2022
EnvEcon – Irish Research

Road Transport Electrification – Is timing everything?
Transportation Research Interdisciplinary Perspectives

Working from Anywhere – Spatial Index
Pending

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TFIAM 51

EnvEcon
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EnvEcon Background

Specialised economics research operation spun-out of UCD in 2006.

Team of *economists*, modellers and policy analysts.

Major interest in the transport, built *environment* and *agricultural* sectors.

Strong focus on *environmental policy* (*driver*) but have a *broader outcome* focus.
Road transport electrification – Is timing everything? Implications of emissions analysis outcomes for climate and air policy

https://doi.org/10.1016/j.trip.2021.100478

Guo, Kelly, Clinch (2021)
The Idea

**Electrification of road transport** is a central tenet of broader environmental policy. Focus is often placed on numbers of electric vehicles in the fleet by a given date. Clearly on the basis of cumulative emissions, an earlier realisation delivers more abatement. Quantification of the impact of varied uptake rates are often somewhat neglected. Formal appraisal of air and climate outcomes for various uptake rates can inform policy action.

Why?

- Calibrate a refined model of the Irish road transport fleet.
- This would include the existing fleet structure with detailed mileage data by class.
- Our scenarios would then explore varied 'plausible/possible' uptake pathways.
- This would provide details of how important uptake rates are across road transport.
- We would examine alternate absolute targets and different transport segments.

The Plan

**What?**

- Calibrate a refined model of the Irish road transport fleet.
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- We would examine alternate absolute targets and different transport segments.
The Research

A variant of the COPERT model was used for the estimation of air and climate emissions. The fleet structure and evolution was tailored to detailed Irish data on stock and sales. Mileage data at a vehicle level was used to adjust mileage and mileage age corrections. Survival rates were informed by empirical data on sales, registrations and non-registrations. Electric vehicle pathways were informed by the current policy strategies in Ireland. Late and early adoption pathways were explored in detail.

How?

- An earlier ramp up can deliver more than twice the cumulative CO2 abatement by 2030.
- E-Vans and E-Trucks are almost equally as important as passenger cars in our fleet case.
- E-Vans and E-Trucks are more important in the context of air pollution (NOX – PM).
- Quantifications offers insights to support policy in terms of how hard to push EVs.

The Result

So What?
Results

Annual CO2 Changes
CAPACITY EXAMPLE

WORKING FROM ANYWHERE - SPATIAL INDEX

Assessing Preference and Potential - An application to the workforce of Ireland

Kelly, Kelleher, Deegan, Larsen, Shukla, Collins and Guo (2022)

In submission process
The Idea

We had prior work on working from home about 10 years ago ... planned an update.
The notion was to explore upper and lower bands of plausible working from anywhere.

Then COVID hit.

Upper band estimates of remote working potential were arguably revealed in stages.
The world received a global crash course in remote working.

We saw a need to support policy with understanding preference and potential for WFA.

The Plan

- Assemble routine and reliable data at small area level (18k+ in Ireland)
- Review and assess international literature on factors influencing the preference to WFA
- Review and assess international literature on factors influencing the potential to WFA
- Construct a composite index of WFA for our case country of Ireland
- Apply various dynamic changes to explore impact on WFA Index at a fine spatial scale
The Research

Census data was the key source for many variables in the WFA Index. Granular transport and travel data were also included in the research. The Index is designed to measure the potential to work from anywhere and the preference. Analysis is again available at the small area scale for Ireland and offers a baseline WFA metric.

How?

1. WFA is neither uniformly valuable nor universally viable.
2. Plausible (2 day) WFA scenarios for those who can and would - can deliver emission benefits.
3. WFA is not a silver bullet for transport emissions and VOT is expected as main motivator.
4. Shifts in attributes (e.g. commute times, broadband access) will influence change in WFAI.
5. WFAI can be combined with methods for targeting investment and assessing impacts.

So What?

The Result

So What?
Working from Anywhere Index

Feasibility, Preference and Composite
Working from Anywhere Index

Impact of shifting employment types and broadband access

Counties with increased Professional/Managerial positions due to working from anywhere.

10% Boost in Professional/Managerial

10% Boost with Full Broadband Roll-out in the County
Commuting Hotspots

Viable Co-Working Office Locations

- Identified areas with busy outflows of commuters
- Identified areas with higher WFA Potential and Preference
- Identified existing office hub locations in these areas
- Identified viable high potential new locations for office hubs
## The 9 WFAI Categories

