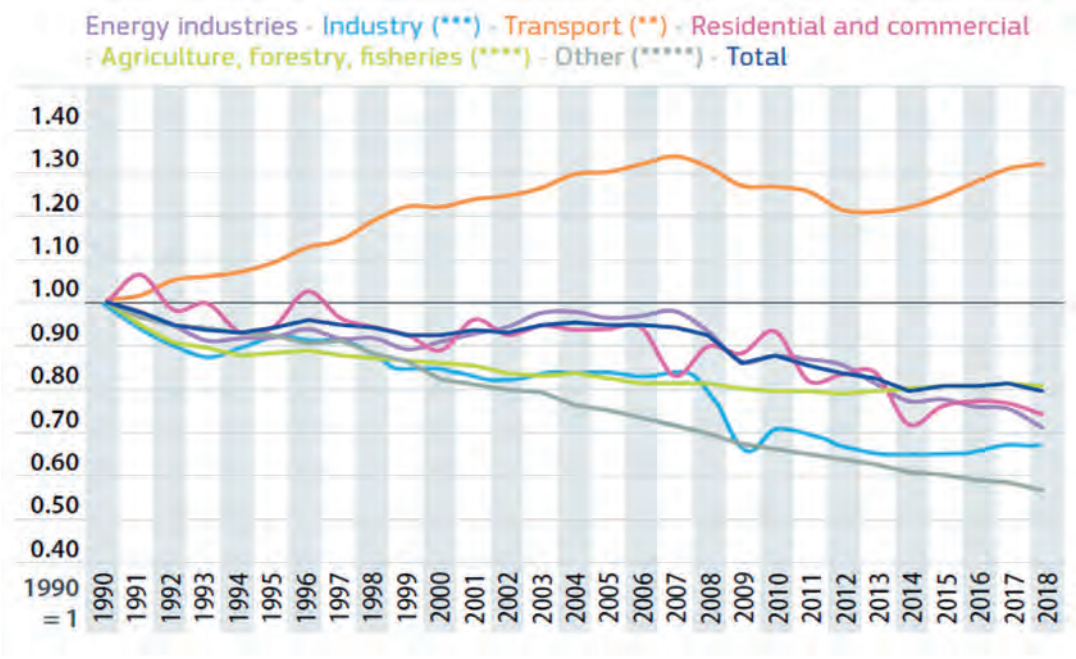
• There are several comments to be made regarding mobility actions. Reducing mobility will undoubtedly contribute to decarbonization. Currently, teleconferences are demonstrating that business travel can be reduced to a certain extent. Another option is shifting to cleaner modes, though it is not always easy. Finally, it is possible to take better advantage of the vehicle capacity by promoting sharing and pooling approaches, and by making a most efficient use of freight vehicles with the help of ICT technologies.

• Acting on the energy side of the equation requires shifting to low or zero carbon technologies and increasing energy efficiency in the life cycle from cradle to grave.

• Finally, market measures aim to incentivize the development and use of cleaner technologies and the adoption of more rational behaviours through the use of carbon prices and taxes, and also through incentives to promote innovation.

The European Union isstriving to become the first climate-neutral continent. The Green Deal proposes to achieve a 90 % reduction in GHG emissions produced by transport by 2050. That goal requires making all transport modes more sustainable, providing sustainable alternatives available in a multimodal system, and putting in place the correct incentives. To that end, the EU Green Deal is expected to mobilize at least €1 trillion of sustainable investments by 2030.

A recent McKinsey report shows the required global investment to achieve global climate neutrality in 2050 as a percentage of GDP. The report states that to achieve such a goal, investment should grow from 6.8 to almost 8.5% of GDP. Of the different sectors —agriculture, industry, forestry, buildings, etc.— the largest amount will have to be invested in the mobility sector, being the one whose needs will grow the most over time, with levels between 3 and 4% of global GDP.




**Why is it so important to decarbnize mobility ?**
**GHG Emissions by sector in EU 28 (growth from 1990)**

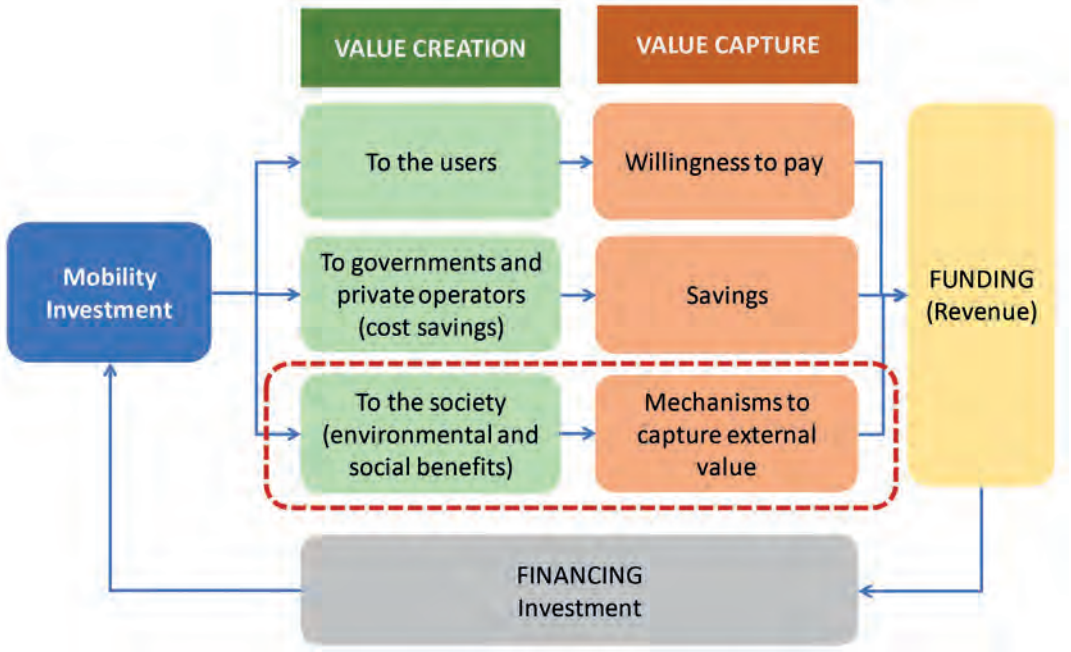
To become climate-neutral in 2050, the investment needs the world faces are enormous. Electromobility requires good infrastructure for recharging, and implementing dynamic charging through electric road systems, crucial for heavy vehicles. Moreover, balancing the production of renewable energy with its use would require using green hydrogen as a way of storing green power produced in low demand periods. However, to make the production of green hydrogen cheaper, a lot of research is required to reduce the cost of electrolysis. Finally, we need to consider the possibility of using biofuels and synthetic fuels, particularly for planes and heavy vehicles for which road systems are not technically or economically feasible.

How can we fund and finance these new mobility investments to promote climateneutrality? On the one hand, we need to raise revenue (funding) from capturing the value produced by the investment.

On the other hand, we need to obtain money upfront (financing) from investors willing to provide capital to develop the facilities. If the funding and financing cycle fails, the investment will no longer be possible, undermining the anticipated benefits.

***« To become climate-neutral in 2050, the investment needs the world faces are enormous. »***

Mobility investment is expected to produce value for users, governments, private operators, and society. The greatest share of the value produced by investment to mitigate climate change usually falls on society. One of the main problems in obtaining funding for decarbonization is hence that most of the benefits are positive externalities that are difficult to capture.




**The cycle of infrastructure funding and financing**

As public budgets are constrained in most economies, rising revenue is crucial to make sustainable investments. While capturing environmental benefits is complicated, imposing a charge on mobility pollution is easier. Pollution charges will facilitate raising money and at the same time will incentivize more sustainable behaviors. Many congestion and pollution charging approaches in cities are following that path. However, before implementing pollution charges, it is crucial to apply homogeneous environmental taxation on energy products across transport modes. While road transport has higher fuel taxes than other modes, air transport is subjected to the cap-and-trade market. The revenue coming from pollution charges should be devoted to promoting clean investments together with research and innovation for decarbonization.

Once the revenue source is available, it is necessary to go to the financial markets to borrow money upfront to meet the investment needs. In that respect it is worth mentioning that there is an increasing trend towards promoting sustainable finance, which refers to the process of taking environmental, social and governance considerations into account when making investment decisions in the financial sector. A variety of products such as sustainable investment funds, green bonds, social venture capital, green loans, etc. are being promoted to channel savings towards investments aimed at achieving sustainability, both environmentally and socially.

However, for sustainable finance approaches to be successful, it is crucial to comply with three requirements:

• Increasing awareness of sustainable objectives. Governments are are getting better at this.

• Putting sustainable objectives at the core of government agendas.
• Promoting incentives to investors since for them it is important to reap something out of investing in sustainable finance products. Those benefits can be associated to reaching a greater profitability rewarded in a way or another (competitive advantages, tax deductions, etc.), or at least acquiring a better reputation.

**Jean-Bernard KOVARIK**
We now welcome David Zambon, Deputy Director-General of Cerema responsible for production management, while also being the director of Transport infrastructure and materials.

# EVALUATING TRANSPORT INFRASTRUCTURE RESILIENCE

**David ZAMBON,** Deputy Director-General, and director of Transport infrastructure materials at Cerema


Cerema is a national public body involved in all aspects of research, innovation and the production of doctrines and methodology. It is also a conduit for knowledge, feeding the scientific, technical, and professional community, providing support to numerous public but also private sector actors.

I am going to talk about transport infrastructure resilience.

The infrastructure arena and local government authorities generally is one of Cerema's historical areas of jurisdiction. We are in synch with public policy challenges and climate change-related issues, which are linked. When we talk about infrastructure, we talk about transport, but also about local government authorities, about society, about economic models... We have tackled the issue of resilience through the prism of this global and strategic approach.

What is resilience? We use this concept as construed by the IPCC, which defines it at length. The most commonly accepted use is confined to the fact that infrastructure or a service returns to a functional state after a crisis, or breakdown. We have elected to incorporate other dimensions, relating to slower or more widespread developments, in particular the problem of chronic deterioration and ageing, but also the impact of climate change and the emergence of new uses of this infrastructure. Indeed, this infrastructure must be capable of adapting to changing social needs, thereby continuing to serve the regions and geographical spaces it exists to serve.

