



TRANSPORT CHALLENGES IN 2021-2027 AND BEYOND

ECTRI POSITION PAPER Future research in the area of transport economics and policies

November 2019

The European Conference of Transport Research Institutes (ECTRI) is an international non-profit association that was officially founded in April 2003. It is the first attempt to unite the forces of the foremost multimodal transport research centres across Europe and to thereby promote the excellence of European transport research.

Today, it includes 28 major transport research institutes or universities from 21 European countries. Together, they account for more than 4,000 European scientific and research staff in the field of transport. **ECTRI as the leading European research association for sustainable and multimodal mobility is committed to provide the scientifically based competence, knowledge and advice to move towards a green, safe, efficient, and inclusive transport for people and goods.**

European Conference of Transport Research Institutes | ECTRI aisbl

Rue du Trône 98 | 1050 BRUSSELS | Belgium

Tel: + 32 (0)2 500 56 87/88 | Fax: + 32 (0)2 500 56 89

Number: 831 370 370

Website: www.ectri.org



1. Introduction

ECTRI launched its Thematic Groups in September 2007 as a means to facilitate exchanges among its researchers interested in similar research fields and in order to promote joint initiatives and positions. One of the groups is the **Thematic Group on Transport Economics and Policy** (TG-ECOPOL). The main objectives of this group are to define research topics of interest for supporting EC policies and programmes, to increase successful participation in EU projects and to provide a platform for networking and scientific exchanges. TG ECOPOL's scope includes **the economics of transport systems and mobility via the study of policies, decision making, evaluation methods, modeling individual's travel choices and social behavior, mobility patterns along with finance and business models**. The group consists of **43 experts from 27 Transport Research Institutes and Universities representing 21 European countries**. Most of these institutes are working in the field of **policy analyses e.g. scenarios, foresight analysis, *ex ante* and *ex post* evaluation of policies and of sustainable mobility plans, cost-benefit analysis (CBA), Public-Private Partnerships (PPPs), behavioral modeling (e.g. stated-choice), pricing models and externalities (e.g. valuation and internalization of environmental externalities) covering a multidisciplinary expertise and pan-European coverage**. Members are: AIT, BAST, BME, CDV, CENIT, DLR, Fraunhofer, HIT, IFSTTAR, ITS, KTI, LNEC, NTUA, POLITO, TØI, TTI, UL, UNEW, UNIZA, UPM, UVEG, VGTU, VTI, VTT, VUB, and WVU (RWS).

The present Position Paper (PP) considers the above scientific competences and aims to outline the research needs in the field of **transport economics and policies (including behavioral economics applied to transport and mobility policies, institutional changes, cross-sectoral policy developments and disruptive and transformative transitions)** until 2050. A special focus is given for topic contributions aiming to be developed within the scope of the next EU Research and Innovation Program Horizon Europe 2021-2027.

2. European Transport Policies: sustainability challenges in mobility and transport until 2050

Transport as an economic and social enabler of sustainable development

At the European Transport Conference 2019 Ms Maja Bakran Deputy Director-General for Mobility and Transport outlined the social and economic relevance of transport (EC, 2019). Indeed, **transport is economically important as an individual sector and also as enabler of economic growth across sectors**. Transport is also socially important for everyday commuter and leisure travel, connects activities, families and friends across Europe.

Efficient transport is fundamental to boost the economic strengths of all regions of the European Union, to supporting the internal market and growth, and to enabling economic and social cohesion. Transport also influences trade competitiveness and economic attributes of transport services such as price and quality have a high impact on production processes and businesses within Europe and the World (EC, 2019d). In urban areas, **the mix**



and features of mobility solutions will shape quality of life in cities through influencing productivity and well-being.

Economic and social indicators

In the EU, transport services comprise a **network of around 1.2 million private and public companies** which employ approximately **11 million people** (EC, 2019d).

