



Infrastructure
& Network
Center

Toulouse
School of
Economics



Economics for the Common Good



Director's word

Infrastructure development around the world poses ever-changing challenges, including financing, sharing access to certain infrastructure and optimizing the often complex and networked underlying structure. TSE aims to undertake research that helps organizations in both the public and the private sector to better understand these issues and provide operational responses. In 2021, TSE expanded its footprint in this area by creating a center combining TSE's own expertise with its private and public partners' financial support and knowledge.

Frédéric Cherbonnier

48 Researchers

44 Working papers

36 Articles in peer-reviewed journals

11 Partners

8 International conferences

TSE's involvement in real-world relevant research

During the last quarter century, Toulouse economists have developed a model that brings academic research at the highest level to focus on real-world problems, through interactive dialogue with industrial partners and national policy-makers, leading to the establishment of a unique, world-class research center in economics and other social sciences.

Building on this model, TSE's Infrastructure & Network Center is designed to encompass participation from a wide range of partners. We aim to apply our expertise on these topics to reach a new high of world-leading research, with contributions to theoretical and applied research published in the best international scientific journals. In addition, we have a track record of disseminating our cutting-edge research findings to firms, policymakers and the wider public. We regard this as a further, crucial mark of success.

Our vision



The first objective of the Center is to make the best use of the synergies between the academic world and the different sectors of activity concerned by these questions. Emerging issues in some areas of activity can be addressed by examining work in related fields, while operational issues can often be effectively reformulated in more general terms and then solved with existing academic work.

A second essential target is to spur research on the rising issues in those fields. Economists sometimes have the temptation to work on issues that have been in the limelight for a number of years: data is easier to find, and there already exists a literature on which to build. It is essential to be ahead of the curve and to study tomorrow's issues, rather than finding that one is in fact looking back at yesterday's. TSE has been a consistent front-runner in this domain.

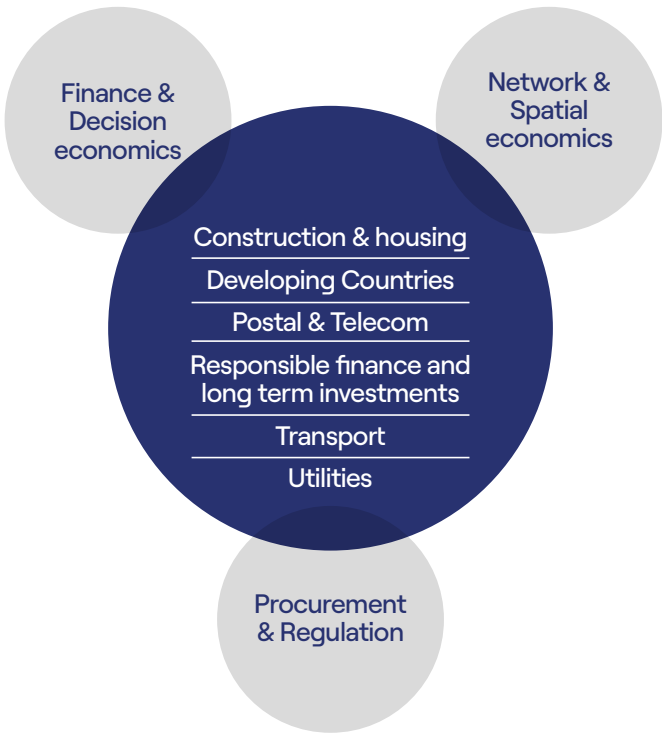
For this reason, the center is organized through a matrix structure: on one hand, three lines of research, presented in the following section, cover the main issues related to business strategy, financing and regulation. On the other hand, the center will address different sectoral domains by building dedicated teams of researchers. Such teams have been active for many years in five distinct domains.

Interrelationships with this matrix structure are quite straightforward, the six areas listed at the center refer to areas of activity that face similar strategic and regulatory issues, in particular regarding the sharing of access to scarce resources and the optimization of infrastructure with network and geographical spread. These issues are also crucial for financial players, such as portfolio managers invested in infrastructure debts and equities. More specific examples are given in the appendix.