As Herald Ruijters said, the time for action is now. Leaving aside IPCC graphs and scenarios, the infrastructural impact varies greatly, extending, for example, from fires in the areas in which the infrastructure is located, to land slippage, to floods etc. When this data is broken down regionally to analyse infrastructural resilience, we can, for example, focus on the issue of precipitation, and its variability over time, and conclude that the impact on infrastructure works is moderate. But if at the same time we look at other indicators, such as increasing drought, combined with heightened phenomena in terms of floods and extreme precipitation, we can appreciate the extent of the changes in the type and intensity of the hazards to which these infrastructure works might in future be exposed, which not all of them are well placed to cope with.

There is a very clear link between our problems of infrastructural resilience, its upkeep, its maintenance, and the UNO's sustainable development objectives, which link to many of the challenges our society faces: access

to education, to health, the functioning of the economy and of our institutions, etc. Our core business, based on infrastructure development, construction, and engineering, can no longer be divorced from what these infrastructures are there to do, and which is integral to the challenges facing our regions. Thinking about, discussing, or challenging the resilience of this infrastructure is what this overall approach is about.

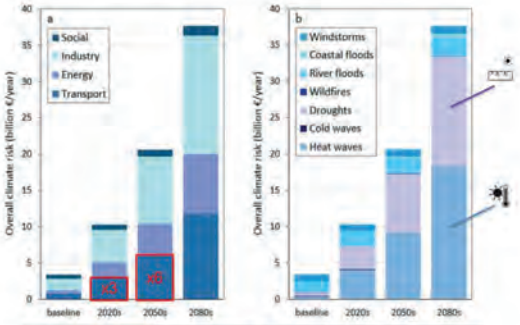
Over the past 10 years damage to European infrastructure attributable to climate-related events has been three times greater than in the previous decade. The European study demonstrates that if this trend were to continue and if infrastructure does not adapt, this damage will increase exponentially. Other international studies evaluate the cost of inaction in relation to so-called proactive investment and highlight the long-term profitability of investment in more resilient infrastructure. Others identify the significant extra cost of failing to act in a timely manner. Spending money today will save money tomorrow and we need to think ahead to avoid even higher costs!

Cerema has developed a methodology based on this framework and targeted at those in charge of infrastructure, encouraging them to incorporate this overall vision of the network. We developed this methodology based on managing an existing overall network to which new projects are added. How do we integrate the short-term and the long-term? How do we achieve a multidisciplinary approach ?

We developed a concept of integrated legacy infrastructure management with a few objectives: knowledge of the initial situation, but also identifying how we use the component parts of our legacy infrastructure, identifying what makes it resilient given our use of it, and having regard to specific local circumstances. Then we incorporate the social, economic, and environmental dimensions, employing a systemic approach to achieve the best value for money. Based on a forward-looking analysis of a network, we endeavour to identify vulnerabilities to different phenomena, to see how these vulnerabilities evolve in response to different stresses and to identify which approaches to adopt, and the appropriate solutions. The legacy infrastructure management strategy therefore incorporates the resilience challenges.

The method is broken down into ten steps the first of which is essential: defining objectives in terms of resilience. Resilience cannot be analysed as an absolute but in relation to what is expected of infrastructure old and new, and of a region or geographical space. Numerous questions then arise. For example: are we thinking, short, medium, or long term? Can the infrastructure be duplicated? What failures (location, duration...) are acceptable? We think about the overall system with its manager but also with the various stakeholders in the regions. That enables us, in partnership with them, to define the resilience objectives both of the infrastructure itself and the services it facilitates (access to hospital, daily travel to an area of employment, interregional transport...). Steps 2 to 7 are then evaluation of the risks, of the various sources of vulnerability to which infrastructure is exposed, its particular sensitivities, paving the way in subsequent steps for working on adaptation measures, the resilience strategy and implementation planning appropriate to the region or geographical space in question.

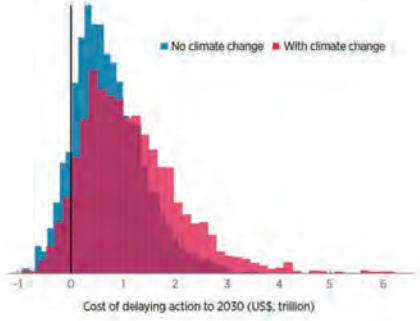
**Le coût des dommages liés aux aléas climatiques va augmenter de manière significative au cours des prochaines décennies.**




**x3**

Augmentation du coût des dommages liés aux événements climatiques en Europe au cours de la décennie actuelle (par rapport à 2010)

**Il est rentable d'accroître la résilience des futurs investissements dans les infrastructures, et le coût de l'inaction augmente rapidement**




**~2000 milliards de dollars**

Coût supplémentaire médian à l'échelle mondiale d'un report à 2030 des actions en faveur de la résilience des infrastructures.

We are starting to receive feedback from rail and road projects and from local government authorities that have applied this methodology. Project owners are still asking many legitimate questions about this relatively new subject area. How do we change? How do we design, operate, or maintain infrastructure differently? How, in the medium and long term, do we define a strategy for a new type of management?

As we have seen, this is about having a broader vision of infrastructure resilience challenges, analysed in light of the services they provide, and the need expressed by regional managers and stakeholders. This is a bespoke approach, tailored to each region or geographical space, its physical characteristics, its socio-economic context, its resources, etc. which aims to forge a long-term strategy benefiting all users.

# OVERLAPPING PERSPECTIVES

**Jean-Bernard KOVARIK**
After these three very different presentations on sustainability, which we have seen was multifactorial, we now come to the discussion.
I would like to give the floor first to Péter Balázs, a former Hungarian Minister of Foreign Affairs, European Commissioner for regional policy, Permanent Representative of Hungary to the European Union, and who is currently coordinating the North Sea-Mediterranean corridor.

**Péter BALÁZS, North Sea-Mediterranean corridor coordinator**
With regard to infrastructure development and programming, since the 1990s the European Union has gradually developed an ambitious policy, accompanied by specific funding tools, benefiting projects throughout Europe. By way of example, my first project was the rail link between Paris and Bratislava. Since then, the European transport infrastructure development policy has become more ambitious, identifying a trans-European network at two levels – the comprehensive network and the core network – covering all Member States and all modes of transport. We gradually included various important connections with the European Union's neighbouring states

I am currently in charge of the multimodal North Sea-Mediterranean corridor. We are therefore working on preparing tomorrow's world. These are large-scale and long-term projects. They will benefit society as a whole. They often require between 10 and 15 years of upstream planning and we are trying to include as many stakeholders as possible. We begin with the Member States' authorities and then we include the regions, the economic operators, and all interested parties.

In 2014, the Union created the Connecting Europe Facility (CEF), which is the first true infrastructure fund at European level. 2021 marked this fund's entry into a second seven-year period. It complements national and regional investments and other European funding tools, including the recovery plan.

Another very useful tool is also available for use: a Commission implementing act. This act, approved by national authorities, contains the list of works required to deliver a project and a detailed timetable. It is very important

for sustaining projects: when we are dealing with a large-scale infrastructure project, governments change, budgetary periods come and go, but the commitment and political support needs to be maintained. For example, I remember a government which was planning to build a bridge over the Danube to access an airport. The following government wanted to bore a tunnel, and a third government resumed the bridge project. For the Seine-Nord Europe Canal and the Seine-Escaut in its entirety, and for two other major projects, the Commission adopted and implementing act which commits all the stakeholders and creates the foundation for long-term financial planning.
The European coordinators are mandated by the European Commission and confirmed by the Parliament. We work closely together, as we do with the Commission's DG MOVE (Directorate-General Mobility and Transport), to properly implement the projects that are required to deliver the transEuropean transport network. We are the Commission's eyes, ears and hands.

Construction of tunnels, canals, locks, railway lines, cooperation with the project sponsors, local authorities, the transport operators, etc. It is exciting work to be able to contribute to all that. Very often these are achievements of human creativity.

**Jean-Bernard KOVARIK**
Dominique Riquet, Member of the European Parliament, you are a member of the European Parliament's transport

commission, a specialist in transport infrastructure financing and have recently been appointed as the rapporteur for the revision of the Trans-European Transport Network.

**Dominique RIQUET, Member of the European Parliament**

For about 15 years now I have been engaged, at European level, exclusively on the subject that is the occasion of our meeting today. When I first began to take an interest in this topic, we were simply wondering how to do things better, how to progress in terms of use, density and performance. Resilience existed because it was better for investments to be sustainable in the sense of durable, but the two terms were not interchangeable: things had to last and be used.

The environment was virtually a non-issue 15 years ago. An advance-guard in society was beginning to take an interest in the issue, but this had no impact on transport infrastructure policies. The danger has now become clearer, we are starting to see the direct effects of the environmental threat and scientists can define it more objectively.

The paramount problem of politics is that it requires a social pact, or at least a majority. Are most people in society aware of the price performance ratio you will be calling for, given the climate threat and the services you are proposing ?

It is a very complex matter because people are resilient to the threat, and many are aware of it only to a limited extent. There is an advance-guard in society that is very alarmed, but the overwhelming majority of people are as yet largely unconcerned. But they are being asked to make a considerable effort. We have witnessed the impact of the proposed economic and social measures, on the personal impact for our citizens. They are being asked to pay a great deal more for a degraded service, with a bad conscience thrown in for good measure!

It is a problem for politicians to adapt transport policies while having to resolve enormous economic constraints at the same time. You have seen the numbers: we have never gone below a trillion as the unit of account and we have been as high as 275 trillion.

You first need to overcome the technical problems. There are numerous proposals on the go because they have not been finalised and need to be optimised to be acceptable and productive. Secondly, you are faced with economic roadblocks. You are going to call for effort, investments, and you are going to affect economic performance. At the same time, you are going to ask Member States to make a considerable budgetary effort, while being aware that their economic contribution is complicated because they are in a pretty poor financial state. Finally, society is only averagely sympathetic, because transport and energy has a direct effect on people's lives. I am in the habit of saying that society has only found one way of punishing the delinquents: depriving them of transport. When you put someone in prison, it is the ultimate punishment. If you impose prison sentences on society as a whole, you should not be surprised if there

is a social backlash. If the exits are subject to financial conditions, you will have a class revolt.

Social tolerance for the proposed system is very low, which contrasts with enormous economic and financial challenges. A political decision maker must enact extremely restrictive measures but is faced with a society with very little resilience on the subject.

So, I have seen the world change. When you spoke about infrastructure and development 15 years ago, you were talking about supersonic aircraft, plus motorways, plus high-speed trains. For the past 70 years you were being sold better performance, greater comfort, better safety. And people got it: it is more expensive, but everyone benefits. Nowadays you are being sold more restrictions for a lot more money.