The **total turnover of the transport industry** for all EU countries was approximately **1.5 trillion euros**¹. The European Union exported 6.1 million motor vehicles in 2018, worth €138.4 billion.

The **EU is among the world's biggest producers of motor vehicles** and the sector is the largest private investor in research and development, underlining its global technological leadership (EC, 2017). Considering the sum of exported motor vehicles, planes and ships these were worth a value of € 295 billion (this represents around 17% of the EU's total good exports; 2016 data). The EU also exported transport services worth € 146 billion.

The Blue Economy established sectors (maritime transport, shipbuilding and repair, ports, warehousing and water projects, coastal tourism, extraction and commercialization of marine living resources, marine extraction of minerals, oil and gas) contributed 1.3% to the EU economy and 1.8% to the EU employment. The mentioned EU Blue economy sectors generated a turnover of € 658 billion and €180 billion of Gross Value Added in 2017 (EC, 2019b).

The **ocean covers 71% of the Earth's surface**, hence, the **economics of maritime transport (e.g. Economics of the sea, including coastal and passenger freight, ports, inland passenger water transport, new water services such as renting and leasing)** are relevant modes to the regional and local economies to be adequately addressed within the context of **sustainable multimodal transport**.

On average, **between 12% and 15%, of the European household's spending is allocated to transport** (source: Eurostat, 2017). Households expenditures with fuel and maintenance of personal transport represents 6.5% (higher than the expenditure on clothing which is 4.9%), the purchase of vehicles represents 3.7% (no insurance expenses are included here), being the purchase of other transport services responsible for 2.8% of the total transported related expenditures. It is interesting to note that the average European household's spending on food was 11.1% in 2017, lower than transport related expenses. Therefore, **social equity issues** such as **affordable public transport, accessibility, reliability of transport services** will need to play a key role within a **just mobility transition**.

Also, the transport sector is not gender balanced and equal opportunities and empowerment of women are envisaged by the EU. Only 22% of the workers in the transport sector are women (in road transport the percentage is lower, 14%). In 27th November 2017

¹ <https://www.statista.com/statistics/449066/europe-28-turnover-volume-in-the-transport-sector-by-country/>



the EU launched a gender related platform: the Women in Transport – EU Platform for Change. European transport and mobility research and innovation shall encompass **gender issues across topics**.

The social costs of transport and sustainability challenges

Air pollution, to which transport is a contributor, is responsible for around 400,000 premature deaths in the EU/year and harmful noise levels, mostly from road transport, affecting the health of around € 120 million of Europeans. Around 37% of road fatalities take place within **road accidents** in urban areas (EC, 2018b). Around 25% of **greenhouse gas emissions** (GHG) are generated by the transport sector, being **road transport the biggest emitter and accounting for more than 70% of all GHG emissions**². Emissions from heavy duty vehicles, such as lorries, buses and coaches currently represent around a quarter of road transport carbon dioxide emissions and are forecast to increase by up to 10 per cent between 2010 and 2030 (EC, 2017).

Road safety is also a major societal and policy problem. In 2018, there were around 25100 fatalities in road accidents in the EU 28 and around 135,000 were seriously injured. This represents very high social costs and economic burden. The EU had adopted the “**Vision Zero**” (no road fatalities on EU roads by 2050) and “Safe System approach” (a more forgiving road system to prevent fatalities and serious injuries) aiming to eliminate deaths and serious injuries on European roads (EC, 2019e).

Transport externalities (or external costs) in the EU are estimated to cost € 1 trillion/year and a significant part of these costs are not internalized (EC, 2019b). Environmental costs (climate change, air pollution, noise, well-to-tank and habitat damage) are estimated to be around 44% of the total costs but this percentage can vary per transport mode. Congestion from road transport causes significant inefficiencies which are estimated to be around 1% of the EU GDP (EUR 100 billion)³. The **future internalization of transport externalities** can be made using **regulation** (e.g. command and control measures), **market-based instruments** that aim to provide the right incentives to users (e.g. carbon taxes), a combination of various **policy measures (hard and soft) and other systemic instruments that would enable an integrated approach**. The assessment of the state -of-play of internalisation shows that there is room for improvement with respect to the internalisation of external and infrastructure costs of transport in the EU28 (EC, 2019c). An integrated approach is needed to optimize measures to accomplish the mix of policy goals related to the main external costs.