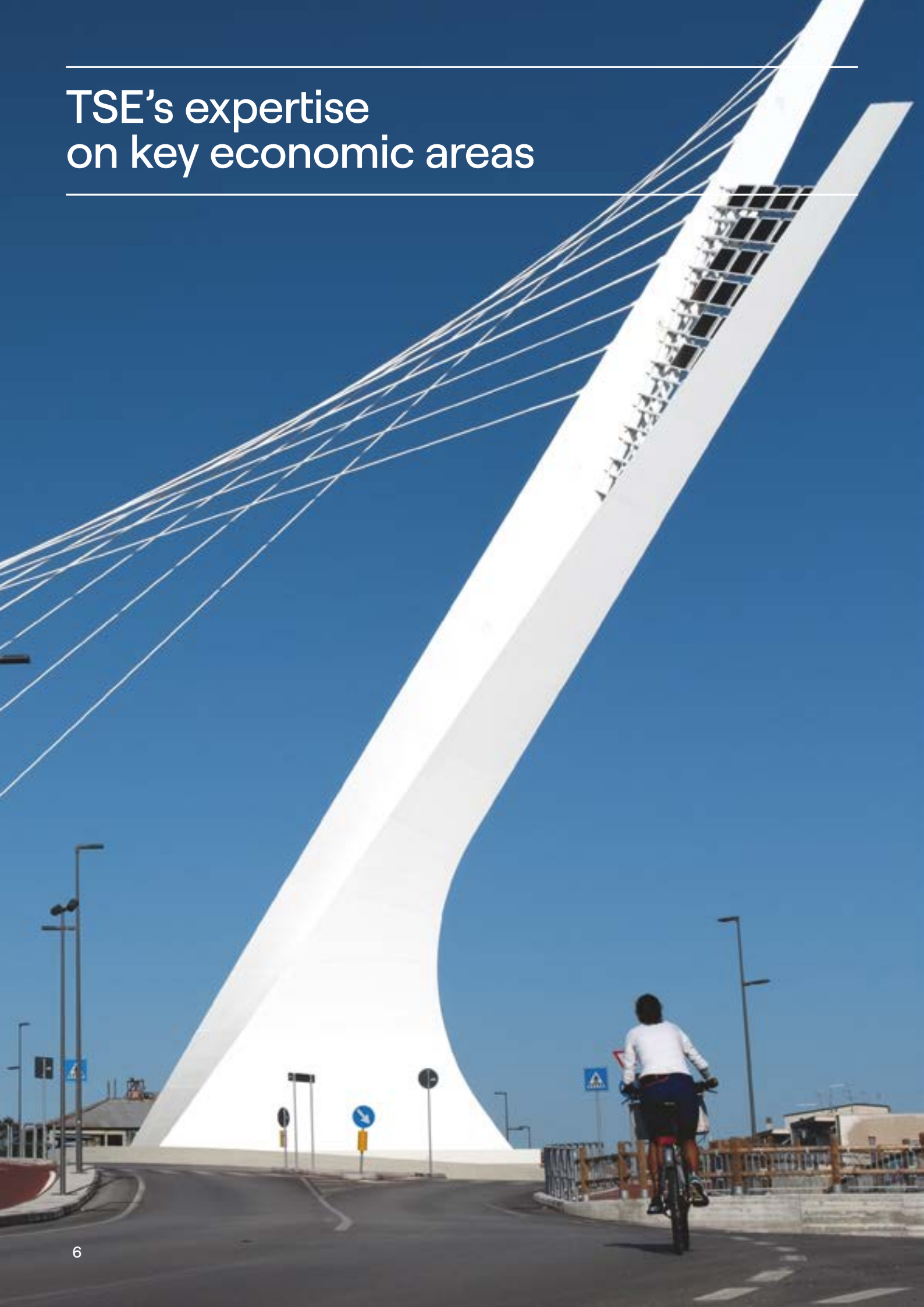
Among the partners with which TSE has collaborated, we can mention the French national railway company SNCF, Orange, La Poste Groupe, the French Electricity Transmission Network RTE or the FIT IN Initiative with the support of the Bill & Melinda Gates Foundation.

The way the Center operates is threefold:

1. Dedicated exchanges with each partner on specific issues, to trigger academic works on relevant questions and provide operational answers to the partner. This may include joint brainstorming, executive teaching (e.g. professional training on auction strategy) as well as internal seminars during which researchers present a synthesis of current knowledge on a specific topic and/or work in progress;
2. Open international conferences on specialized topics. TSE has a long experience in organizing such events in Toulouse, Paris or other cities around the world. As an example, in 2022, we can mention the 11th bi-annual postal economics conference and the 13th conference on the economics of energy and climate. Such conferences make it possible to widely disseminate knowledge developed in this partnership, by reaching out to regulators and economic decision-makers
3. Beyond the academic publications, which constitute the heart of our researchers work and the essential passage for a recognition of work carried out, we publish regular outreach notes and newsletters, as well as more specific policy notes and op-eds to reach a wider audience and convey economic policy messages. As an example, in 2022, TSE launched [TSE Reflect](#), a thematic newsletter series with a May edition focusing on the economics of infrastructure and networks.



