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# What impact could remote working have on Irish passenger transport CO2 emissions?

FUNDED BY:

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### **Policy makers**

- Policy documents
- Needs of the public
- Emissions targets
- Modelling blind spots



### **Energy System Modellers**

- Modelling Tools
- Analytical capacity
- Policy blind spots



#### Where do Ireland's Green House Gas Emissions come from?



[1] Environmental Protection Agency, 2020. *Ireland's Environment - An Integrated Assessment 2020*. [online] Available at: <a href="https://www.epa.ie/media/EPA-Ireland's-Environment-2020-Chapter11.pdf">https://www.epa.ie/media/EPA-Ireland's-Environment-2020-Chapter11.pdf</a> [Accessed 26 March 2021].





[1] Environmental Protection Agency, 2020. *Ireland's Environment - An Integrated Assessment 2020*. [online] Available at: <a href="https://www.epa.ie/media/EPA-Ireland's-Environment-2020-Chapter11.pdf">https://www.epa.ie/media/EPA-Ireland's-Environment-2020-Chapter11.pdf</a> [Accessed 26 March 2021].



The Irish Passenger Transport Emissions and Mobility Model (IPTEM Model) provides a historical look and a future projection of the total passenger transport demand by:

1. Mode

- 2. Trip length
- 3. Trip purpose

For Ireland. It is based on the Irish Car Stock Model [3] and the National Travel Survey [4]

[2] Daly, H., Ó Gallachóir, B.P., 2011. Modelling private car energy demand using a technological car stock model. Transp. Res. Part D Transp. Environ. <u>https://doi.org/10.1016/j.trd.2010.08.009</u>
 [3] Central Statistics Office, National Travel Survey, <u>https://www.cso.ie/en/statistics/tourismandtravel/nationaltravelsurvey/</u>







Exploratory climate action targets are applied using the LEAP simulation model and scenario analysis. This allows the construction of pathways to low carbon transport and the estimation of carbon budgets for the period 2020 – 2030 [6].



Identify key government end year targets for 2030

[4] Mac Uidhir, T., Rogan, F., Gallachóir, B.Ó., 2020. Develop a LEAP GHG Ireland Analytical Tool for 2050 Report No. 349. Available at: <u>https://www.epa.ie/pubs/reports/research/climate/Research\_Report\_349.pdf</u> (Date Accessed: 16th December 2020)

#### Passenger Transport Demand by mode





Data Source: CSO

#### Passenger Transport Demand by purpose













[5] F. Crowley and J. Doran, "COVID-19, occupational social distancing and remote working potential: An occupation, sector and regional perspective," *Reg. Sci. Policy Pract.*, vol. 12, no. 6, pp. 1211–1234, 2020, doi: 10.1111/rsp3.12347.
[6] Central Statistics Office, "Persons aged 15 years and over in Employment (ILO)." [Online]. Available: https://data.cso.ie/. [Accessed: 22-Jun-2021].

















2020 2020 2020 2020 2020 2020 2020 2020 2020 2020 2020 2020 2020



Significant and immediate GHG emissions reductions from all sectors are required to meet Ireland's 51% emissions reductions target by 2030, from 63 million tonnes per year (2018) to 31 million tonnes (2030)

Widespread working from home could reduce passenger transport emissions by between 0.4 million tonnes (2 days per week) and 1 million tonnes (5 days per week) in 2030.

The Program for Government "Work from home for 20% of the Civil Service" scenario achieves a 0.004% reduction in CO2 emissions when compared to the reference scenario in 2030, compared to a 6.6% reduction for 2-days working from home, and a 16.4% reduction for 5-days working from home.



## The rebound effects of working from home and travel for other purposes are acknowledged but not considered in the analysis

The cumulative effect of remote working is vitally important when considering low carbon transitions – remote working can be introduced with immediate effect, unlike the adoption of new technologies such as EVs



#### Our impact

## 

#### **Emissions Reduction in Transport:**

Submission to Oireachtas Committee on Climate Action

#### April 6th 2021

Brian Ó Gallachóir, Paul Deane, Tomás MacUidhir, Vera O'Riordan, Shane McDonagh, Vahid Aryanpur and Fionn Rogan



### How could working from home contribute to Ireland's 2030 climate target?

Passenger transport is responsible for 10% of GHG emissions emitted by Ireland. Traveling for work is the main contributor to passenger transport demand (30%) - what GHG reductions could working from home deliver? <u>Kay Messages</u>

Significant and immediate GHG emissions reductions from all sectors are required to meet Ireland's 51% emissions reductions target by 2030, i.e. from 63 million tonnes (2018) to 31 million tonnes (2090) Widespread working from home could reduce passenger transport emissions by between 0.4 million tonnes. (2 days per week) and 1 million tonnes (5 days per week) in 2030.