European strategies: goals until 2050

As previously set by the European Commission’s **Transport White Paper** (EC, 2011a), **GHG from transport are envisaged to be reduced by 20% and 70%, respectively until 2030 and**

² Data presented at: https://ec.europa.eu/clima/policies/transport_en

³ Study on Urban Mobility – Assessing and improving accessibility of urban areas, European Commission, 2017.



2050 (with respect to 2008 levels). Moreover, conventional vehicles are expected to be banned from cities until 2050.

The EU action plan for the **“transition to a more circular economy”** takes economic actors as key in driving the process and the regional/national authorities (enablers of such transition) that require a regulatory framework with the EU support (EC, 2015). An action plan focusing on the mobility system needs to be developed using research and innovation. Mobility systems are **among the three main systems to assure human needs, besides food systems and the built environment**. The analysis of the mobility, food, and built environment value chains shows that Europe’s resource use remains surprisingly wasteful, often due to **market and regulatory failures**. **“Structural waste” in the mobility system can be easily detected using digital activity footprints and artificial intelligence methods**. Examples of the mentioned **“structural waste”** (adapted from EMF and McKinsey, 2015) are:

- A typical European car is parked 92% of the time and only 5% driving (the rest of the time is engaged in congestion, looking for parking and other wasting time);
- When the car (5 seats) is used it only brings 1.5 people/trip on average;
- 50 percent of inner-city land, often of high social and/or economic value, is devoted to mobility (roads and parking spaces).

The **European Strategy for Low-emission Mobility** (EC, 2016) has among its main elements increasing the efficiency of transport, accelerate the deployment of low-emission alternative energy for transport and **move towards zero-emissions** vehicles. For example, to tackle the need for **regulatory changes** to allow the transition to low-emission mobility, the Commission identified the following focus areas that could optimize the transport system and its efficiency: **digital mobility solutions** (for safer, more efficient and inclusive transport); **fair and efficient pricing in transport** (prices to account the negative externalities of transport) and measures to **support multimodality**.

The **Europe on the Move - An agenda for a socially fair transition towards clean, competitive and connected mobility for all** (EC, 2017) set the ambition to move forward towards **sustainable mobility** and an agenda for the future of mobility in the EU, for jobs, growth and a **socially fair transition**.

The EU strategy for **mobility of the future** (EC, 2018c) considers **connected and automated mobility** a new opportunity for Europe: driverless (or autonomous) vehicles are expected to lead to reduced road transport safety related external costs and it’s noted there that human error is estimated to play a role in 94% of accidents. **Automation and the sharing economy** (e.g. car sharing; bicycle sharing schemes) are expected to provide opportunities to reduce urban congestion. The Commission recognizes that “the long term effects of driverless mobility on the transport system, the economy, the environment and on the existing jobs are still largely unknown”. **Research is needed to address those socioeconomic and environmental impacts in each context**.



The Communication from the Commission on **Artificial Intelligence for Europe** (EC, 2018d) outlines the need to prepare for the **socio-economic changes generated by artificial intelligence** developments that will include tackling the **impacts on education, skills and labour markets**.

The European strategic long-term vision for a prosperous, modern, competitive and climate-neutral economy (EC, 2018b) confirm Europe's commitment to lead in global climate action and outlines a vision **to achieve net-zero greenhouse gas emissions by 2050** which is aimed to be “a **socially-fair transition in a cost-efficient manner**”.