TSE's expertise on key economic areas



The development of infrastructure and network-based industries and services is facing fundamental issues that are subject of extensive worldwide economic studies. We can cite three major topics upon which TSE has world-renowned expertise and is highly involved in the ongoing debate between economic actors and regulatory bodies.

Finance and decision economics

Related to long term investment, such industries need to make considerable and irreversible investment decisions even though the parameters guiding these decisions, particularly with regard to the future evolution of costs and demand, are highly uncertain. Companies are facing “real options”, available to curtail or partly postpone projects in order to better adjust to future market conditions. Financial decision models need to be adapted in order to take into account long-term investment and risk with unknown “ambiguous” probability distribution.

These problems concern both private companies and public entities that are able to commit to long-term projects in the interest of global welfare. Precisely, this implies to refine classical models such as the capital pricing asset model, and its extension based on consumption, so as to provide new estimates on long term discount rates. It is also necessary to better understand what can prevent financial markets from funding long term and/or risky assets, and to assess the determinants and the impact of material and immaterial investments at the macroeconomic level.

Network and spatial economics

In markets considered here, an accurate view of the demand curve and cost structure is crucial, as well as a deeper understanding of the constraints related to network externalities and geographical location. Econometrics analysis are therefore necessary to assess elasticities, economy of scale and scope as well as cost-effectiveness frontier, while modelling choices of agents and competitors must make it possible to find the optimal underlying structure.

Efficient mechanisms to share scarce resources are also essential, that is how to grant access on saturated links according to precise timetables, how also to allocate costs between infrastructures, using for instance cooperation models based on Shapley value. Besides, investing in shared resources often requires solving coordination problems, which may involve political economy issues as is the case in the context of urban development. Finally, a large variety of techniques - based in particular on willingness to pay - have also been developed to assess external cost and benefits, and can provide an economic assessment of congestion costs, environmental damages and ecosystem services.

Procurement and regulation

Infrastructures often have the characteristic of essential facilities that is, they become necessary to reach customers or allow competitors to continue their activities. Network industries are generally developed by natural monopolies and oligopolies subject to anti-competitive regulation and laws. Public intervention in this area aims at facilitating non-discriminatory third-party access, providing incentives toward cost efficiency and quality of service, while allowing financing of current and future activities.

Today it is largely based on the “new regulatory economics” originally developed in Toulouse by Jean-Jacques Laffont and Jean Tirole, taken into account the asymmetry of information between regulators and firms. It consists in defining optimal mechanisms that translate into very concrete implications in particular with respect to price (two-part tariffs, price cap vs. cost + rule, ..), access mechanism (auction, priority rules, scarcity premium,...), procurement by private contractor on behalf of a public authority (delegation, public - private partnership...).

Public policy also seeks to influence investment decision and access to infrastructure by acting more generally on the regulatory framework, in particular through fiscal and property law.

Focused research programs



Construction and housing economics

Overview and specificities

Housing, the single largest asset category in the portfolio of a typical household, exemplifies the interplay between spatial choices and financial decisions. Our research offers a better understanding of housing occupancy choices and the consumption of housing services, the political economy of social housing construction, and finally, the macroeconomic analysis of construction.

Current or former partnerships

Ministère du logement

Current research projects include

- Design and calibration of a general equilibrium model of households decision regarding housing tenure choices and housing service consumption
- Political economy of social housing construction
- Macroeconomic analysis of construction

Head of research team

Martial Dupaigne



Developing Countries

Overview and specificities

Developing countries display major gaps in access to infrastructures, which raises complex investment and financing issues. Close to one billion individuals worldwide are without electricity, over 600 million without access to improved sources of drinking water, 2.4 billion to improved sanitation facilities, and a large fraction face work, educational, and health barriers due absent or high cost transport and communication services. The way these challenges will be solved will have a decisive impact on human development, but also on CO2 emissions and climate change in the 21st century. Our research provides academic insights into the development of infrastructure and network in the specific context of developing countries.

Current or former partnerships

Center for Global Development (Bill & Melinda Gates Foundation), Agence Française de Développement, Engie-Terrawat, Meridiam, World Bank.