**Jean-Bernard KOVARIK**
You have highlighted the technological, social, societal, economic and time complexity. And, listening to you, we really want to "roll up our sleeves" to win this sustainability challenge.

David Valence, one year ago you were appointed as the president of the Infrastructure Steering Committee.

**David VALENCE, President of the Infrastructure Steering committee (ISC)**
We will have great difficulty explaining that reduced mobility may be progress to aspire to. The ageold idea whereby the ability to travel defines a certain level of progress is deeply entrenched in the overwhelming majority of our fellow citizens. It is therefore probable that we can move towards reduced mobility, but only for what was unreasonable. A return journey to Marseilles for a meeting lasting 1 hour 30 minutes was unreasonable mobility. On the other hand, we will have great difficulty explaining reduced popular, rural and suburban ability and breaking this link between mobility and progress. We have to say this from the very outset.

French public debate has experienced two periods during the past 20 years. The first such era, that of the mythology of "ever faster", of the four-lane highway or the TGV was very present. And then you might have heard that this was primarily about mobility and that too much been said about infrastructure. It was to counter this public discourse that a tool such as the Infrastructure Steering Committee was created 10 years ago. There is also the pressure brought to bear on the French State by the European Union, which constantly highlighted infrastructure as being the priority, which the mere mention of mobility did nothing to dispel. There was also this pressure on local government authorities, in which the question of infrastructure was very often prominent.
I am not sure that the question of infrastructure, public decision-makers included, is mainly and as a matter of priority tackled in terms of decarbonisation, unfortunately. When working on the projects that the Minister for Transport assigned to us, I was struck to see that the arguments put forward by local government authorities, the regional prefects, and the chambers of commerce to build or refurbish infrastructure, rarely factored in the modal switch or greater energy efficiency for travel andtransport, without evaluation.

But the approach must first and foremost be that of decarbonisation. It is a powerful argument, debates within the machinery of government included, which have not always been won when discussing infrastructure or mobility. This decarbonisation is an argument that needs to be used more systematically, framing our mobility, investment, and infrastructure policies in the context of decarbonisation policies.

Social and regional justice is also a fundamental issue. We occasionally struggle to incorporate it in our socio-economic evaluations. For example, in modernising rail infrastructure so that it remains operational, you are avoiding some households being compelled to buy a second vehicle. On the other hand, you will not be selling your second vehicle overnight because more trains have been laid on toserve the small or medium-sized town where you live. We must be very mindful of this.

This social and regional justice consideration also needs to be present in all our assessments. Socioeconomic evaluations should not always translate into upgrading or developing infrastructure in regions and geographical entities that are already dynamic. There is a strong temptation in France to steer necessary rail investment decisions towards those places where the demographic and socioeconomic dynamics are at their strongest. Toulouse is in the process of such demographic growth, and it is conceivable that in 20 or 30 years Toulouse will have a bigger population than Lyon. But we also know that the number of people using the train every day is comparable in Occitania and in Bourgogne Franche-Comté, with far fewer inhabitants. What should we do in terms of decision-making? The socioeconomic aspect is not only demographic dynamics, but also practices, the way in which people use the various means of transport.

***« Social and regional justice is also a fundamental issue. »***

The proportion of major investments funded by the taxpayer will have to be greater for projects capable of decarbonising mobility and less for projects that do not. The proportion of funding borne by users will therefore have to be greater where the environmental amenity is less. We must put this equivalence ratio on the table.

To conclude, we fully realise within the Infrastructure Steering Committee that we here in France struggle to assume political responsibility for investments in maintenance or increased capacity. This is what explains the under-equipment in ERTMS or our tardiness in respect of the centralised control of the network and the simplification of our points system. A public decision-maker gives the impression of being less ambitious when he calls for


investment in this type of equipment, which is less visible, than in a motorway or the upgrading of a two-lane road into one with two lanes in both directions. This is a public decision-making problem on which we need to agree. The infrastructure network in France is relatively dense, especially as regards roads, and very dense as regards the rail network in certain regions, but we are unable to maintain it or sufficiently develop its capacity. The romanticism of the new project is ever present in French public debate. This is something we all need to be on the lookout for.

A final concluding remark on the time factor: the way in which public debate is conducted does not facilitate long-term public decisions, but we must find a way of debating and paving the way for the decision that is adequately shared. Environmental difficulties, financing difficulties and political aboutturns that can occur along the way must not jeopardise projects that are essential to people's lives and to decarbonising mobility. This is a democratic issue every bit as much as it is a transport issue.

***« The way in which public debate is conducted does not facilitate long-term public decisions, but we must find a way of debating and paving the way for the decision that is adequately shared. »***

**Jean-Bernard KOVARIK**
When we encounter this problem in large urban areas, what is your opinion regarding congestion charging? Is it a good economic tool, an effective pricing tool for sustainable development objectives and for relieving congestion and promoting sustainable mobility?"

**Todd LITMAN**
I prefer to call it decongestion charging rather than congestion charging. It is really the only long-term solution for combating traffic congestion. Opposing decongestion charging is tantamount to supporting congestion. Decongestion charging is like preventive medicine. Effective road pricing and effective charging for parking constitute a preventative treatment for the ills afflicting our urban transport.

**Jose Manuel VASSALO**
I fully agree with Todd. What we usually call congestion pricing is actually about decongestion pricing, and it is the only effective solution to the problem. The experiences that have been implemented in different cities worldwide have demonstrated that. Stockholm implemented a one-year pilot, with areferendum one year after its full implementation to dec ide whether the policy was acceptable or not. Before the referendum, most of the population was against that. But after the pilot, the majority approved the measure. Why did people change their minds? Because at the end of the day what really matters to people is to live in a better place. Reducing congestion helps improve the quality and reliability of both private and public transportation. People who want to use their car can still do so. But society takes advantage of that to capture the revenue to improve more sustainable means of transport, and promote active mobility as well. Walking is one of the greatest

activities we can do if we want to live longer and feel much better.
Congestion pricing should in future be implemented by many more cities. The main barrier is that some politicians are not brave enough to put that measure into effect because they fear that people are going to oppose them. However, if the policy is implemented in a smart and intelligent way, that should not be the case.

**Jean-Bernard KOVARIK**
I would like to ask a question about the interactions between resilience and evaluation, about the updating of socio-economic evaluation benchmarks. How do we move on from methodology to supporting public policies ?

**David VALENCE**
I would say there is still work to be done. Our methodological framework helps build management strategies, knowledge of one's legacy infrastructure and how to adapt previous practices, but there are new criteria as compared with the existing matrices or socio-economic project evaluation methodologies. This multi-criteria analysis is yet to be done. One of the learnings from our method is that it needs to be tailored to the project and its purposes. The analytical matrix varies according to the nature of the investment project, its features, objectives, and challenges, especially those relating to resilience.

# RESEARCH TIMETABLE : TRANSPORT IN EUROPE

**Sandra MOATTI**
We are going to talk about the future transport research timetable. Thierry Goger, you are SecretaryGeneral of the Forum of European National Highway Research Laboratories (FEHRL), which is a rallying point for research bodies, with particular reference to road transport matters.

**Thierry GOGER, Secretary-General of the Forum of European National Highway Research Laboratories (FEHRL)**
The FEHRL is an alliance of research centres, universities, and transport authorities. It primarily works at European level but also has partners outside Europe. We are committed to contributing to collaborative research to develop innovative road and future mobility solutions. Our ambition is to work with others to create an integrated transport infrastructure that is available around the clock.

To that end, we have two major research programmes: the Forever Open Road, which is a sort of European equivalent of the 5th Generation Road presented a short while ago, and the FOR x 4 initiative on transport infrastructure, which extends the Forever Open Road to other means of transport.

We need to remind ourselves of the burgeoning development of autonomous and connected vehicles and the unpredictable event that was Covid and its consequences, especially in terms of remote working. We are happy to be meeting face-to-face, but there will doubtless be a long-term impact.
Public transport is suffering enormously from the Covid-related collapse in ridership. On the logistics front, just-in-time delivery on demand offerings, for example, are further exacerbating the pressure on infrastructure and its use.

There are also high-level decisions to do with the environment and in particular the climate emergency, with the immediate demand to reduce our CO2 emissions. We wield no influence over the public norover the promises of continual growth we still hear, but we do exert pressure as regards energy efficiency and the decarbonisation of the energy we will be using.

*« The idea is to prioritise infrastructure maintenance, to extend its life. We need to use this maintenance to improve and modernise it. »*

No matter how mobility develops, the infrastructure is still there and will remain the backbone of mobility. Unfortunately, we regret that part of our infrastructure is in a critical state and that it is therefore urgent that we act. This concern is at the forefront of public expectations. Since 2006-2007, maintenance investment by European countries has exhibited a clear downward trend. This impacts the cost per kilometre of repairs: we are almost on par with the cost of refurbishment. This is therefore an additional pressure, with an increasingly limited budget. The idea is to prioritise infrastructure maintenance, to extend its life. We need to use this maintenance to improve and modernise it. It is here that the focus will increasingly have to be.

Concerning research, we suggest focusing our efforts on three major pillars :

• The physical pillar, especially resilience, the extension of infrastructure life and the incorporation of digital aspects.

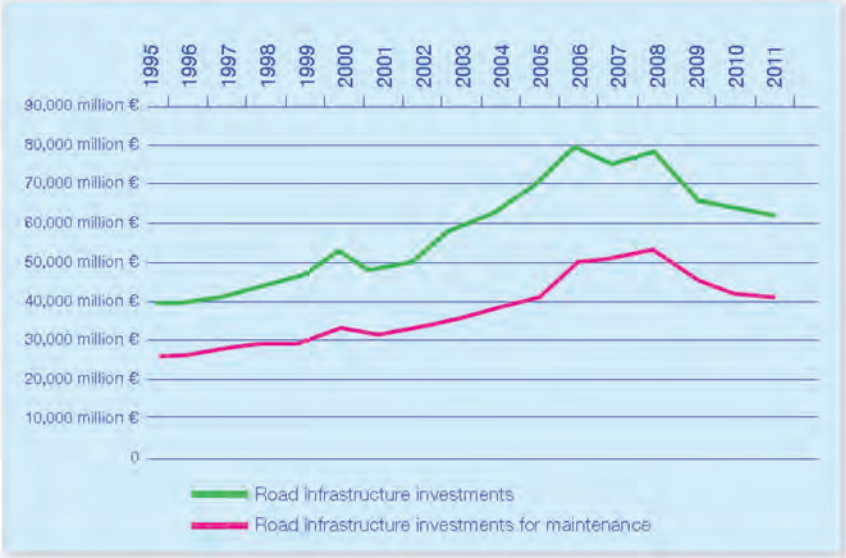
• The natural and environmental pillar. Decarbonisation is a necessary leitmotif, but it tends to conceal other aspects, especially biodiversity, which direct impacts on climate change and which therefore needs to be given greater emphasis.