Considering section 2., research and innovation needs shall feed the following vision until 2050: **achieve zero GHG or zero carbon, zero local air pollution, zero fatalities and zero seriously injured from road accidents, zero negative transport externalities not internalized in the market, zero social inequities (including zero gender gaps) and zero “structural waste” in a sustainable and multimodal/intermodal mobility system for passengers and freight.**

3. Research and innovation actions’ needs for 2021-2027

3.1 Multidimensional transitions in transport and mobility systems in Europe and beyond

As outlined in section 2., the EU envisages to achieve a **socially-fair transition in a cost-efficient** manner. Europe shall consider that transport systems all over the world are going through multidimensional transitions but enabling a **just transition** requires social equity to be part across research and innovation across areas. A socially-fair transition will require the combination of a mix of policy measures besides fair pricing to address social equity issues, providing users’ information and behavioural changes at the micro-scale and matching institutional changes at meso-and macro-scale for system transition. Micro-scale changes need to be complemented by institutional innovations.

Transitions are gradual, continuous processes of change, where the structural character of a society transforms (Rotmans et al., 2001). As mentioned by Leibowicz (2018) technological changes in transportation since the onset of the Industrial Revolution have fundamentally reshaped human societies. The future of mobility is inherently disruptive. **Combined policies shall enable disruption and the appropriate institutional changes and regulatory framework.**

Global challenges, such as climate change, urbanization, social inequality, safety and security concerns, along with technological developments such as digitalization, automation, servitization, electrification and decarbonisation **are driving transport systems towards multiple directions and socioeconomic outcomes that need to be subject to *ex ante***



assessment. These forthcoming changes will have major impacts on all elements of the mobility system (see e.g. Auvinen et al. 2015, Auvinen & Tuominen 2014) and actors in transport systems in the coming years. Furthermore, these mixed impacts are far beyond those identified and neither corresponds to one technological field only.

Although there exists several decarbonisation roadmaps at the European and regional level developed by several international institutions, European funded projects, etc. (EC, 2018), **future city trajectories that could enable multiple societal benefits from disruptive mobility forms in a cost-efficient way are still uncertain** (Arsenio et al., 2019). During the past decades, the European Research Agenda has paid a lot of attention and allocated vast resources to automation, digitalization, electrification and carbon neutrality of transport. The research has, however, mainly been field specific. Present research relates largely to a single mode rather than to **cross-modal approach** (e.g. Autonomous Road or Maritime Transport, Green Vehicles and Transport Safety as separate fields in the recent Horizon 2020 Work Programmes). Most recent EC funded projects (e.g. USE-IT) confirm the benefits of pursuing a **research agenda towards cross-modal cooperation** (Reeves et al., 2018).

To address the issue of multidimensional transitions relating equally to transitions in automation, servitization and carbon neutrality, the following research topics were identified:

3.1.1 Policy (behavioural) incentives to increase social acceptance and uptake of advanced technologies

This will comprise the following:

- Consider combination of technologies and transport modes in urban and peri-urban contexts focusing on collective transport for functional trips versus leisure trips;
- Test policy incentives' options aimed to influence/change individual's behaviour (e.g. unlock perceived risks, promote zero-carbon mobility choices, etc.);
- Use of behavioral experiments and/or living labs (e.g. city led) engaging the ecosystem of stakeholders;
- Account for gender and social equity issues (affordability, universal accessibility, etc.).
- Optimize range of expected social and environmental benefits.

3.1.2 Responsible research and innovation, ethics and social equity impacts of advanced technologies to allow a just transition

This will comprise the following:

- Framework for responsible research and innovation as a collaborative effort to meet social, environmental and economic goals, including ethics and social equity impacts in technology development and testing in each context;
- Address fully the social equity impacts of advanced technologies (autonomous vehicles, connected vehicles, etc.) to enable a just transition (e.g. business models



and other measures to allow fair prices) and to meet vulnerable user needs (e.g. account for low-income people, needs of the elderly, etc.).

- Stakeholders' matrixes with a comprehensive quantification of social and environmental benefits and costs.