<table>
<thead>
<tr>
<th>WFAI Category</th>
<th>Total Car Drivers Work (Census 2016)</th>
<th>Average Commute Distance Car One Day One Way (KM)</th>
<th>Current Commute Situation – No WFH Scenario: Annual Total Commute Distance (Million KM)</th>
<th>Proportion of Current Annual Total Commute Distance Travelled</th>
<th>2 days a week WFH Scenario: Saved Annual Total Commute Distance (Million KM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-High WFAI</td>
<td>3,301</td>
<td>13.2km</td>
<td>22.04 million km</td>
<td>0.24%</td>
<td>8.82 million km</td>
</tr>
<tr>
<td>High-Medium WFAI</td>
<td>34,855</td>
<td>12.3km</td>
<td>216.93 million km</td>
<td>2.36%</td>
<td>86.77 million km</td>
</tr>
<tr>
<td>High-Low WFAI</td>
<td>121,025</td>
<td>12.5km</td>
<td>765.48 million km</td>
<td>8.30%</td>
<td>306.19 million km</td>
</tr>
<tr>
<td>Medium-High WFAI</td>
<td>169,984</td>
<td>14.7km</td>
<td>1,264.38 million km</td>
<td>13.70%</td>
<td>505.75 million km</td>
</tr>
<tr>
<td>Medium WFAI</td>
<td>295,735</td>
<td>16.5km</td>
<td>2,469.10 million km</td>
<td>26.84%</td>
<td>987.63 million km</td>
</tr>
<tr>
<td>Medium-Low WFAI</td>
<td>329,660</td>
<td>17.0km</td>
<td>2,835.74 million km</td>
<td>30.86%</td>
<td>1,134.29 million km</td>
</tr>
<tr>
<td>Low-High WFAI</td>
<td>164,148</td>
<td>16.5km</td>
<td>1,370.47 million km</td>
<td>14.85%</td>
<td>548.18 million km</td>
</tr>
<tr>
<td>Low-Medium WFAI</td>
<td>32,429</td>
<td>15.3km</td>
<td>251.06 million km</td>
<td>2.73%</td>
<td>100.42 million km</td>
</tr>
<tr>
<td>Low-Low WFAI</td>
<td>1,494</td>
<td>14.6km</td>
<td>11.03 million km</td>
<td>0.12%</td>
<td>4.41 million km</td>
</tr>
</tbody>
</table>

- Analysis refines assessments to **actual commute patterns** of those in different groupings.
- Commuting only – **top 4 WFAI categories only represent 24% of commuting** at present.
- Still offers the potential to **save 1bn car commuting km** per annum.
## Working from Anywhere Index

### Impacts of Working from Anywhere

<table>
<thead>
<tr>
<th>WFAI Category</th>
<th>2 days a week WFH Scenario Savings: Annual Total CO₂ Emissions Tonnes</th>
<th>2 days a week WFH Scenario Savings: Annual Total CO₂ Emissions Cost €</th>
<th>2 days a week WFH Scenario Savings: Annual Total Nox Emissions Tonnes</th>
<th>2 days a week WFH Scenario Savings: Annual Total Nox Emissions Cost €</th>
<th>2 days a week WFH Scenario Savings: Annual Total VOT Cost €</th>
<th>2 days a week WFH Scenario Savings: Annual Total Vehicle Operating Costs € (non-Fuel)</th>
<th>2 days a week WFH Scenario Savings: Annual Total Vehicle Operating Costs € (Fuel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-High WFAI</td>
<td>1,446</td>
<td>€ 28,920</td>
<td>5</td>
<td>€ 28,440</td>
<td>€ 2,963,057</td>
<td>€ 636,570</td>
<td>€ 747,596</td>
</tr>
<tr>
<td>High-Medium WFAI</td>
<td>14,258</td>
<td>€ 285,160</td>
<td>45</td>
<td>€ 255,960</td>
<td>€ 29,153,499</td>
<td>€ 6,263,218</td>
<td>€ 7,355,595</td>
</tr>
<tr>
<td>High-Low WFAI</td>
<td>50,070</td>
<td>€ 1,001,400</td>
<td>160</td>
<td>€ 910,080</td>
<td>€ 102,873,992</td>
<td>€ 22,101,029</td>
<td>€ 25,955,701</td>
</tr>
<tr>
<td>Medium-High WFAI</td>
<td>82,698</td>
<td>€ 1,653,960</td>
<td>263</td>
<td>€ 1,495,944</td>
<td>€ 169,920,537</td>
<td>€ 36,505,035</td>
<td>€ 42,871,930</td>
</tr>
<tr>
<td>Top 4 WFAI Categories</td>
<td>147,026</td>
<td>€ 2,940,520</td>
<td>473</td>
<td>€ 2,690,424</td>
<td>€ 304,911,085</td>
<td>€ 65,505,853</td>
<td>€ 76,930,822</td>
</tr>
<tr>
<td>Total 9 WFAI Categories</td>
<td>603,520</td>
<td>€ 12,070,400</td>
<td>1,923</td>
<td>€ 10,938,024</td>
<td>€ 1,237,234,003</td>
<td>€ 265,802,304</td>
<td>€ 312,161,263</td>
</tr>
</tbody>
</table>

- Clear benefits for emission outcomes but somewhat **modest – not a silver bullet**.
- Policy and personal motivation for WFA expected to be **dominated by value of time**.
THANK YOU