• The social pillar with the safety aspect but also infrastructure for health travel.

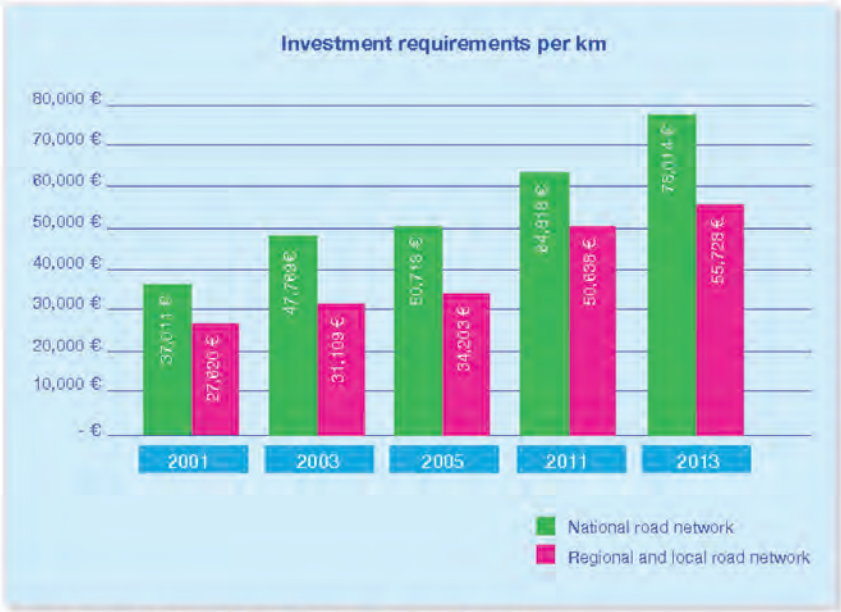
Certain research activities are already culminating in prototypes or even products that are almost ready to be marketed. I am thinking for example about prefabricated construction methodsfor asphalt or for maintenance which are ready for industrial deployment. All this is increasingly promoting the modernisation of maintenance, with self-healing solutions that, in respect of roads, are the subject of attempts to couple them with energy provided by solar panels. When the roadway buckles, it spontaneously reconstitutes itself, thereby avoiding the use of maintenance processes associated with road use, which have negative external effects.

## Investment in road assets has dropped...

**Evolution of Road Infrastructure Investments and Road Maintenance Investments in a selection of Western European Countries***




## ...to the point that maintenance costs are increasing and operations even moving to much more expensive rehabilitation




INFORME-NECESIDADES-DE-INVERSION-EN-CONSERVACION-ABRIL-_2014.pdf - Source A.E.C.

We have also started to study the much talked about Connected and Automated Vehicles (CAVs), and initial research findings are now available thanks to assistance from the European Commission: they indicate that there will definitely be a positive impact in the future but that we will probably have to go through a complex phase and even, initially, experience negative effects. To ensure a very high level of safety, autonomous vehicles will need more highway "real estate". They will also generate higher induced mileage, because the car occupants will suffer less from the time spent in it. We must accept this start-up phase before obtaining positive outcomes.

We are also going to start working on optimising freight. Certain projects very clearly demonstrate the benefits of freight optimisation, in terms of HGV loads and convoys. We can imagine reducing distance travelled even more if this is combined with autonomous vehicles. On the other hand, we do not have any studies on the impact this will have on road wear. We will have more HGV traffic, a much greater weight and very certainly premature wear on infrastructure without even mentioning bridges.

Freight optimisation is also relevant to new types of delivery for which we will also have to prepare the infrastructure. The industries developing these tools are primarily focused on business and typically transfer the infrastructure cost to users, and therefore on to public policy. We also need to allocate funding for this type of study.

DAs concerns infrastructure and transport, we are doing our utmost to comply with CO2 reduction requirements, but the energy we are being supplied with needs to be clean. The challenge will be to work more at a strategic level between transport infrastructure and policies on the one hand and energy policies on the other. In light of the rather negative or neutral effects of the 350 billion euros Germany has spent on renewable energies, there are grounds for scepticism. How do we successfully supply these new transport sources with clean energy?

We are examining this subject as well. We now have some very interesting solutions in terms of energy recovery, using the road surface and transport infrastructure to produce energy, either for mobility purposes or for other activities. For example, between 15 and 20 linear metres of solar panels can power a home for a year.

Turning to soft mobility, which boomed during Covid, the median commuting distance in Europe, in particular France, is less than 6 km. For this sort of distance one can easily use bicycles and especially e-bikes. This needs to be taken into consideration and investment made available for creating, implementing, and optimising innovative solutions: either in terms of new build, for example cycle highways, or in terms of the signage and interconnection of these highways or cycle paths. Physical discontinuities which make the use of bicycles so dangerous that no one will use them need to be avoided.

Biodiversity is another point to be emphasised. In Europe, notwithstanding the Natura 2000 requirement for 20% of the land area to be conserved, the median distance between two transport infrastructures (two roads or one road and rail track) is less than 2 kilometres. At global level, this pressure will increase yet further: it is estimated that there will be around 50% more new roads by 2050. In the Bison project, we are working on the creation of a similar biodiversity map. The issue is to see how we can avoid excessive deregulation of European land area, bearing in mind that the lack of biodiversity has consequences that are not only climate-related.

Finally, innovation gives hope. Roads have a very long history which we have availed ourselves of to create these new construction and maintenance methods, but innovation does not always work. As with trial-and-error tests, some of them work, whereas others will progress no further. We must therefore occasionally accept spending money on a solution that does not yield the desired result.

To conclude, I would like to touch on the occupations of the future. Everything depends on the human factor, even if robots will be increasingly numerous. About 10% of our labour force is employed in the transport sector. If we look at requirements in 2035 in terms of robotics innovations and other digital solutions, skills and qualifications will be completely different. The human factor will also have to be managed, and not in haste, we need to think about it now, namely anticipate training levels to have qualified people at the right time and in the right place.

# DISCUSSION

**Jean-Bernard KOVARIK**
Concerning the strategic research timetable for transport at European Union level, what should be the relative shares of the humanities and social sciences, engineering sciences, life sciences, and information sciences? Have we not somewhat underestimated the importance of a humanities and social sciences education in understanding the complexity of transport and sustainability issues?

**Thierry GOGER**
It is a real challenge, all the more so as we tend to work in silos, by transport mode and by discipline. For the HGV electrification project, the technical aspect was resolved fairly quickly and easily. Nevertheless, questions remain: who is going to pay for the construction costs? Who is going to take care of maintenance? How do we link electrified areas with those that are not? The same applies for recycling. We will of course have new components in the roadway that have never been taken into account before. As for the social aspect of integration within the landscape, we have seen no marked reticence but rather a need to see the benefits. What benefit do I as a neighbour derive from this installation? These dimensions are not currently incorporated, and this will be increasingly necessary as we invest heavily in new technologies. For digitalisation in general, we are headed for colossal investment, but which is not visible, for example 5G antennas. It is therefore important to ensure that we focus on the right area.

**Jean-Bernard KOVARIK**
Ultimately, are you optimistic given all these challenges, all these research projects, all these initiatives at the cutting edge of knowledge? For you, are research and education in Europe headed in the right direction? What recommendations might we make?

**Thierry GOGER**
Certain strategic decisions need to be made very quickly on decarbonising the energy sector, which necessarily requires investment. This is very closely related to energy use by the transport sector, which needs to be taken into account in forging an overall vision. In France, it would appear that nuclear is recovering some momentum. It is essential that this be discussed. The decision to conduct battery studies at European level is, for example, very positive. We need to try to take back, not control or supremacy, but some sort of independence in our own decision-making. The same thing applies, for digitalisation, vis-à-vis the Chinese. For the time being, we master 5G technology. We absolutely must regain this ability to decide for ourselves.

# CONCLUSIONS

**Jean-Baptiste DJEBBARI, Deputy Minister responsible for Transport, reporting to the Minister for Ecological transition**

Your topic area and mine have coincided exactly these past 48 hours because we have just concluded the Council of Transport Ministers in which our discussions ranged very widely over economic regulation, infrastructure investment and innovation. I have therefore come to share with you the thinking and the latest state of play in the discussions at European level, which obviously have implications for France.

First of all, the transport world is in a state of profound upheaval. The transformation of behaviours and practices, assisted by videoconferencing and teleworking, has emerged as a new reality with which we have to come to terms. Throughout Europe, the public transport economic model in our very largest cities has been profoundly affected by the fact that a very large number of passengers are staying away for the time being. At the Greater Paris level, the shortfall is several hundreds of millions of euros annually.

A second driving force behind this transformation is technology, with changes across the board towards the electrification of light vehicles, and the use of hydrogen for heavier forms of mobility, buses, coaches, trains, and perhaps tomorrow aircraft.

***« A second driving force behind this transformation is technology, with changes across the board towards the electrification of light vehicles, and the use of hydrogen for heavier forms of mobility, buses, coaches, trains, and perhaps tomorrow aircraft. »***

Finally, we are at a tipping point in which there is a societal pressure on political decision-makers to go faster, particularly in response to pressure from younger people who feel the climate emergency more acutely. This investment wall that must be climbed is compounded by a purchasing power problem.This transition is costing the government dear and is costing our fellow citizens dear as well. I am thinking in particular about energy price inflation.

In a complicated transport universe, we need to operate with simple ideas. What we have been discussing these past 48 hours are essentially common-sense measures for decarbonising, innovating, regulating.

First of all, we have taken the anticipated decision of further accelerating the decarbonisation of transport by giving ourselves the resources to do so. The electrification of light vehicles is crucial, hence the support for manufacturers during the crisis. This support is set to remain, both to relocate industrial activity and to accelerate the deployment of electric charging and hydrogen refuelling points throughout Europe. The devil is in the detail and the specifics are many and varied, but the ambition is there, with greater attention being paid to purchasing power and affordability.