3.1.3 Transition from ownership to “usership” and its implications to new business and governance models for urban and rural mobility

This will comprise the following:

- Transition mobility models in urban and rural areas (e.g. moving to usership and the sharing economy comprising shared ride services such as ridesharing and ridesplitting, taxisharing, etc.);
- Model assessment and quantification of costs and expected benefits using various perspectives (user, service provider, etc.).
- Financial implication of transitions (e.g. revenues for city/public transport operators, taxes related to ownership and use of vehicles, etc.).
- New business models for shared ride services, public transport, shared electric vehicles, etc.
- Impacts on transport governance models and build an action plan.

3.1.4 New tools from data-driven transport modeling to evaluate performance of public transport

This will include the following:

- Development of new tools making use of data-driven transport modelling (e.g. travel activity trajectory data) considering research on ICT and AI models and tools such as machine learning/deep learning;
- Transform big data into useful information to enable policy evaluation and assessment of measures (e.g. through dynamic cost-effectiveness);
- Assessment of the mobility system performance through dynamic key performance indicators, focusing on public transport/collective transport fleets.

3.1.5 Enhanced Public-Private Partnership (PPP) models for transport

This can include the following:

- Europe and pan-European coverage of practices (transfer of knowledge);
- Innovative PPPs across multi-stakeholder partnerships, e.g. for energy and mobility;
- Enhanced procurement, planning and financial structure of PPP projects;
- Regulatory frameworks for enhanced PPPs;
- Meta-analysis of PPP implementation cases across Europe and beyond.



Megatrends such as digitization, automatization and decarbonization already start impacting transport and mobility systems. They give rise to two major dynamics: **disruptive changes** (immediate, often ‘shocks’) and **transformative developments** (i.e. long term, structural, ‘deep’) developments such as the circular economy. Transitioning towards sustainable mobility means integrated policies and approaches to respect the boundaries of planet, people and profit (triple bottom line). Transition in the transport and mobility domains thus means to consciously prepare for the challenges ahead – until 2030 and beyond. It results that another important research and innovation (R&I) direction will be **to enable and accelerate the transition towards future-proof sustainable mobility**.

3.1.6 Combined policy measures to increase active transport in short trips and the economic value of public street spaces

Active transport has a role to play to achieve zero-carbon mobility in urban areas. The potential of active transport (walking, cycling and other recent human-powered and non-motorized travel forms) requires to be fully explored for policy purposes considering its multidimensional socioeconomic impacts in each city context. For example, these will include the quantification of benefits derived from health enhancement of specific target groups, positive impact on household’s expenditures, labor productivity, public health service costs, communities’ economic resilience and increase of city public street space value.

3.2 Enabling and accelerating the transition towards future-proof sustainable mobility

To enable and accelerate the transition towards future-proof sustainable mobility, the following research topics were identified:

3.2.1 Policies sensitive to contexts to internalize the external costs of transport and production of energy

Road transport (and particularly passenger cars) is responsible for 83% of the total transport external costs in EU28 (€ 820 billion). Therefore, **instruments for internalizing the negative externalities of road transport** such as GHG related in congested urban contexts, where other transport alternatives are available, can accelerate the choice of more sustainable transport options. External costs to be internalized in markets can comprise traffic noise, accidents, carbon emissions, congestion, well-to-tank emissions, etc.

Behavioural experiments along with the co-creation of schemes (e.g. green taxation options comprising the transport and/or energy markets) can help to assess future instruments in order to account for peoples’ preferences and increase user acceptance of alternative policy



options. Differentiated schemes (e.g. time of day, type of user, etc.) shall enable a fair distribution of costs.

