



Third International Workshop: The Energy Transition in Land Transportation

Timing : November 9-10 2017

Location: Ecole Normale Supérieure, 45 rue d'Ulm, Paris 5, France

Organizing Committee: Dominique Bureau, Anna Creti, Carolyn Fischer, Guy Meunier, Juan Pablo Montero, Thomas Sterner

Coordinator: Jean-Pierre Ponsard

Scope of the workshop

Land transportation for passengers and merchandises is one of the major sources of CO2 emissions worldwide and urban toxic particles (NOx, fine particles...). Emissions are barely declining in OCDE countries and bound to grow in emerging countries due to the increase in standards of living and urbanization. This situation creates an important challenge for the mitigation of climate change: new technologies have been launched, a set of complementary policies has been designed both national and local, and consuming habits are changing.

Topics

- Economics of the new powertrains: evaluation and deployment strategies
- Learning-by-doing, spill-overs and coordination needs along the value chain
- Competition and/or complementarity in usage and infrastructures
- Implications of zero emission vehicles for electricity storage and supply/demand balance
- New trends in transportation modes (collaborative transportation modes, development of multimodal journeys, autonomous vehicles...)
- Evaluation of public policies at the national and local levels (carbon tax, subsidies, technical norms, driving restrictions, urban tolls...)

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Thursday 9 November

Welcome Address, Jean-Pierre Ponssard (CNRS & Ecole Polytechnique)

Session 1: Evaluation of Public Policies

Chair: Guy Meunier (INRA-ALISS and Ecole Polytechnique)

Giulia Pavan (TSE, Toulouse, France)

Easy availability of stations serving **alternative fuels** is an obvious concern for customers considering to buy a “**green**” car. An econometric analysis of the Italian is developed. The results suggest that subsidizing fuel retailers to offer alternative fuels is a more effective policy to indirectly increase low emission car sales than proposing rebates to customers.

Julie Bulteau (CEARC, Université Paris-Saclay, France), with Thierry Feuillet and Rémy Le Boennec

The article focuses on the **impact on house prices** of the “**sustainable**” **transportation** infrastructures and policies in the Nantes (northwestern part of France) urban and peri-urban/rural areas. The results of the estimated functions showed that, in Nantes Métropole, proximity to alternative offers to the private car has a direct impact on house prices. This effect is mainly positive, but depends on the type of transportation system, whereas in peri-urban and rural areas this effect is either minor or nonexistent.

Isis Durrmeyer (TSE, Toulouse, France)

The paper estimates the **distributional effects** of the **French Fee-bate Policy**, a CO₂ related tax/subsidy implemented in 2008, on the New Car Market. A structural model of demand for new automobiles that allows for large heterogeneity in preferences is developed and estimated. The results show that the fee-bate policy has an overall negative effect: the increase in consumers’ surplus and French manufacturers profits do not compensate the deficit used to finance the policy. The policy also appears to favor the middle-class income households.

Session 2: Deployment

Chair : Jean-Guy Devezeaux (I-tésé CEA)

Mads Greaker (Statistics Norway, Norway)

The technical features of the **charging systems for electric cars** are important for the success of the transition to electric cars. In Norway, there are several **different charging standards**, which limits the opportunity for the individual electric car owner. The analysis shows that these constraints have a negative impact on the adoption of electric cars. It also makes the socioeconomic costs of cutting greenhouse gas emissions unnecessarily high.

Frédéric Lantz (IFP, Paris, France) with Arash Farnoosh, Maria-Juliana Suarez, Yulu Tian

The development of **electric vehicles** and **renewable electricity** should be considered together to reach objectives of reduction of CO₂ emissions. Nevertheless several problems need be tackled due to renewable intermittency and uncertainties on the car electricity demand. A model is developed

and applied to New Caledonia. It shows that to stimulate the dynamics of electric vehicles significant financial and environmental benefits can be made by investing more in renewables and mainly hydroelectric units.

Patrick Jochem (French-German Institute of Environmental Research and Karlsruhe Institute of Technology, Germany) with Katrin Seddig, and Johannes Schäuble

The development of the **battery market** accelerates the market take-up of electric vehicles and makes stationary batteries more attractive for private households (in combination with photovoltaic systems) and industry. The **demand patterns** in decentral electricity systems becomes significantly more volatile. Hence, the decentralized electricity system should integrate stationary and mobile batteries synergistically. A model of parking lots with various types of customers is used to quantify the benefits of monitoring jointly renewable production and demand/storage from EVs. The CO₂ reduction potential and the impacts from different uncertainties on charging costs are explored.

Vivien Fisch-Romito (CIRED, Ecole des Ponts ParisTech, France) with Céline Guivarch

Transportation mode choices, distances traveled and resulting CO₂ emissions are influenced by **transport infrastructures**. Socio-economic scenarios with the integrated assessment model Imaclim-R are used to quantify **investments needs** for transport infrastructures over time to reach both development and climate objectives in different world regions. They show that expenditures needed for transport infrastructure are reduced along low-carbon pathways compared to investment levels in baseline scenarios but vary significantly over world regions.

Carolyn Fischer (Resource For the Future, Washington, USA) with Antoine Dechezlepretre

Increases in fuel economy (CAFE) standards and technological innovation go hand by hand. Existing studies focus on a single market while the automobile industry exhibits a highly concentrated market structure. The technology investment decision of a firm operating with two product lines on two markets with different domestic standards is analyzed. The model provides the framework to test the existence of international spillovers of induced domestic innovation.