Innovation is absolutely key. It is present in every field of transport: technological innovation, innovation within organisations, innovation in political decisions.

Finally, we need more regulation. We can articulate a calm and constructive critique of transport liberalisation over the past 20 to 25 years. There are of course indisputable benefits, but also certain failings that need rectifying. We also need to look ahead, so that they do not recur. I am thinking in particular about forms of employment that are coyly referred to as “atypical”, but which are in reality highly controversial. The intra-European competition to which the French road transport industry was subjected is nowadays very largely regulated by the Mobility package. But in the air and maritime sectors, we need to bear down on the use of bogus self-employed, what is known as pay-to-fly, for example, which requires transport professionals to pay to practise their profession.

Discussions have enabled consensus positions to be achieved. These are consensus positions that are endorsed by a very large number of European Union countries, with support from the Commission. Consensus positions that will enable us to invest unprecedented sums of money in transport infrastructure.

# ANNEXES

## ANNEXE 1 - EUROPEAN HACKATHON : WHAT INFRASTRUCTURE IS REQUIRED FOR LOW CARBON MOBILITY IN EUROPE ?

In 2021, AFIT France and Gustave Eiffel University began thinking about mobility and about adapting infrastructure to the ecological transition emergency as we emerge from the crisis, with challenges to match in terms of finance.

Accordingly, two special sessions on "What challenges does decarbonised mobility pose in terms of infrastructure and services?" and a European hackathon involving students of Gustave Eiffel University and four European partner universities were organised during the fifth edition of the FUTURE Days on 30th November and 1st December 2021 on the university's Marne-la-Vallée campus.

This hackathon was both an opportunity to get the students thinking about a subject related to their courses of study and to put them in touch with researchers and public stakeholders.

The two prize-winning projects were presented during the conference; you will find a summary below.

# Green'inder

**Collect, rinse, drive : a safe way to capture CO2**

*Sohaib Sharif – Hélène Laurent – Yanis Mansouri – Billy Rejuso – Alpar Gür*

Green'inder® is developed to support and increase the awareness of green transportation in big cities. In essence, Green'inder® is modeled as a rectangular parallelepiped installed on the top of an electric-bus, allowing air to flow through it, to achieve the adsorption of air-polluting particles, whilst the public transportation vehicles are traveling on their usual routes around the city.

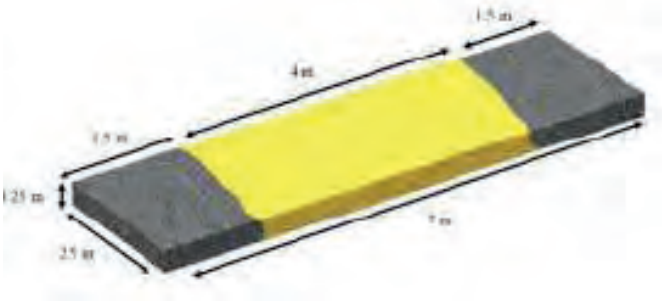
**Green'inder® concept model**

Green'inder® is composed of two main materials: Silica gel and Polyetherimide Resin (PEI). Silica gel is disposed on both ends of the aluminum tube and is responsible for capturing the humid air in order to stream dry air to resin. In fact, humidity decreases the adsorption efficiency of the resin which can capture up to 9600 g/m^3 of carbon dioxide ($CO_2$). With this proficiency, 3.5 tons of $CO_2$ per Green'inder® vehicle can be annually recuperated in Paris. Resin is a non-toxic and reusable material which can operate approximately for four months. When the resin is saturated, it goes through rinsing process, drains $CO_2$ in liquid form, and gets ready to be reused.

By 2025, the Régie Autonome des Transports Parisiens (RATP) aims to develop 50 electric buses. Using Green'inder® on RATP e-buses, it can be promoted not only in France but Europe-wide. The establishment of resin can be conducted in French Labs such as CNRS that are specialized in materials research, even if the intellectual property question cannot be avoid. As the development of the resin is still in progress, the efficiency of Green'inder® remains as an approximation.

Paris endeavors to be full carbon neutral by 2050. According to the numbers, approximately 180,000 cars circulate in Paris every day. This poses a serious challenge to our environment and human health.

Green'inder® is anticipated to contribute to the decarbonization of Paris.



**Concept design for the interior of Green'inder® (grey material: Silica gel; yellow material: Polyetherimide Resin)**

To extend, area behind the tube can be covered with photocatalysis paint to capture NOx particles which are hazardous for human health. Favourably, this innovation will majorly lead to decrease in air pollution, alongside socioeconomic benefits to fulfil the three objectives of sustainable development. PEI resin is still under development and the current market price is unfixed. Nevertheless, a cost estimation can be made by taking the various factors in count e.g., PEI resin, Silica gel, aluminum tube, and the maintenance cost.

# ECOROAD: A SYSTEM THAT LINKS ENERGY GENERATION AND DECARBONISATION OF THE LIGHT HIGHWAY INFRASTRUCTURE

YVANO CHRISTIAN SAMIA DEQQAQ YANN SOBGUI BENJAMIN TURPIN

## A fact that cannot be ignored

Climate change projections indicate an increase in average temperature and more frequent and extensive flooding. Therefore, in a complex global climate context in which international, European and national regulation is being tightened, public policy has no other choice, in France, but to deploy innovative measures to limit its environmental impact

## What is ECOROAD ?

ECOROAD is a solution combining several existing technologies within a unified system that can be applied to light road infrastructure renovation projects (pedestrian path, cycle path, small-scale road development project).
This system aims to deliver better control of runoff water before it flows into the municipal water system. On the one hand, this new way of thinking about the roadway minimises flooding in the event of extreme rainfall while indirectly protecting the roadway and surrounding areas. On the other hand, and at the same time, ECOROAD produces electrical energy from the rainwater flow.

## Why ECOROAD ?

ECOROAD is part of a philosophy that aims to counter the artificialisation of the soil to the greatest extent possible. The system is targeted at those responsible for planning, creating, and transforming the urban and regional fabric. ECOROAD is designed to curb thermal comfort and water management problems in an urban environment which are potentially exacerbated by the detrimental effects of urbanisation.

## What does a conventional road comprise ?


A → Couche de roulement
B → Couche de liaison
C → Couche de base
D → Couche de fondation
E → Couche de surface
F Couche d'assise

## What does the ECOROAD system comprise?

1. Pervious concrete wearing course
2. Recycled plastic road structure
3. Energy generation by pico-turbine

### 1 - Pervious concrete

The wearing course is made of pervious concrete which absorbs rainwater.
This is a highly porous material. 35% of its volume is made up of voids enabling the water to drain directly into the recycled plastic road structure. The turbine transforms the mechanical motion of the water into electric energy which is primarily used for urban lighting.

### 2 - Recycled plastic road structure

This course is 100% composed of recycled plastic. These are prefabricated hollow interlocking elements. The water leaches from the uppermost course into these elements, where it is stored before being redirected to the downstream part of ECOROAD.

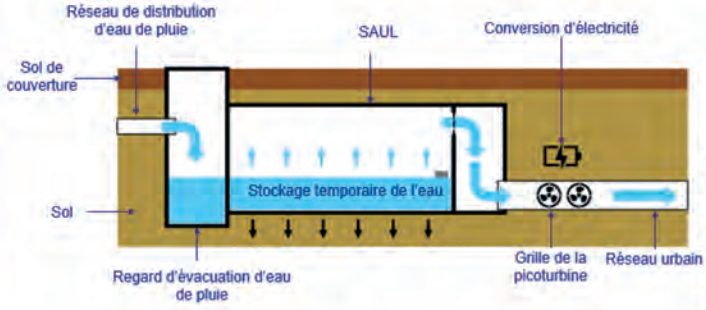
This part of ECOROAD reduces CO2 by up to 72% compared with an ordinary road. Moreover, the use of the prefabricated elements is made easier because each one weighs only 43 kg.

### 3 - The Ultra-Light Honeycomb Structure (ULHS) and the pico-turbine

The rainwater passes through a filter array within our road infrastructure whence it will be conveyed to a ULHS water storage system. ULHS is made of a very dense polymer, a 90% void quotient, and variable conductivity. ULHS can store a large volume of water and is recyclable.

Once the reservoir is full the valve opens automatically with the water being discharged into two pico-turbines with a constant flow rate of 60 litres/s. These turbines are connected to an electric generator and will produce an average power output of 400 W.

In 2026 there will be a total of 1520 km of cycle tracks in Paris.
If we develop the 520 km of additional cycle tracks using ECOROAD, we can generate 2.47 GWh of renewable energy. This energy will be used locally by the city thereby using green energy to reduce the carbon footprint!



# ANNEXE 2 - AGENDA

**22 February 2022, Maison de la Chimie, Paris**

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| **9:15** | **Arrival of attendees** |
| **10:15** | **Opening of the conference**<br>**Sandra MOATTI** and **Jean-Bernard KOVARIK**, moderators |
| **10:25** | **Video compilation of the** FUTURE **Days session** on 1 December 2021: "What are the challenges facing decarbonised mobility in terms of infrastructure and services?" |
| **10:30** | **Opening speeches**<br>**Christophe BECHU**, President of AFIT France and **Gilles ROUSSEL**, President of the Université Gustave Eiffel |
| **10:50** | **Keynote "Ecological transition, the challenges facing transport infrastructure and public stakeholders."**<br>**Herald RUIJTERS,** Director of Investment, Innovative & Sustainable Transport (DG MOVE, EuropeanCommission)<br><br>Discussion with the participants hosted by<br>**Fabienne KELLER**, Member of the European Parliament |
| **11:30** | **Round table 1: "How to finance transport infrastructure in Europe in the future"**<br>Introduction and overview by **Philippe DURON**,<br>Co-President of TDIE and former President of AFIT France<br><br>**Anne-Marie IDRAC**, Chairwoman of France Logistique:<br>"The views of freight transport and logistics stakeholders."<br><br>**Dirk BECKERS**, Director of CINEA: "The complementarities between European and national funding." au niveau européen et les financements nationaux »<br><br>**Exploring perspectives** with the heads of European transport infrastructure financing agencies : **Tomáš BLECHA** (Czech Republic), **Prof. Dr Torsten BÖGER** (Germany) and **Christophe BECHU** (France) and **Björn HASSELGREN** (Sweden) |
| **13:10** | **Lunch** |