3.2.2 Steering the future-generation mobility (eco) systems through assessing the socioeconomic and business impacts of technological/non-technological solutions to maximize societal benefits

The **transition to next-generation mobility systems** will entail major changes in the management of mobility and transport. **Technological and non-technological solutions** play a key role to achieve a **future-proofing sustainable mobility where autonomous, connected, electric and shared vehicles are expected to interact with active modes such as walking and cycling**. With the rapidly changing business environment, new strategies and **value chains emerge** to set the next-generation mobility. Innovations in transport and mobility may come from different technological or sectoral domains and through several channels: entrepreneurs may act on their own or innovation can emerge from innovation ecosystems that include many actors. New actors populate the emerging **new mobility ecosystems**: incumbents are increasingly challenged by start-ups; profit and non-for-profit organizations from other domains enter the market for transport and mobility services. They have the potential to significantly change the operating models of transport authorities and providers with **significant socio-economic effects** (e.g. infrastructure, employment). Due to the dynamic developments in digitalization and decarbonization (particularly the circular economy), **new business models for personal and public transport** are being developed that have the potential not only to reduce environmental harms from and produce societal benefits in the wider mobility system.

3.2.3 Tools to support policy-makers in the transition to integrated mobility policies, market regulation and institutional changes to meet grand challenges and common goals

Eco-systemic approaches in policy and practice in the field will increasingly lead to a shift from sector-specific **policy-making towards cross-sectoral policy processes** for policy alignment to meet grand challenges. It is thus necessary to provide tools for a richer and more differentiated understanding of policy options and its **effects such that these are dynamically monitored through a multidimensional system of key performance indicators**. The “open” paradigm for science, technology and innovation entails ethical and legal implications of ‘big data’ (e.g. privacy) which may be addressed with various hard and soft policy measures.

To ensure sustainability and a fair level playing field, the mobility sector needs (targeted) **regulation**. Given the dynamics in the field, ‘regulatory ‘sandboxes’ may be required to experiment with ‘breakthrough’ innovations in risky yet ‘safe’ settings. **Innovation-oriented procurement** is a promising way for the public sector to boost new ideas, bring ecosystem actors together, and have their solutions tried out in the marketplace.



3.2.4 New and improved governance models for multimodal mobility addressing desired societal goals such as carbon neutrality and social equity issues

Acknowledging the complexity of multi-sectoral and multi-level developments in technology, field is rapidly expanding from narrow ‘planning’ to broader ‘governance’. This requires **agile transport governance models to enable multimodal mobility management** for meeting desired societal goals such as **carbon neutrality and social equity issues**. The mission of public policy is to ensure societal benefits, i.e. **accessibility and affordability of mobility services**. Governing the mobility transition for societal impact (i.e. profit and prosperity) entails a changing role of the state towards more collaborative governance modes and settings. **Public-private collaboration through enhanced models** may be a key policy instrument to stimulate innovation. It is not limited to just physical infrastructures and financing capital projects. Institutionalizing networks and processes into more strategic partnerships needs to be considered as promising strategic inroad at and across levels of agency.

Whereas the near future developments at the strategic level can be captured and could be controlled to a certain extent, e.g. through trend analysis and predictive models (‘forecasts’), the more distant future is notoriously more difficult to outline due to often surprising and potentially disruptive developments arising from the interaction of different systems (ICT, energy, production, consumption, artificial intelligence, etc.). For the transition phase 2030 /2050, strategic intelligence can be gathered through adequate methods such as horizon scanning and scenario building (‘foresight’) which are required to explore sound and robust governance options to create desirable long-term mobility futures. In addition, advanced qualitative and experimental methods (e.g. for scaling and/or embedding mobility innovations) to draw generalizable conclusions that will help shape future-proof sustainable mobility systems.

