Study exploring the social, economic and legal context and trends of telework and the right to disconnect, in the context of digitalisation and the future of work, during and beyond the COVID-19 pandemic

Annex 11. Environmental issues

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EUROPEAN COMMISSION

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This annex covers various pieces of research dealing with the implications of telework on environmental issues, with particular attention to its contribution to tackling climate change.

Two significant studies (Hook et al., 2020 and O'Brien et al., 2020[1]) have carried out comprehensive reviews of the literature on the environmental impact of telework. The key message from these reviews is that many studies are of low quality, addressing a small number of dimensions that deal only with direct environmental and climate impacts. To provide a more accurate indication of the overall effects of telework on the environment, studies should consider several dimensions of the impact of flexible working arrangements: (travel, energy housing, etc.), and should explore not only direct impacts but also 'higher-order' effects.

In this regard, the review by Hook et al. (2020) covers four impact criteria: (a) commuting, (b) non-work travel, (c) home, and (d) office; while O'Brien et al. (2020) deal with: (a) travel, (b) office energy consumption, (c) domestic energy consumption and (d) the use of ICT.

Hook et al. (2020) also highlight the difference between direct and higher-order effects. Direct effects relate to the energy used in the manufacture, operation and disposal of ICT equipment, together with the associated network infrastructure, while higher-order effects relate to changes in energy consumption stimulated by the use of ICT, including changes in individual behaviour (e.g. commuting behaviour) and changes in prices, consumption, investment and other variables throughout the economy. These higher-order effects take a number of forms that (both individually and collectively) may either increase or reduce energy consumption relative to a baseline scenario in which those changes do not occur.

The overall conclusion of both reviews is that poor-quality studies more frequently tend to predict that telework will have a positive impact on the environment. In contrast, more complex studies of better quality tend to identify a more limited positive impact, no impact or even a negative impact. Both reviews call for more ambitious and rigorous research on this topic.

A recent Eurofound report (Eurofound, 2022e) explores the ways in which telework can reduce climate impact, stemming from the fact that the number of employees working from home expanded in an unforeseen way in response to COVID-19, albeit that such changes were unevenly distributed among occupations, sectors and geographical areas.

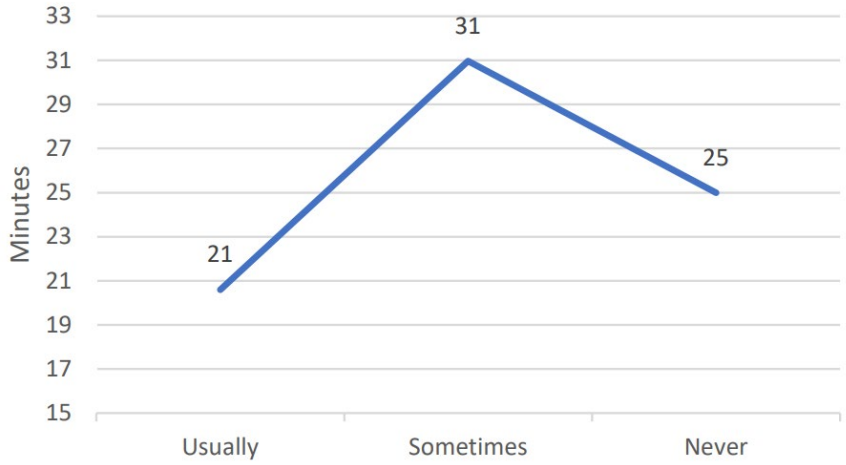
Eurofound (2022e) highlights a clear geographical divide in the prevalence of telework that corresponds the degree of urbanisation, and that this has been amplified by the COVID-19 crisis. On average, capital regions show higher levels of the prevalence of telework compared with other regions. This geographical divide is partly related to differences in occupational and sectoral structure, as cities tend to have a higher share of knowledge-based, white-collar services jobs that are 'teleworkable'. Another factor explaining this divide is that cities usually have a higher availability of the digital infrastructure required for telework.