Friday 10 November

Session 3: Urban transportation

Chair: Anna Creti (University Paris Dauphine, PSL Leda)

Erik Verhoeff (Tinbergen Institute, The Netherlands)

Recent empirical work has suggested that there is an important distinction between **short-run versus long-run scheduling behaviour** of commuters, reflected in differences in values of time and schedule delays, as well as in preferred arrival times. The paper investigates whether this distinction affects optimal pricing of a congestible facility. The model shows that consistent application of short-run first-best optimal congestion pricing does not optimally decentralize the optimal formation of routines in the long-run problem. A separate instrument, next to road pricing, is therefore needed to optimize routine formation.

Elisabetta Cornago (OECD Environment Directorate, Paris, France) with, Alexandros Dimitropoulos and Walid Oueslati

In the past ten years Milan's municipal authorities have worked along multiple ways to induce its inhabitants to shift from road transport towards more sustainable transport options. The paper investigates how the introduction of the congestion charge introduced in 2012 has impacted demand for sustainable mobility options, and particularly **bike-sharing**, in the city. The analysis assesses these impacts at different times of the day and for different origin-destination pairs. *(no slides publicly available)*

Stef Proost (KU Leuven, Belgium)

In **Norway**, **electric vehicles** have been strongly promoted in urban areas by a combination of instruments: tax advantages, free parking, the use of the bus lane... But these instruments may adversely affect other **urban externalities**, as congestion or accidents. A simplified model for urban transport is used to test the cost-benefit of different policy scenarios, including the reduction of the advantages for electric cars, the promotion of electric public transport, and subsidies for the use of electric bikes.

Efthymia Kyriakopoulou (Swedish University of Agricultural Sciences, Sweden) with Wolfgang Habla

Urban air pollution from commuting is a major issue for both developed and developing countries. This theory paper analyses the internal structure and the size of a circular city where commuters can choose between **two alternative vehicles**: the electric or the conventional ones. This choice defines two types of commuters: the polluters (ICE) and the non-polluters (ZEV). It shows that the location decisions of each type affect the aggregate pollution levels and the size of the city.

Session 4: Policy issues and future research topics

Chair: Jean-Michel Trochet (Senior Economist EDF), then Dominique Bureau (Ecole Polytechnique, Conseil Economique MEDDEEM)

Yannick Perez (RITM, University Paris Saclay, France)

Electromobility is a major innovation in the field of transportation systems, but not only. In fact, electromobility is the convergence of technical innovations in battery technologies and charging systems, on Internet of things and finally on new business model developed by classical OEMs and innovative new comers. This new phenomenon is challenging both for car manufacturers, for electrical grid operators and for local and national public policies. The article reviews these challenges and highlights the most promising way of future researches in each of these dimensions.

Alena Fargère (Economist & Hydrogen Energy Market Analyst, Air Liquide)

The years 2015 to 2017 confirmed a growing momentum for **fuel-cell electric vehicles** (FCEV): the number of vehicles has grown from 1 000 to 10 000 vehicles and the number of H2 stations from 100 to 300. Some projects in several countries and regions are presented, in California, Japan, Germany or France, illustrating the challenges for **mass market deployment**, as the need for H2 stations network, their integration with renewable energy, the work with captive fleets, or the search for innovative business models.

Guillaume Gazaignes (Innovation & Research Department, SNCF, Paris, France) with Tony Letrouvé

Energy is important for SNCF, the French national **railway** company, because it represents its second operational cost, and the company represents 10% of the industrial electricity market in France. The consumption throughout the day is highly variable and there are many local and moving loads in the railway system, making important the **smartgrid deployment**. SNCF explores various possibilities, as the valorization of existing assets including stations and high-speed trains, the search for alternative fuels, and the deployment of multi-service storage system. These services have a value in terms of societal responsibility, but many challenges are still to face, in terms of operations, regulation and market incentives.

Francisco Luciano (Head of the working group on Mobility, The Shift Project, Paris, France) with Nicolas Raillard.

The group of the Shift Project studied 5 possible **short- and medium-term actions to reduce carbon emissions** generated by daily mobility in **medium density areas**: teleworking, grocery delivery, ridesharing, express public transport and bike system, in order to compare their maximal potential in terms of CO₂ emissions reduction and an ambitious scenario with a reference case. The bike system and ridesharing appear to be the most efficient measures to reduce the emissions. The global combined scenario of the five measures shows a maximal potential of a 70% reduction and a 40% reduction in the ambitious scenario in 2026 as compared to 2014.

Dany Nguyen-Luong (Director of the Department Mobility and Transportation, Institut d'Aménagement et d'Urbanisme de l'Île de France)

The **Île de France region** has a population of 12 million people, and produces 20% of the French GDP. The region manages the **mobility and transport infrastructures** issues, at the crossroads of several challenges, among them energy transition, strong constraints on public investment budgets, and political will to invest in the « daily mobility ». These policies are implemented through regional plans: the strategic plans for air quality, logistics, bikes, roads; the promotion of « new mobilities »; the use of financial instruments; or the public space management. The main investments are devoted to public transport infrastructures, especially to the rail network, with around one billion euros per year.