3.2.5 Accounting for regional equity in the allocation of transport investments and other transport policies

Policy impact assessment research on its connection to societal outcomes is important to enable fair transitions. Many European countries experience political polarization which is highly related to the center-periphery dimension. Transport policy is relevant in this context, as transport projects constitute large and geographically targeted public investments which could have an **impact on spatial equity**. One challenge is that policy objectives related to **regional redistribution** are often very broadly defined. This gives policy-makers considerable discretion in the allocation of spending and could result in fragmented or uninformed decision-making vulnerable to the influence of special interests. Hence, there is a need for more well-defined policy objectives along this dimension that can be used in project appraisal and transport planning. Also, there is a lack of knowledge about the actual **allocation of transport investments over time and their impact on regional welfare**. Increased availability of detailed spatial data implies potential for more and better research,



a more informed public debate and **more efficient policy-making** within this area. Proposals under this topic shall address the following aspects:

- Documenting the geographical allocation of transport investments over time as well as the impact of transport policies on regional economic activity and welfare, identifying winners and losers;
- Identifying the attitudes of citizens and decision-makers towards regional equity in transport;
- Defining measures of spatial equity and regional redistribution that can be used in transport planning;
- Identifying the potential trade-off between regional redistribution and other policy objectives in transport planning, for instance economic efficiency;
- Developing practical methods for how to take concerns regarding spatial equity into account in project appraisal and transport planning.

3.2.6 Fostering the economics of maritime transport for carbon neutrality and intermodality through combined policy measures

Research and Innovation Actions under this topic can address the following aspects:

- Cooperation with the International Maritime Organization (IMO) and other stakeholders engaged in technology development, decarbonisation and intermodal freight;
- Selection of **policy measures to achieve both zero-carbon shipping and efficient intermodal transport**. The mix of policy measures include technological, operational, fuel and energy, regulation, cross-modal cooperation, etc. and its selection shall be based on a comprehensive framework that includes cost-effectiveness, and/or cost-efficiency indicators and needs in each market segment (e.g. policy instruments to overcome existing market barriers);
- Implementation of combined policy measures through setting “Port/Shipping living labs” with the support of an ecosystem of cross-modal stakeholders.

3.2.7 Fostering the economics and mobility governance of circular economy in European cities and regions & beyond Europe

By 2050 around 70% of the World population will live in cities. Cities generate around 50% of global waste and more than 80% of global GDP. Moreover, 90% of the urban expansion will take place in Asia and Africa (UNEP, 2017). **Mobility systems are one of the three systems with more “structural waste” which contributes to inefficiencies in the economy.** Circular business models are important to maximize environmental benefits and stimulate mobility related stakeholders to move towards sustainable production (e.g. of new mobility services) and consumption (land use, energy, etc.). **Collaborative modes consumption** shall be better



addressed as well. It is important to pursue international cooperation for targeting systemic policies and governance models to **enable mobility of circular economy**. Coordination and Support Actions and/or Research and Innovation Actions under this topic can address the following aspects:

- Set the mobility ecosystem for the circular economy through building a network of policy makers, regions, cities, transport operators, new service providers and other mobility related stakeholders (promoters, facilitators, enablers, responsible for mobility management, etc.) for action;
- Identify categories of “structural waste” (SW) across mobility system contexts (e.g. touristic regions with seasonal mobility patterns, congested cities, etc.); SW can include “time lost in congestion”, “time lost in parking search”, “energy waste”, “generation of air pollution” etc. and quantify these in social and economic terms through using quantitative indicators;
- Assess collaborative modes consumption and rebound effects in each context while harnessing digital technology;
- Identify smart/green policy measures and develop approaches for tackling each SW type through engaging a multi-level stakeholders’ network (across sectors and across different levels of governance) aiming to build sound intra-EU and/or pan-European international comparisons;
- Analysis of value chains of combined/collaborative modes and development of business models for the circular economy in each mobility system context (city, region, city neighborhoods);
- Assess the potential scalability of business models.

Contact

ECTRI Transport Economics and Policies’ Thematic Group (TG ECOPOL)

Elisabete ARSENIO
Leader/Moderator of TG
ECOPOL
Senior researcher
LNEC, Portugal
elisabete.arsenio@lnec.pt
+351 21 8443326

Anu TUOMINEN
Co-leader/Rapporteur of TG
ECOPOL
Principal Scientist
VTT, Finland
anu.tuominen@vtt.fi
+358 20 722 4976

Petra Wagner
Co-leader/Rapporteur of TG
ECOPOL
Senior researchers
AIT, Austria
petra.wagner@ait.ac.at
+ 430 50550-4549



REFERENCES

Auvinen, Heidi, Sampsa Ruutu, Anu Tuominen, Toni Ahlqvist and Juha Oksanen. Process supporting strategic decision-making in systemic transitions. *Technological Forecasting & Social Change* (2015), pp. 97-114.