Teleworking has commonly been seen as a solution to alleviate climate impact, due to the possibility to mitigate congestion and transport-related emissions through the reduction of journeys between home and work. However, Eurofound (2022e) points out that many studies have failed to consider the potential counter-effects. For instance, telework may actually induce longer home-to-work commutes due to residential relocations, as occurred in Ireland (Remote Working National Survey, 2021) and may be happening in North America. The report shows that in 13 OECD countries, demand for housing may have shifted away from city centres towards the peripheries due to a gap in house prices, better access to green spaces, good connectivity and confinement measures. To compensate

[1] See the main report for full reference details.

for these consequently longer commutes to work from these peripheral locations, teleworkers therefore need to commute less frequently. In fact, the relationship between the frequency of telework and commuting tends to follow an inverted U-shape: weekly commute distance and travel time are lower for teleworkers who 'usually' or 'never' (or very rarely) work from home, while among individuals who work from home 'sometimes', they are higher (see Figure 1).

Figure 1 Average (one-way) commuting time, by teleworking frequency



Source: Eurofound (2022e, p. 11).

In addition to residential relocation, there are other long-term impacts of employee lifestyle changes that result from the possibility of telework, and which may partially offset the positive climate impacts associated with reduced commuting. For instance, some short daily trips such as shopping, leisure and school runs were previously carried out during work commutes, and must now be made as separate journeys. Furthermore, if a vehicle is no longer being used to commute as a result of teleworking, it may then be used by another household member. In a similar vein, an increase in non-work travel may occur, due to the lower availability of services in the new living area.

On the other hand, reduced work commutes can lead to other potential benefits. Traffic congestion would be reduced, which would lead to shorter commuting times and reduced engine idling. However, such benefits may not be as noticeable if the frequency of teleworking is not sufficiently high. Another factor to consider is whether the shift towards telework is related to a significant change in the emission intensity of the mode of transport, taking into consideration combustion engines, the use of electric/hybrid vehicles and vehicle occupancy. Clearly, those who previous undertook shorter trips, using public transport and/or low-climate impact vehicles with a high level of occupancy will not have as much scope to reduce their climate impacts.

The other important impact of telework is energy consumption, both at home and in the office. In the case of the former, the effects of telework on energy consumption will depend on several factors: the frequency of telework, heating and cooling technology, home energy efficiency, energy sources, the size of the home/home office space, home office set-up, climatic and seasonal conditions, and the sharing of the home/home office space with other household members. In the case of the office workplace, energy consumption depends on the office energy management policy and the characteristics of the office building, as well as the share of employees who telework, the energy sources used and the size of the office. The concept of hot-desking is put forward in response to these issues. This is 'an office management approach whereby individual employees are not permanently assigned to a desk or office, such that the number of workplaces can be less than the number of employees. According to some analyses, hot-desking plays a key role in reducing office-

related energy emissions under teleworking policies. However, the impact of telework on energy consumption will depend on whether changes in residential energy consumption and office energy consumption allow a reduction in overall energy consumption.

In a similar vein, an increase in the use of ICT equipment, internet use and cloud storage services is expected, since these are required for teleworking. As such, there may be an increase in energy consumption as a consequence of the high electricity consumption of data centres. However, disagreement exists in the literature with regard to additional energy consumption related to the increasing number of Internet users, and the pollution impact of Internet-based services remains under-explored by research.

Calculating the magnitude of the impacts mentioned above is particularly complex, because they depend on many contextual factors, requiring a diverse range of emission sources and a wide range of impacts to be taken into account. According to the systematic review carried out by Hook et al. (2020), those studies which considered a wider scope of emissions tended to reveal lower overall teleworking-induced climate benefits, given the larger pool of impacts considered, while the more methodologically robust studies were more likely to estimate smaller energy savings from teleworking.

The Eurofound report uses the case of Ireland to explore the potential environmental benefits of telework (Eurofound, 2022e, pp. 28-39). As a country, Ireland is an interesting case to explore in this context because in 2020 it was the EU country with the third-highest share of employees working from home 'usually', and also the country that recorded the greatest increase in working from home due to the COVID-19 pandemic. This increase was especially marked in Dublin, in parallel with relocation towards more affordable and less congested areas. From a policy perspective, it should also be noted that several measures[2] were implemented to promote teleworking.