| | |
|---|---|
| **14:30** | **European Hackathon "What infrastructure is required for low carbon mobility in Europe?":**<br>presentation of two projects by the winning students<br><br>Sponsored by **Hélène JACQUOT-GUIMBAL**, Co-Founder of the Université Gustave Eiffel |
| **14:50** | **Modal shift and new infrastructure: a glimpse into the future of decarbonised mobility**<br>**Virtual visit to a major construction site: t**he Seine-Nord Europe Canal:<br>**Jérôme DEZOBRY,** Chairman<br>of the Management Board of the Seine-Nord Europe Canal Society<br>**The 5th Generation Road programme (R5G), Nicolas HAUTIERE,** Director COSYS Department, Université Gustave Eiffel<br>Discussion with the participants hosted by **Michel NEUGNOT,** President of the Mobility and Transport Commission, Régions de France |
| **16:00** | **Coffee** |
| **16:30** | **Round table 2: "How to include sustainable development issues in investment choices"**<br>**Todd LITMAN,** Founder and Executive Director of the Victoria Policy Transport Institute (Canada):"Transport and equity projects"<br><br>**Jose Manuel VASSALO,** Professor in the Department of Transportation Engineering, Urban and Regional Planning at Universidad Politécnica de Madrid (Spain): "Funding and Financing to Ensure Sustainable Mobility"<br><br>**David ZAMBON,** Director of Infrastructure for Transport and Materials at Cerema: "Assessing the resilience of transport infrastructure"<br><br>**Exploring perspective** avec **Péter BALÁZS**, Coordinator of the North Sea – Mediterranean Corridor; **Dominique RIQUET**, Member of the European Parliament and **David VALENCE**, Chairman of the Council for the Orientation of Infrastructures (COI) |
| **18:00** | **The research agenda "Transport in Europe"**<br>**Thierry GOGER,** Secretary-General of the Forum of European National Highway Research Laboratories (FEHRL) |
| **18:45** | **Conclusions : Jean-Baptiste DJEBBARI,**Minister Delegate for Transport, attached to the Minister of the Ecological Transition |

* Cet événement n'est pas organisé par le Gouvernement français. Il est cependant autorisé par celui-ci à utiliser l'emblème de la Présidence française du Conseil de l'Union européenne.

# ANNEXE 3 - BIOGRAPHIES OF SPEAKERS

**Péter Balázs, Coordinator of the North Sea – Mediterranean Corridor**

Mr Péter Balázs was appointed European Coordinator for the North Sea - Mediterranean Corridor of the Trans-European Transport Network (TEN-T) in 2014. Mr Balázs has previously been European Coordinator for the TEN-T Priority Project 17 (Paris-Bratislava). Mr Balázs was born on 5 December 1941, in Kecskemét, Hungary. He has been, among others, Minister for Foreign Affairs of Hungary (2009-2010), EU Commissioner for regional policy (2004), Permanent Representative of Hungary to the European Union (2003-2004) and Ambassador of Hungary in Berlin and Copenhagen. Péter Balázs is Professor at the Central European University.

**Christophe Béchu, President of the French transport infrastructure financing agency (AFIT France)**

Christophe Béchu became President of AFIT France in April 2018 and was reappointed by the President of the Republic in June 2021. For Mr Béchu, the work of the agency is an integral part of the ecological transition, where it will make a full contribution in the field of transport. By organising this conference during the French presidency of the Council of the European Union, his aim is to lay the foundations of a European network for the regular exchange of good practices and innovative ideas.

Since 2014, Christophe Béchu has also served as Mayor of Angers and President of the Communauté Urbaine Angers Loire Métropole since 2014. He was previously a Member of the European Parliament (2009-2011) and Senator for Maine-et-Loire (2011-2017).

**Dirk Beckers, Director of Cinea**

Dirk Beckers, a Belgian national, has more than 30 years' experience within the European Commission implementing projects in the transport, energy, research, and innovation fields. After more than 15 years' experience as Director of the Innovation and Networks Executive Agency (INEA), he is now Director of the European Climate, Infrastructure and Environment Executive Agency (CINEA), with a budget of more than 58 billion euros for the period 2021-2027, and more than 500 staff. He is responsible for the overall management of financial and human resources and for coordinating the Agency's funding activities, to ensure the successful implementation of the European Commission's operational priorities and policies concerning the European Green Deal.

**Tomáš Blecha, Deputy Director of State Fund for Transport Infrastructure (SFDI) in Czech Republic**

Graduated engineering degree from economic science from Prague University of Economics and Business (1997-2003) with specialisation in International Trade, Mr. Blecha started his career at the Ministry of Transport of the Czech Republic as project executive officer in charge of administration of major projects co-financed from the ISPA and the Cohesion Fund. After a short experience in banking institutions, he spent three years as sales manager at Linde Gas (2006-2009). Subsequently, he was assigned Deputy Director of the department of administration of payment requests - Implementation of EU Funds (Operational program Transport) and national financing of transport infrastructure of SFDI in 2009 and became Director of this department one year later. In 2015 he was promoted to the position of Deputy Director of the State Fund for Transport Infrastructure.

**Torsten Böger, Head of the Financing Division of the Autobahn GmbH des Bundes**
Prof. Torsten R. Böger is Head of the Financing Division of the 'Autobahn GmbH des Bundes'. The Financing Division includes the Financing of the Investments including Maintenance and Operations of the Federal Motorways in Germany. For many years, Mr. Böger has been dealing with financing and implementation of large and complex infrastructure projects in federal transport roads. As Managing Director of the Federal Transport Infrastructure Financing Company (VIFG), which had been integrated 55 into the "Autobahn GmbH" in 2019, Prof. Böger and his team have supported the federal PPP-projects (Public-Private Partnerships) in federal roads. As a member of various expert commissions, such as the Daehre-Commission ''Future of Transport Infrastructure Financing' and the 'Reform Commission for Major Projects', Prof. Böger has been getting involved in challenges of financing and implementation of infrastructure projects. As an honorary professor and graduate economist, Prof. Böger has been teaching "Project Financing and Infrastructure Projects" at the Technical University of Braunschweig for more than 20 years.

**Rémy Croix, Project director at Egis**
Rémy Croix is an engineer who graduated in 2002 from the ENTPE, the national school of public works. He began his professional career in 2002 at Egis, a French engineering company involved in transport and inland waterway infrastructure development. For the past 20 years he has worked in the engineering field, specifically hydraulic structures, and inland waterway infrastructure. His experience is mainly with canals, inland navigation structures, dams, and inland waterway structures in an environmentally and ecologically challenging context. He has managed projects in all these fields, including many of the significant projects assigned to Egis by Voies Navigables de France (VNF), the French navigation authority responsible managing the majority of France's inland waterways network. Since 2020 has worked in the ONE group, for which Egis is an agent, and for Société du Canal Seine Nord Europe, as the prime contractor project director for Canal Seine Nord Europe's locks and systems.

**Jérôme Dezobry, Chairman of the Management Board of the Seine-Nord Europe Canal Society**
The Seine-Nord Europe Canal Society (SCSNE) is the contracting authority of the Seine-Nord Europe Canal, a major European project in the river sector. The SCSNE's supervisory board is composed of territorial collectivities financing the project such as the administrative region Hauts-de-France and the three Northern departments: Oise, Pas-de-Calais and Somme (in collaboration with the Ile-de-France region), as well as the French government and the European Union. The supervisory board is chaired by Xavier Bertrand, president of the Regional Council of Hauts-de-France. Jérôme Dezobry was appointed chairman of the management board in October 2018. He had previously been responsible for the prefig uration of the SCSNE together with the Director General of Voies navigables de France (Navigable Waterways of France). Jérôme Dezobry is a territorial administrator (National Institute of Territorial Studies - Schuman class of 2010-2011). He has a technical background (Ecole Centrale Lille / Ecole Centrale Paris - 1994) and a political science background at the Paris Institute of Political Studies (2005). His work experience is a mix between business and public service: he worked in business for 15 years at GDF Suez, in particular in the group's Major Infrastructures department, and then at the Department Council of Nord as Deputy Director General in charge of Sustainable Planning and Territorial Development.

**Jean-Baptiste Djebbari, Minister Delegate for Transport, attached to the Minister of the Ecological Transition**

After graduating from ENAC (École nationale de l'aviation civile) in 2007, in 2008 he became an airline pilot for NetJets. From 2014 to 2015 he was a civil servant at the DGAC (Directorate General of Civil Aviation). In 2015 he was appointed a legal expert to the Appeal Court in Paris, working mainly on matters related to the fight against illegal labour practices in the aviation industry. From 2016 to 2017 he was Director of Operations for Jetfly. In June 2017 he was elected to the National Assembly, representing the 2nd constituency of the Haute-Vienne department. In 2018 he acted as rapporteur on a bill in the National Assembly on the reform of French railways. On 3 September 2019, he was appointed Secretary of State for Transport in the Ministry of the Ecological Transition. He succeeded Elisabeth Borne, who was appointed Minister of the Ecological Transition on Tuesday 16 July 2019.

**Philippe Duron, Co-President of TDIE and former President of AFIT France**

Born on 19 June 1947, Philippe Duron has held a number of political offices: President of the BasseNormandie Region, Deputy Mayor of Caen, Deputy Mayor of Louvigny. He was a member of the Board of Directors of AFIT France from 2005 to 2017 and its President from 2012 to 2017. As a specialist in transport issues and infrastructure financing, he chaired the Mobility 21 Commission (2012-2013) and the first Infrastructure Policy Council (2017-2018). In July 2021, he submitted a report to the Minister of Transport on the impact of the health crisis on the economic model of urban and regional public transport (excluding the Île-de-France region). In 2001, in collaboration with Jacques Oudin, UMP Senator for Vendée (1986-2004), Philippe Duron founded the TDIE association (Transport, Development, Intermodality, Environment) of which he is now Co-President. This association brings together representatives from the entire transport world (companies, public institutions, associations, elected representatives), and works primarily on issues of transport infrastructure financing, regional planning, logistics and consultation. In 2018, TDIE created an observatory on policies and strategies for transport in Europe (OPSTE). In 2019, Philippe Duron became President of IHEDATE (a graduate institute for Regional Planning Studies).

