

Thesis

The stakes of telecommuting for the energy transition

September 2022

Résumé

This project aims to shed light on the central theoretical and empirical issues surrounding the question of telework, mobility and energy consumption, and the resulting greenhouse gas emissions in order to provide recommendations for public policies. It will be carried out and financed within the Chair of Environmental Economics (CLEE) of the University Savoie Mont Blanc.

This thesis will answer the following question: To what extent is telework an efficient lever to reduce greenhouse gas emissions in a society in energy transition? The analyses provided will have to take into account the possible modal shift as alternative modes of transport in the future. This doctoral work will be structured in three axes. We will therefore provide three empirical and theoretical insights on the following points: (i) The level of telecommuting that optimizes productivity and related mobility (ii) Telecommuting opportunities, recruitment radii and location choices (iii) Telecommuting policies and residential & business energy consumption. These three axes correspond to the writing of three research papers, all of which will assess the indirect impact of telecommuting (via mobility practices and building energy consumption) on greenhouse gas emissions.

Context

The health crisis has contributed to the spread of telecommuting in many countries where the type of job and the sector of activity allow it. This organization of work is not without consequences on greenhouse gas (GHG) emissions. Indeed, between 1994 and 2008, the share of commuting for workers living in low-density areas increased by 4%. On average, 72% of working people go to work by car, and 90% in low-density areas (Hubert et al., 2016). In 2019 in France, nearly 38 million private cars emitted 69.5 Mt CO₂ eq. of GHGs, or 51% of transport sector emissions and 16% of total national emissions.

Organisation

In the three axes developed below, an exhaustive state of the art will be carried out, then theoretical and empirical methods will be mobilized. Axis 2 will be addressed through the implementation of a frictional matching model. For the three axes, unpublished data collected by the Chair may be used to propose econometric approaches.

Axis 1 : Optimal level of telework and mobility

The development of telework, at home or in third places near the home, allows to reduce the time spent on transportation. Considering that 18.1 million French people travel to work by car, and that 60% of distances less than 5 kilometers are also covered by car, changing habits can significantly reduce CO2 emissions (Giovanis, 2018; Tenaillon et al., 2021).

Nevertheless, depending on the types of jobs held and the industry, the optimal level of telecommuting will not be the same (Adams-Prassl et al., 2022; Dingel and Neiman, 2020). While telework can lead to productivity gains through reduced travel and related stress, through a better work-life balance, the formal and informal exchanges possible in the workplace are also productivity drivers (OECD, 2020). This is why we will try in this first axis to identify the optimal level of telework, the one that allows to optimize employees' performance. Then, all other things being equal, we will estimate the impact of this level of telecommuting on the CO2 emissions generated by employee travel by personal vehicle (Shabanpour et al., 2018). This thinking is in the short to medium term, a time horizon in which labor market positions are relatively rigid. But in the longer term, substantial changes in work organization may lead to changes in labor supply and demand behaviors, just as mobility practices are bound to change (Olde Kalter et al., 2021).

Axis 2: Telework opportunities, recruitment radii and location choices

In the longer term, changes in the organization of work can lead to a widening of the recruitment perimeter for companies and the radius of prospection for employees. For companies, offering teleworking opportunities can broaden the geographic scope of their search for new skills, and thus increase the possibility of making the best possible match between a job vacancy and a candidate. As employees have to travel less to reach a workplace (less frequently, and less far if they are going to a third place, a co-working space), they may indeed wish to enlarge the geographical radius within which they will offer their work. These habit changes may therefore challenge well-established findings in the literature that show that workers with high productivity and wages reside close to jobs and have low travel costs per distance (Zenou, 2009).

Nonetheless, increased distance between employer and employee may lead individuals to travel less often, but potentially farther to reach their firms when they do not telecommute. We will therefore assess the impact of the change in work supply and demand following the permanent introduction of some telework. To propose a robust evaluation, it will also be necessary to identify a good counterfactual situation, i.e. to compare the changes in mobility conditions following the introduction of permanent telework with a reference situation taking into account the development of alternative modes of transport likely to replace the individual thermal vehicle (electric vehicle, two wheels, public

transport). Transport policies for the energy transition must take into account not only the changes in energy carriers and modal shift but also the evolution of telework (and its consequences)

Axis 3: Telework and residential and business energy consumption

This third axis can be closely linked with the short, medium and long term effects identified in axis 1 & 2 in terms of telework practices. The development of telework leads to a shift of energy consumption from companies to residential energy consumption when telework is done at home. The reduced presence of employees on site can lead companies to optimize the occupation of their premises and reduce their energy consumption. In turn, the increased presence of employees in their homes can lead to higher energy consumption for both digital and routine domestic uses (heating, lighting, cooking, etc.) (Bieser et al., 2021). However, the energy consumption of professional buildings is not equivalent in terms of emissions to that of residential buildings. Several factors specific to the type of building influence the emissions: the energy efficiency of the buildings, the type of energy used, etc. But behavioral factors must also be taken into account: do individuals adopt the same consumption behaviors at home and at work? In this section, we will analyze the impact of telecommuting on the net emissions from energy consumption in buildings, whether they are professional or residential.

Valorization

The envisaged valorization is classical. The expected objectives of this doctoral work are the following:

- To lead to scientific publications in peer-reviewed journals,
- Contribute to the public debate on the best environmental and social inclusion policy choices,
- Participate in international conferences in economics,
- To participate in international conferences in economics, and to organize a workshop around the themes addressed.

Thesis Supervision & Contact

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Profile required

The candidate must have a master's degree in economics or equivalent. He/she must demonstrate an excellent **knowledge** of quantitative data analysis methods and tools (advanced statistics and

econometrics, mastery of Excel and Stata), a good ability to write summary documents, an ability to exchange and communicate, and a good command of English, particularly in writing.

University and host research unit

With more than 15,000 students, a multi-disciplinary range of courses with more than a hundred national degrees, and quality laboratories that have earned it a place in the Shanghai ranking, Université Savoie Mont Blanc is a human-sized institution that combines research and professionalization, proximity to its regions, and a broad outlook on the world. On its three campuses in Annecy, Bourget-du-Lac and Jacob-Bellecombette, it offers short (University Diplomas, University Technology Diplomas) and long (Bachelor's, Master's, Doctorate, Engineering Diplomas) courses, whether in initial or continuing education, in work-study programs or via various validations, in-class or by distance learning.

Between Geneva, Turin, Lyon and Grenoble, on the borders of Switzerland and Italy, with the support of the communities that gave birth to it and the companies that accompany it, it is a major player in the dynamic national and cross-border ecosystem, strongly involved in its economic, social and cultural development.

The Institute of Research in Management and Economics (IREGE) is a host team of the Savoie Mont Blanc University (USMB). IREGE researchers work closely together on the federative theme of "Environmental Choices and Innovations" within two major multidisciplinary thematic axes: Environment, Sustainable Consumption, Tourism and Innovation & Development of Organizations. They pursue their actions around four main missions:

- To produce knowledge in their scientific field,
- To valorize the knowledge produced, particularly in the socio-economic world,
- To provide support to the community,
- Training in research through research.

Références

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