The Eurofound study (Eurofound, 2022e, pp. 28-39) analysed three main emissions sources in Ireland: travel, domestic energy use and office emissions. Its analysis aimed to expand previous research by modelling secondary environmental effects (i.e. increases in non-work trips), and determining changes in office-related emissions. This analysis builds on regional-level data from the Central Statistics Office (CSO). Data on the share of employees working from home in Ireland was captured in time periods in order to consider pre-COVID-19 incidence (Q2 2019), incidence during the lockdown period (Q1 2020) and post-pandemic incidence (Q2 2021).

The study's estimation of reduced commuting emissions takes into account the average distance travelled to work by mode of transport, the CO2 gas emission rate of each mode of transport (based on the Common Appraisal Framework Document of the Department of Transport, 2021) and the number of days spent teleworking annually. Note that almost all respondents (98%) from the Pulse Survey (November 2021) worked from home, while 18% of respondents expressed a preference to work from a remote working hub (RWH) after all COVID-19 restrictions are lifted. An analysis assessing the potential of RWHs in terms of environmental sustainability is presented in greater detail in another report, but the findings suggest that respondents who drive to work alone can reduce emissions annually if they were to work from a RWH for three days per week for one year.

No consensus exists as to the magnitude of the effect of working from home on additional non-work trips, even though these are expected to occur, as shown by other studies. For this reason, the following assumptions were considered:

[2] According to Eurofound (2022e, pp. 28-29), the Department for Enterprise, Trade and Employment published its National Remote Work Strategy ('Making Remote Work') in 2021. The main government actions were as follows: mandating that home and remote working should be prevalent in 20% of public sector employment; reviewing the taxation of remote working; mapping and investing in a network of remote working hubs; legislation on the right to request remote working; and developing a code of practice for the right to disconnect.

- An increase of 0.5 trips per day is expected when working from home, and individuals are expected to take 2 to 4 trips per day according to the National Travel Survey.
- Non-work trips were limited to the average distance travelled to a range of services for each NUTS-3 region.
- The mode of transport chosen for each trip is assumed to be a car.

The formula is similar to the one used to compute energy savings, with the above constraints imposed.

Domestic energy consumption is expected to increase, in terms of both electricity and heating. In both cases, it is estimated to increase by 10%. This estimate is based on the amount that the Irish Revenue (the national tax collection agency) allowed employees to claim back due to working from home during the years covered by the analysis. Note that due to Ireland's mild climatic conditions, emissions linked to domestic cooling at home were not considered, because such systems are only used by a small share of the population for very short periods.

The estimate of office-based emissions savings considers only individual lighting and computer usage.

Overall, Eurofound's results show that telework in Ireland has had a positive climate impact, and that this impact has increased fourfold compared with the pre-COVID-19 period. The most significant impact is due to a reduction in commuting trips. However, the impact of reduced commuting may be lower in the future, due to the use of electric vehicles and the increased use of remote working hubs.

In terms of domestic emissions, it is important to note that in Ireland, the thermal efficiency of residential buildings tends to be poor. This means that the results of the analysis may underestimate the increase in domestic emissions. Conversely, only taking into account light bulbs and computer usage is likely to lead to the underestimation of office-based emission savings, since a hot-desking scenario is not considered in this analysis,

When looking into NUTS-3 level results, it is relevant to note that in Dublin, emissions savings are lower compared with the rest of Ireland, due to the shorter travel distances in Dublin for both work trips and non-working trips.

Based on the literature review and analysis, Eurofound (2022e) provides a set of specific telework recommendations: to enable telework as much as possible for employees with long commuting distances that require a car; to promote the flexible use of space in offices (taking into consideration hot-desking) to avoid unnecessary energy consumption or sparsely used offices spaces; to leverage the seasonal effects of teleworking, since teleworking during the warm season is less energy intensive and heating is more efficient in offices; and to prevent and mitigate negative long-term impacts. Rebound effects due to long-term impacts are, to a large extent, uncertain. However, certain measures are put forward to reduce commuting time and traffic congestion (improving affordability and liveability within city limits; expanding the infrastructure of remote working hubs).

In addition to telework, it is also recommended to support improvements in energy efficiency, to switch to renewable energy sources, and to shift to low-carbon modes of transport.

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