**Thierry Goger, Secretary-General of FEHRL - Europe's National Road Research Centres**

Dr Thierry Goger is a senior executive in Transport Research and European Affairs. As FEHRL SecretaryGeneral, the association of the European National Road Research Centres, Thierry is a strategist and an engaged facilitator of cooperative research and innovation, in the field of road and transport infrastructure. Thierry has also a solid experience in policy-briefing and research grant management, as well as in fostering the exploitation and implementation of research results. Prior to joining FEHRL, Thierry was the Science Officer for the Transport and Urban Development Domain at the COST Office – European Cooperation in Science and Technology. His expertise and advocacy are regularly solicited by the industry, policy-makers and transport authorities. On the research front, Thierry has about 20 years of experience and is a Coordinator or Partner of several European projects, including the very innovative ERA-Net scheme "INFRAVATION", where FEHRL has been a key enabling agent for transatlantic collaboration and funding.

**Björn Hasselgren, Senior Advisor at the Swedish Transport Administration**
Björn Hasselgren is also active in as a researcher in economic history and technology transition and has strategic management experiences from several fields in the government sector in Sweden combined with extensive experience of international cooperation in the EU, Bank for International Settlements (BIS), European Central Bank and in advisory consultancy services within KPMG. He has experience from more than 15 years in management positions in the Sveriges Riksbank, KPMG Sweden and the Swedish Rail Administration. Additional management experience as Chairman of the Board of Directors of the Sveriges Riksbank's group of subsidiaries. Areas of experience include the government sector, the financial sector, infrastructure and investment management, performance auditing and management advisory services primarily for the government ministries in Sweden. From 2010 until 2016 Research Fellow at the KTH Royal Institute of Technology (Stockholm). Finalized PhD project; 'Government's role for transport infrastructure' in 2013. Currently working with different research projects in relation to transport infrastructure, such as cross-border infrastructure in the Öresund and the Baltic Sea Regions and electrification of the road network. Since 2017 Guest researcher at the Economic History Department, Uppsala University, Sweden.

**Nicolas Hautière, Head of the COSYS Department at Université Gustave Eiffel**
Nicolas Hautière is a graduate engineer from ENTPE, Graduate School of Civil, Environmental and Urban Engineering (2002) and is also a doctor from the University of Saint-Etienne (2005). He holds the accreditation to supervise research (Habilitation à Diriger des Recherches, HDR) from the Université Paris-Est and has obtained an Advanced Masters diploma in Public Policies and Actions for Sustainable Development from the Ecole des Ponts-ParisTech in 2013. He is currently Chief Engineer of Bridges, Waters and Forests (2021) at Université Gustave Eiffel. He has a ten-year experience in computer vision applied to cooperative ITS, automated vehicles and opportunistic weather observation. Now, his mission is to initiate, develop and lead research or innovation devices that will allow the industrial transfer of solutions resulting from research in the field of renewed intelligence of mobility vectors and infrastructures capable of contributing to the achievement of the Sustainable Development Goals (SDGs). Within this framework, he has been in charge of the 5th Generation Road Project (R5G) since 2013 and was recently appointed as head of the Components and Systems Department (COSYS).

**Anne-Marie Idrac, Chairwoman of France Logistique**
Anne-Marie Idrac graduated from Institut d'Études Politiques de Paris (IEP) and École Nationale d'Administration (Simone Weil intake, 1974). She began her career as a senior civil servant serving in a number of posts at the French Ministry of Infrastructure in the fields of the environment, housing, urban development and transport. She was director general at the Public Development Agency (EPA) of Cergy-Pontoise from 1990 to 1993, and director of land transportation from 1993 to 1995. She has also held political functions: Secretary of State for Transport from 1995 to 1997, then Member of Parliament for a constituency in the Yvelines from 1997 to 2002, Councillor for the Paris region from 1998 to 2002, and Secretary of State for Foreign Trade from 2008 to 2010. In addition, she has held significant responsibilities in major transport companies: she was Chair and CEO of the RATP (Paris public transport authority) from 2002 to 2006, before becoming the first woman to head the SNCF (French state railways) where she was Chair and CEO from 2006 to 2008. From 2015 to August 2018, she was Chairwoman of the supervisory board of the Toulouse-Blagnac Airport concession company. In 2017, she was appointed High Representative for the French government strategy on driverless vehicles. In December 2019, she was appointed Chairwoman of France Logistique.

**Hélène Jacquot Guimbal, Co-Founder of the Université Gustave Eiffel**

Hélène Jacquot-Guimbal studied at the Ecole Normale Supérieure and holds a PhD in Theoretical Physics from Sorbonne University and an engineering degree from the Ecole des Ponts ParisTech. She is a general engineer of Bridges, Waters and Forests at the Université Gustave Eiffel. From 2008 to 2019, she was executive director of the Laboratoire Central des Ponts et Chaussées and then of the French Institute of Science and Technology for Transport, Development and Networks (IFSTTAR), which merged with the Université Paris-Est Marne-la-Vallée to create the Université Gustave Eiffel on 1 January 2020, in partnership with three engineering schools: ESIEE Paris, ENSG, EIVP and an architecture school, Eav&t. She was president of the university in the first year of its creation. Since 29 January 2021, she has been a member of the Conseil d'Orientation des Infrastructures (COI).

**Fabienne Keller, Member of the European Parliament**

Fabienne Keller is an engineer and graduate of the Ecole Polytechnique, the Ecole Nationale du Génie Rural, des Eaux et des Forêts and the University of Berkeley. She began her professional career at the Ministry of Agriculture and then at the Ministry of Finance, before moving to the private sector and joining the Crédit Industriel d'Alsace et Lorraine. Her political involvement began in the Neudorf district of Strasbourg, where she was elected as a departmental councillor, then as a regional councillor. She was the first woman to sit on the Bas-Rhin General Council. In 2001, she was elected Mayor of Strasbourg and Senator of the Bas-Rhin in 2005. It was during her term of office as Mayor that the construction of the first phase of the LGV Est Européenne began, and she then, as President of the TGV-Est association, led the second phase project. Passionate about transport and mobility issues, in 2009 she authored a report on 'the contemporary railway station' which led to the creation of the subsidiary SNCF Gares et Connexions. She was also a director of Réseaux Ferrés de France (RFF) between 2009 and 2019, rapporteur for transport in the Senate between 2014 and 2019. Elected MEP in May on 2019 the Renaissance list, she is a member of the Renew Europe group and sits on the Justice and Civil Liberties Committee and the Budgets Committee.

**Jean-Bernard Kovarik, Vice-Chancellor of Gustave Eiffel University in charge of public policy support.**

Jean-Bernard Kovarik, a General Highways, Water and Forestry Engineer, is Vice-Chancellor of Gustave Eiffel University responsible for "public policy support". Since the 1990s, he has held several positions in the transport and transport infrastructure sector, both in central government and in public institutions (maritime and river ports), and within the scientific and technical network. He is involved in standardisation and teaches structural safety and Eurocodes at several higher education establishments in France.

**Sandra Moatti, Moderator**

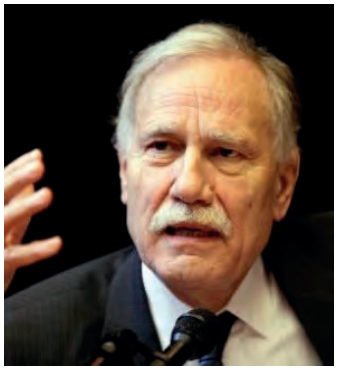
A graduate of Sciences Po Paris and HEC, Sandra Moatti is director of Ihédate (Institute of higher regional development planning studies), a training institute for public and private sector managers. She is also editor-in-chief of l'Economie politique, the quarterly review published by Alternatives Economiques. She was deputy editor-in-chief of this magazine before joining Ihédate in 2017.

**Todd Litman, Founder and Executive Director of the Victoria Transport Policy Institute**

Todd Litman is founder and executive director of the Victoria Transport Policy Institute, an independent research organization dedicated to developing innovative solutions to transport problems. His work helps expand the range of impacts and options considered in transportation decision-making, improve evaluation methods, and make specialized technical concepts accessible to a larger audience. His research is used worldwide in transport planning and policy analysis. Mr. Litman has worked on numerous studies that evaluate transportation costs, benefits and innov ations. He authored the Online TDM Encyclopedia, a comprehensive Internet resource for identifying and evaluating mobility management strategies; Transportation Cost and Benefit Analysis: Techniques, Estimates and Implications, a comprehensive study which provides cost and benefit information in an easy-to-apply format; and Parking Management Best Practices, a comprehensive book on innovative management solutions to parking problems. Mr. Litman has worked as a research and planning consultant for a diverse range of clients, including government agencies, professional organizations, developers and nongovernment organizations. He has worked in more than two dozen countries, on every continent except Antarctica. Mr. Litman is a frequent speaker at conferences and workshops. His presentations range from technical and practical to humorous and inspirational. He regularly blogs on the Planetizen website. He is active in several professional organizations including the Institute of Transportation Engineers (ITE) and the Transportation Research Board (TRB, a section of U.S. National Academy of Sciences).

**Michel Neugnot, Vice-President of the Mobility and Transport Commission, Régions de France**

Son of a farmer, Michel Neugnot was born in Genay, a small town in the Côte d'Or department. After graduating from a business school, he was sales director of a SME before joining the research and development division of EDF. He had diverse experiences before his mandates at the Regional Council, the General Council and the town hall of Semur-en-Auxois, in the Côte d'Or department. In charge of transport, finance and human resources, he has always promoted teamwork. He is currently the 1st vice-president of the Bourgogne-Franche-Comté Region in charge of transport. He is also president of the Association des Missions Locales, a charity for community aid project for young people.



**Dominique Riquet, Member of the European Parliament**

After being Mayor of Valenciennes from 2002 to 2012, Dominique Riquet was elected member of the European Parliament in 2009. He has been serving on the Committee on Transport and Tourism (TRAN) since 2012 and is specialised in the topic of transport infrastructure financing. Dominique Riquet is one of the three rapporteurs for the Connecting Europe Facility Programme for 2014-2020 and 2021-2027, and has recently been appointed as rapporteur for the revision of the Trans-European Transport Network (TEN-T). He endorses an ambitious investment policy to boost the European Union's competitiveness. Dominique Riquet is also president of the European Parliament Intergroup on long term investment and reindustrialisation.

**Gilles Roussel, President of Université Gustave Eiffel**

After graduating from the Ecole Normale Supérieure, Gilles Roussel obtained a doctorate in computer science from the Sorbonne Université. He is currently a Professor at Université Gustave Eiffel. From 2012 to 2019 he was President of Université Paris-Est Marne-la-Vallée (UPEM), which merged with the French Institute of Science and Technology for Transport, Development and Networks (IFSTTAR) on 1 January 2020 to form Université Gustave Eiffel, working in partnership with three Schools of Engineering (ESIEE Paris, ENSG and EIVP) and a School of Architecture (Eav&t). He has been President of this university since January 2021. From 2017 to 2020 he served as President of the Conference of University Presidents (CPU).