Auvinen, H. and Tuominen, A. (2014) Future transport systems: long-term visions and socio-technical transitions, *European Transport Research Review*, Volume 6, Issue 3, pp. 343-354.

Arsenio, E., Romão, M., Gomes, J., Prata, J. (2019). Assessing future use of autonomous, shared and electric vehicle technologies to meet decarbonisation goals: a case study in Lisbon, submitted to: Transport Research Arena 2020 (TRA) 8th Conference: Rethinking Transport. Towards inclusive and clean mobility.

Arsenio, E., Heddebaut, O., Tuominen, A. (2016). TRANSPORT CHALLENGE IN HORIZON 2020. ECTRI SUGGESTIONS FOR THE THIRD WORK PROGRAMME (2018-2020) in the field of "TRANSPORT ECONOMICS AND POLICY, July 2016, ECTRI Position Paper.

Docherty, I., Marsden, G., & Anable, J. (2018). The governance of smart mobility. *Transportation Research Part A: Policy and Practice*, 115, 114-125.

Ellen MacArthur Foundation and McKinsey Center for Business and Environment – EMF and McKinsey (2015). Growth Within a Circular Economy Vision for a Competitive Europe, Cowes, United Kingdom: Ellen MacArthur Foundation.

European Commission - EC (2011a). Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system, Brussels: European Commission.

European Commission – EC (2015). Closing the loop – An EU action plan for the circular economy, COM (2015) 614 final.

European Commission – EC (2016). The European Strategy towards Low-emission Mobility. COM (2016) 501, 20.7.2016.

European Commission – EC (2017). Europe on the Move - An agenda for a socially fair transition towards clean, competitive and connected mobility for all, COM (2017) 283 final, 31.05.2017.

European Commission – EC (2018). Final Report of the High-Level Panel of the European Decarbonisation Pathways Initiative. Directorate-General for Research and Innovation.



European Commission – EC (2018b). A Clean Planet for all. A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy, COM (2018) 773 final.

European Commission – EC (2018c). On the road to automated mobility: An EU strategy for mobility of the future, COM (2018) 283 final, 17.05.2018.

European Commission – EC (2018d). Artificial Intelligence for Europe, COM (2018) 237 final, 25.04.2018.

European Commission – EC DG MOVE (2019). A Transport sector Fit for a Clean, Digital and Modern Economy, European Transport Conference 2019, Dublin.

European Commission (2019b). The EU Blue Economy Report 2019. EU.

European Commission – EC (2019c). Sustainable Transport Infrastructure Charging and Internalisation of Transport Externalities: Executive summary

European Commission – EC DG MOVE (2019d). Transport in the European Union. Current Trends and Issues.

EC (2019e) COMMISSION STAFF WORKING DOCUMENT EU Road Safety Policy Framework 2021-2030 - Next steps towards "Vision Zero", SWD(2019) 283 final, 9.6.2019.

Leibowicz, B. D. (2018). Policy recommendations for a transition to sustainable mobility based on historical diffusion dynamics of transport systems. *Energy policy*, 119, 357-366.

Reeves, S., Lamb, M., Arsenio, E., & Zofka, E. (2018). Cooperation across transport modes to develop common research objectives for the reduction of energy consumption and carbon emissions. TRA 2018, Vienna.

Rotmans J, Kemp R, van Asselt M (2001) More evolution than revolution: transition management in public policy, *Foresight* 3(1):15–31

United Nations Environment Programme - UNEP (2017). Resilience and Resource Efficiency in cities, UNEP.