Current research projects include

- Impact of transportation investment on firms and households
- The welfare benefits of sanitation and water networks in Africa
- Funding and financing infrastructure investment in developing countries
- Regulating quality in the water sector
- Infrastructure in the digital era— How should regulation adapt?



Head of research team

Stéphane Straub

Postal and Telecom

Overview and specificities

In the era of the development of digital technologies, postal services and telecommunications are undergoing constant upheaval. Our research aims at providing academic insights into economic models in these sectors and their need to adapt to a competitive environment, taking into account constraints imposed by regulators.

Current or former partnerships

La Poste Groupe (French main postal service company), Royal Mail Group (main postal service and courier company in the United Kingdom), Orange..

Current research projects include

- Industrial economics of parcel delivery and e-commerce
- Postal services in the digital era
- Econometric analysis of demand and supply in the market of parcel delivery services



Head of research team
Helmut Cremer

Responsible finance and long term investments



Overview and specificities

Financial markets are often blamed for inducing firms to adopt short term strategies that have a negative impact on society. These critiques raise concerns about whether the invisible hand is able to allocate scarce capital efficiently in our decentralized economies. Our research evaluates long-term assets and investments as well as measuring the impact of ESG (environmental, social and governance) factors on company value.

Current or former partnerships

Meridiam, research chair "*Sustainable finance and responsible investment*"

Current research projects include

- Valuation of long term assets and investments
- Impact of ESG (environmental, social and governance) factors on firm value

Head of research team
Catherine Casamatta

Transport



Overview and specificities

Transportation economics tackle a large variety of issues including regulatory policies, optimal resource allocations or urban development. Our research aims at both answering academic questions in these areas and providing practical responses to companies and regulators.

Current or former partnerships

SNCF, Société du Grand Paris, Tisséo

Current research projects include

- Opening up to competition and regulation of access in the market of long-distance passenger rail services
- Optimal pricing of railway infrastructure and application to the case of area of Paris metropolitan area
- Analysis of spatial concentration and agglomeration effects around Toulouse in view of the realization of Toulouse Aerospace express

Head of research team

Marc Ivaldi

Utilities

Overview and specificities

Utilities (water, electricity and gas) provide essential services with strong impacts on economic and social development. They also face a number of important challenges including infrastructure aging, decarbonization of economies, extreme fluctuations of climate (i.e. temperature, rainfall, wind), rapid changes in demand for good and services, and digitization of process. All these challenges require efficient planning of long term investments in relation to the regulatory frameworks in place.

Current or former partnerships

RTE (*French electricity transmission network*), International Water Stewardship Programme

Current research projects include

- Risk-adjusted social discount rates for investment in the French electricity transmission network
- Optimal two-part tariffs and cost allocation on the French electricity transmission network
- Analysis of economic methods (market and non-market approaches) to induce optimal water management in developed countries
- Development of a macroeconomic model for assessing impacts of water security/availability on households in South Africa



Head of research team

Arnaud Reynaud

Scientific team

Today, close to fifty TSE researchers or research associates* have an interest in the economics of infrastructure and networks:

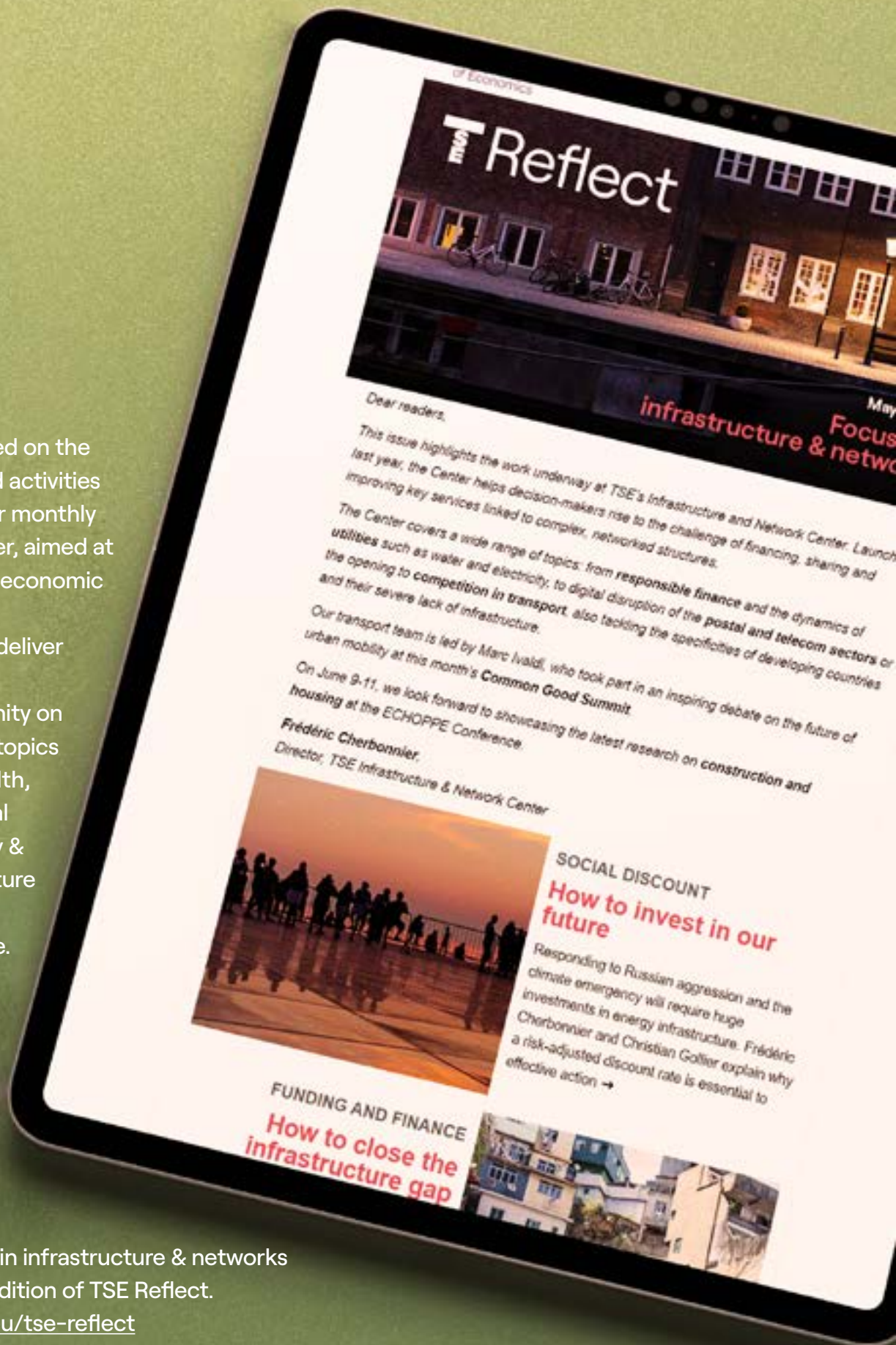
- Emmanuelle Auriol
- Milo Bianchi
- Christian Bontemps
- Philippe Bontems
- Matthieu Bouvard
- Marie-Françoise Calmette
- Catherine Casamatta
- Catherine Cazals
- Frédéric Cherbonnier
- Helmuth Cremer
- Philippe De Donder
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- Silvia Rossetto
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- Mohamed Saleh
- Wilfried Sand-Zantman
- Stéphane Straub
- Augustin Tapsoba
- Jean Tirole
- Nicolas Treich
- Karine Van Der Straeten
- Takuro Yamashita

* Research associates can occasionally intervene on certain research programs.

Stay tuned

We keep you posted on the latest research and activities via TSE Reflect, our monthly thematic newsletter, aimed at bringing insight to economic practitioners. Once a month we deliver analysis from our academic community on important current topics in the fields of health, competition, digital economics, energy & climate, infrastructure & networks, and sustainable finance.

Read our insights in infrastructure & networks in the May 2022 edition of TSE Reflect. Sign up at tse-fr.eu/tse-reflect



Join forces

Philanthropic support and research partnerships have played a significant role in the creation of TSE and in its development ever since. By joining the community of donors and project sponsors of the Center, you will help us achieve our ambitious scientific goals and encourage the emergence of leading teams working on finance and decision economics, network and spatial economics, or procurement and regulation.

You can support the Center as a whole and/or a specific research initiative. With your help we can also create new visiting programs, fund research grants and scholarships. In addition, we value the provision of databases our researchers can work on.

Donations made to TSE through the Jean-Jacques Laffont - TSE Foundation or through American Friends of TSE provide tax benefits to the donor.

Our partners

We are proud and grateful to all our partners and donors. In particular, to the Center's main donors: Orange and La Poste Groupe.

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FIT IN Initiative with the support of
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