**Herald Ruijters, Director of the European Commission's DG for Mobility and Transport**

On 1 February 2017, Mr Ruijters was appointed Director of Directorate B -Investment, Innovative & Sustainable Transport in DG Mobility and Transport, while at the same time continuing as Head of Unit responsible for the Trans European Network(TEN-T) until 1 April. He assumed the role of Head of Unit in 2009 and was directly involved in developing the TEN-T Guidelines. He previously workedin the same DG from 2005 to 2009, in order to promote the implementation of TEN-T projects in cooperation with the European Coordinators, and for the development of road safety policy, from 1997 to 2005. Before coming to the Commission he held various positions in The Netherlands related to transport. Mr Ruijters holds degrees from Nijmegen and Amsterdam Universities in both French literature and European Studies, and was post-graduated at the Centre Européen Universitaire in Nancy, in European Law, and in Business Studies at the University in Leuven.

**David Valence, Chairman of the Council for the Orientation of Infrastructures(COI)**

David Valence is an associate professor of history and a graduate of Sciences-Po Paris. After teaching contemporary history and working as Deputy Director General of a public utility foundation, at the age of 32 he was elected Mayor (Radical Party) of Saint-Dié-des-Vosges in the spring of 2014, then reelected in the first round in March 2020. Since 2014, he has chaired the intermunicipal community Saint-Dié-des-Vosges, which became an agglomeration community (76,000 inhabitants) in 2017. Elected to the Grand Est Regional Council in December 2015, he specialised in mobility and infrastructure issues, first as Chair of the transport committee (2016-2017). In October 2017 he became 3rd Vice-President of the Region, responsible for transport, travel and infrastructure. In 2019, he published a milestone note for the Foundation for Political Innovation (Fondapol): Ferroviaire: l'ouverture à la concurrence, une chance pour la SNCF [Rail: opening up to competition, an opportunity for SNCF] (with François Bouchard). David Valence was appointed Chairman of the Council for the Orientation of Infrastructures (COI) on 29 January 2021.

**Marc Vanderhaegen, Head of the unit responsible for programme support, coordination, and communication at CINEA.**

Marc Vanderhaegen, a Belgian national, has 30 years of experience working in European institutions. After a stint at the Court of Justice of the European Union, he joined the Commission in 1998 where he worked on environmental and transport policy initiatives, serving as head of sector for inland waterway transport policy for six years In 2017, he joined the Innovation and Networks Executive Agency (INEA) which the following year became the European Climate, Infrastructure and Environment Executive Agency (CINEA). Within CINEA he heads up the unit responsible for programme support, coordination, and communication, and his team also includes a financial engineering section. His activities encompass support for all CINEA's European Green Deal programmes.

**Jose Manuel Vassallo, Professor in the Department of Transportation Engineering, Urban and Regional Planning at Universidad Politécnica de Madrid**

José Manuel Vassallo is Professor in the Department of Transportation Engineering, Urban and Regional Planning at Universidad Politécnica de Madrid, Spain. He is also a member of the academic staff of the Transportation Research Centre (TRANSyT). He was research fellow at the Harvard Kennedy School of Government. Presently, José Manuel Vassallo teaches "Socioeconomic Appraisal of Infrastructure Projects" and "Infrastructure Financing". His research activity during the last few years has been focused on transportation management and financing, sustainability, transport regulation, and socioeconomic appraisal of transport policies. In his academic career, he has published five books and more than eighty papers in prestigious journals. José Manuel Vassallo has also received several awards for his research and publications. He has worked as a consultant for many private companies, for the Governments of Spain and Chile, and also for international organizations such as the World Bank, the Interamerican Development Bank, the International Transport Forum and the European Investment Bank. Currently, he is member of the Advisory Board of the Ministry of Transportation of Spain.

**David Zambon, Deputy Director General in charge of production management, and Director of Infrastructure for Transport and Materials at Cerema**

David Zambon, who holds the title of Chief Engineer in the Corps of Bridges, Waters and Forests, was appointed Director of Infrastructure for Transport and Materials at Cerema in November 2020. In November 2021, he also became Deputy Director General in charge of production management. Prior to this, he spent fifteen years at the Ministry of Ecological Transition, alternating between management positions in central administration and operational services in the transport sector. After a position as Deputy Director of Transversal Activities and Resources at the Directorate of Road Safety and Traffic (DSCR), he became Director of Operations and Deputy Director of Highways for Ile-de-France (DIRIF), before joining the DGITM as Deputy Director of Transport Services. In 2016, he took up the post of Director General of IDRRIM, before joining Cerema to support the organisation's strategic project on infrastructure asset management.

# ANNEXE 4 - ORGANISERS

## The French transport infrastructure financing agency (AFIT France)

AFIT France is a national public body that contributes on behalf of the State to the financing of major transport and mobility infrastructure projects. The sectors covered by its interventions are: rail transport, road infrastructure, collective transport, navigable waterways, maritime ports, coastal protection, continuous cycling and pedestrian routes. The agency implements the programming of the Framework Act on Mobility (LOM), major trans-European projects (Seine Nord Europe canal, LyonTurin transalpine tunnel), and the Transport component of the France Relance recovery plan.
The agency is governed by an Executive Board, whose president is appointed by the President of the Republic. Its annual budget exceeds €3 billion a year. It derives from allocated revenues: tax on the consumption of energy products, tax and payments from motorway concession companies, finesautomatic radar devices.

Further information (activity reports, budgets, press releases, deliberation records of the Executive Board,...) is available on our website

https://www.afit-france.fr/

## Université Gustave Eiffel

Multidisciplinary and multi-campus, Gustave Eiffel University's distinguishing characteristic is that it is the first establishment to combine a research organisation, a university, a school of architecture, and three engineering schools. Our ambition: to shape, innovate and imagine the urban spaces of today and tomorrow.

Gustave Eiffel University is pooling numerous training and research resources to develop a strategy based on the complementarity of its founders. Creating superior synergies in this way enables the University to offer its various audiences a more diverse range of skills:

• Educating students, supporting and assisting future generations of citizens who aspire to become responsible agents of change ;

• Being a national, European, and international leader in research into sustainable urban spaces ;

• Committing itself to the task of Illuminating the major challenges facing society through its action in support of public policies and social openness ;

The University in a few figures: 17,000 students / 2270 staff members / 16 educational bodies including 4 in-house establishments and member schools / the 23 research establishments / 7 main campuses

https://www.univ-gustave-eiffel.fr/

## In partnership with

## TDIE

TDIE (transport développement intermodalité environnement) is a pluralist association co-chaired by Philippe Duron, a former Member of Parliament for Calvados, and Louis Nègre, a former senator representing the Alpes-Maritimes, and Mayor of Cagnes-sur-Mer. TDIE is a forum for professionals and institutional actors representing the world of passenger and freight transport to facilitate the collective consideration of issues pertaining to the funding, planning and evaluation of transport, mobility and logistics policies.

TDIE is intended to enlighten debate and questions concerning infrastructure and mobility: both for its members, attentive to the direction of travel set by government, and for, national or regional, government bodies attentive to the concerns of transport professionals.

https://tdie.eu/

## Cerema

CEREMA is the French major public institution for developing and capitalising on public expertise in the fields of planning, regional cohesion, and ecological and energy transition.

It offers unique expertise in the areas of mobility, transport infrastructure, urban planning and construction, resource conservation, risk prevention, road and maritime safety, and the ability to integrate these different skills into developing local projects.
CEREMA provides direct support to governmental services, local authorities, and companies (project management assistance, specific operational missions, etc.). It develops, experiments and disseminates innovative solutions.

With about 2,600 employees in mainland and overseas France and a long-standing knowledge of local issues and contexts, CEREMA is resolutely committed to the challenge of sustainable regional development, in order to define the public policies of tomorrow.

https://www.cerema.fr/en

# ACKNOWLEDGEMENTS

We would like to thank the conference organisers, who contributed significantly to its success. First of all, Mrs Katrin Moosbrugger, Secretary-General of AFIT France, and Mrs Corinne Blanquart, first ViceChancellor of Gustave Eiffel University (GEU), who directed the organisation of the event. Our thanks also go to Mrs Sandrine Witeska, director of communication at GEU and Sandrine Larbre, communications and events manager at GEU, as well as AFIT France's four interns, Hadia Baïz (National School of Administration), Morgane Sellaoui (Sorbonne University), Thibaud Schlesinger (London School of Economics) and Fabrice Clerfeuille (French Institute of Geopolitics). Finally, our thanks are also due to the members of our partners of TDIE (Pierre Van Cornewal, delegate-general, and Juliette Le Seac'h, communications and events manager) and Cerema (Céline Bonhomme, director of research, innovation and international affairs, Charlotte Le Bris, responsible for European and international affairs, Franck Charmaison, assistant director of European and International relations).

FRANCE22*

Achieving the ambitious ecological transition objectives that the European Union and France have set themselves necessarily implies decarbonising mobility. Simultaneous action on several fronts is required: changing the way we travel, looking to research and innovation (especially for decarbonising road traffic), but also finding appropriate, sustainable, and acceptable sources of finance to modernise and develop infrastructure (and services) promoting modal shift.

The transport infrastructure financing issue has therefore become a major challenge. And so it was that AFIT France and Gustave Eiffel University, in partnership with Cerema and TDIE, and in the context of the French Presidency of the Council of the European Union, organised a European conference with their counterparts entitled "Decarbonising mobility: the future of transport infrastructure financing". This conference took place on 22nd February 2022 at the Maison de la Chimie and was attended by almost 100 participants from 15 European countries.

Taking an entirely novel approach, this conference was an opportunity to share perspectives with essential and complementary actors involved in the decarbonisation of mobility. Public decisionmakers, representatives of transport infrastructure financing institutions, and eminent scientists took it in turns to take the floor and engaged in debate in an effort to identify innovative solutions for decarbonising mobility. This conference was also an opportunity to initiate a dialogue, which we hope will become an established fixture, between transport infrastructure financing structures at European level.

By publishing the proceedings of this conference, we hope that a wider audience will benefit from the quality of the speeches and productive discussions that characterised this pioneering initiative.



RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

AFIT France

Université Gustave Eiffel

Cerema
CLIMAT & TERRITOIRES DE DEMAIN

TDIE
THINK TANK