Additional measures such as increased waiting and cycling (including a-bited), increased public transport, the electrification of public transport and cars, and increased biofael mixing are all also needed to further reduce parasenger transport emissions.

The rebound effects of working from home and travel for other purposes are important but are not considered in the analysis. Increased flexibility with travel times could allow for model flexibility, including the use of zero-carbon walking and cycling as modes of travel or flexibility around public transport schedules.





#### IPTEM V 2.8

#### 🔞 Vera O'Riordan; 💿 Fionn Rogan; 💿 Brian Ó Gallachóir; 💿 Hannah Daly

Combining information from Public Transport Providers, the National Travel Survey and the Irish Car Stock Model, a comprehensive picture of passenger transport demand for Ireland is developed. The novel Irish Passenger Transport Emissions and Mobility (IPTEM) Model calculates the passenger transport demand by trip mode, purpose and distance over the period of 2009 – 2019. Historical data from public transport providers in Ireland and a technological car stock model for Ireland can highlight the different energy and emissions intensities used to service travel demand in Ireland. Improvements in efficiencies, changing occupancy rates and fossil fuel switching can be detected in this model using its data from 2009 to 2019. Estimates of transport mode occupancy are also made. The data in this paper highlights the overarching trends in energy consumption patterns in passenger transport over the period of 2009 – 2019 and provides a basis for deeper analysis of the role of transport demand reduction and modal shift to reduce passenger transport emissions.



## **Questions & suggestions welcome! Thanks for listening!**



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#### COVID-19 & Passenger Transport Demand





 [2] Daly, H., Ó Gallachóir, B.P., 2011. Modelling private car energy demand using a technological car stock model. Transp. Res. Part D Transp. Environ. https://doi.org/10.1016/j.trd.2010.08.009
 [4] Mac Uidhir, T., Rogan, F., Gallachóir, B.Ó., 2020. Develop a LEAP GHG Ireland Analytical Tool for 2050 Report No. 349. Available at: <u>https://www.epa.ie/pubs/reports/research/climate/Research\_Report\_349.pdf</u> (Date Accessed: 16th December 2020)



[1] Environmental Protection Agency, 2020. Ireland's Environment - An Integrated Assessment 2020. [online]
 Available at: <a href="https://www.epa.ie/media/EPA-Ireland's-Environment-2020-Chapter11.pdf">https://www.epa.ie/media/EPA-Ireland's-Environment-2020-Chapter11.pdf</a>> [Accessed 26 March 2021].

[2] Daly, H., Ó Gallachóir, B.P., 2011. Modelling private car energy demand using a technological car stock model. Transp. Res. Part D Transp. Environ. <u>https://doi.org/10.1016/j.trd.2010.08.009</u>

[3] Central Statistics Office, National Travel Survey,

https://www.cso.ie/en/statistics/tourismandtravel/nationaltravelsurvey/

[4] Mac Uidhir, T., Rogan, F., Gallachóir, B.Ó., 2020. Develop a LEAP GHG Ireland Analytical Tool for 2050 Report No. 349. Available at: <u>https://www.epa.ie/pubs/reports/research/climate/Research\_Report\_349.pdf</u> (Date Accessed: 16th December 2020)

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[6] Central Statistics Office, "Persons aged 15 years and over in Employment (ILO)." [Online]. Available: https://data.cso.ie/. [Accessed: 22-Jun-2021].







#### Occupancy rates of transport modes in Ireland





Occupancy is the average number of people travelling in a mode of transport. It is based on an estimation from recorded passenger numbers from Bus Éireann, Dublin Bus and Irish Rail Annual Reports [5], [6], [7]. Private vehicle occupancy estimates are based on Eurostat figures [5].

#### Emissions per passenger kilometre for transport modes in Ireland





Irish Car Stock Model











- Scenario analysis uses a simulation tool to compare a new target, which is quantified in a new scenario against the 'Business as Usual' or 'no target' scenario which is called the "Reference" scenario
- By comparing the relative difference in emissions, we can get an insight into the effectiveness of the policy target in reducing carbon dioxide emissions <u>if it is</u> <u>achieved by a given date.</u>
- More details about the LEAP Ireland 2050 model can be found <u>here</u> [9].

[9] Mac Uidhir, T., Rogan, F., Gallachóir, B.Ó., 2020. Develop a LEAP GHG Ireland Analytical Tool for 2050 Report No. 349. Available at: <u>https://www.epa.ie/pubs/reports/research/climate/Research\_Report\_349.pdf</u> (Date Accessed: 16th December 2020)