

2022

EnvEcon – Irish Research

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

Working from Anywhere – Spatial Index
Pending

Andrew Kelly

TFIAM 51

EnvEcon

April 2022

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.



Paper 1

**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



Why?

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

- 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?



The Research



How?

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.

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

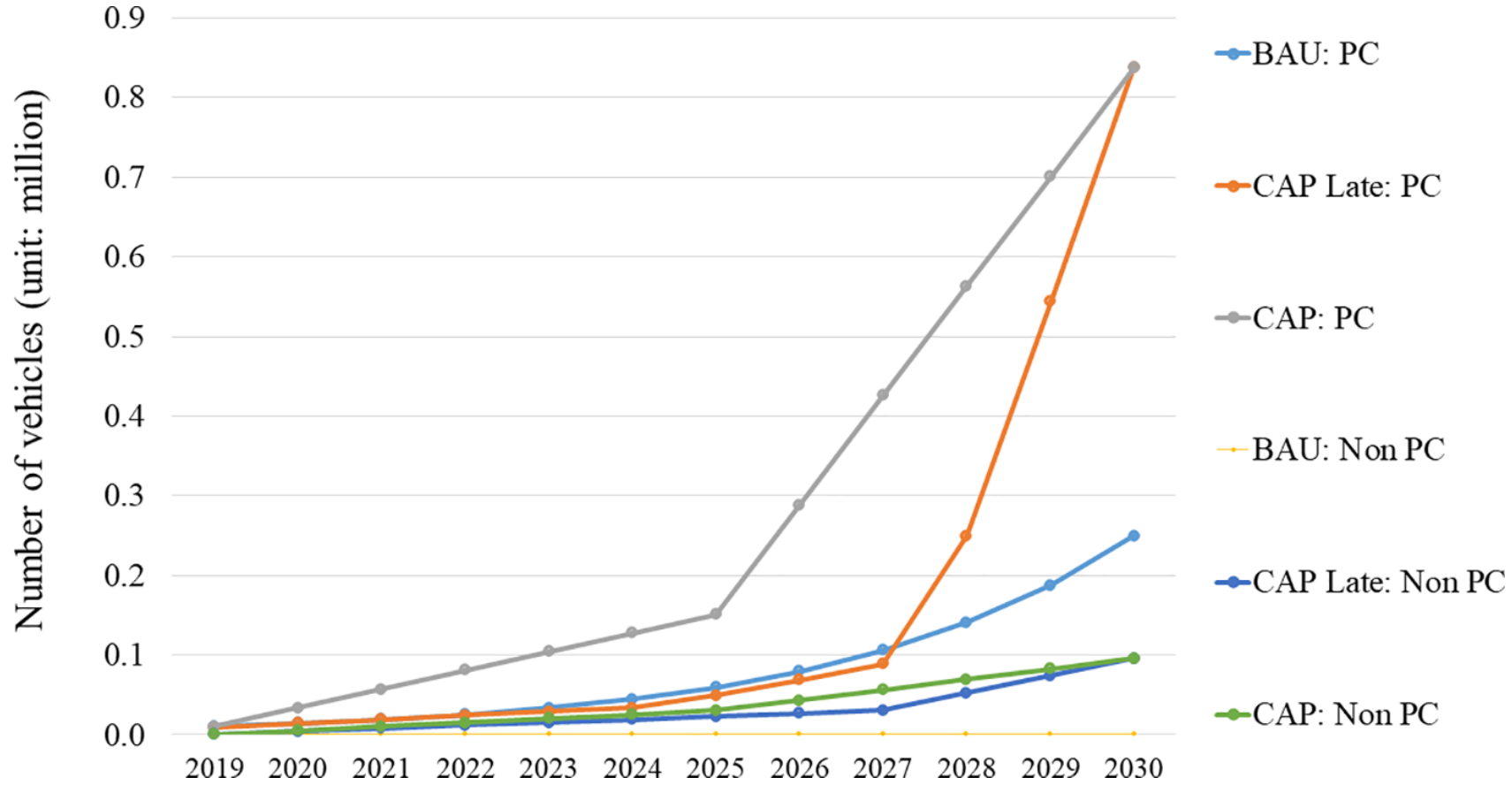
The Result

So What?



Results

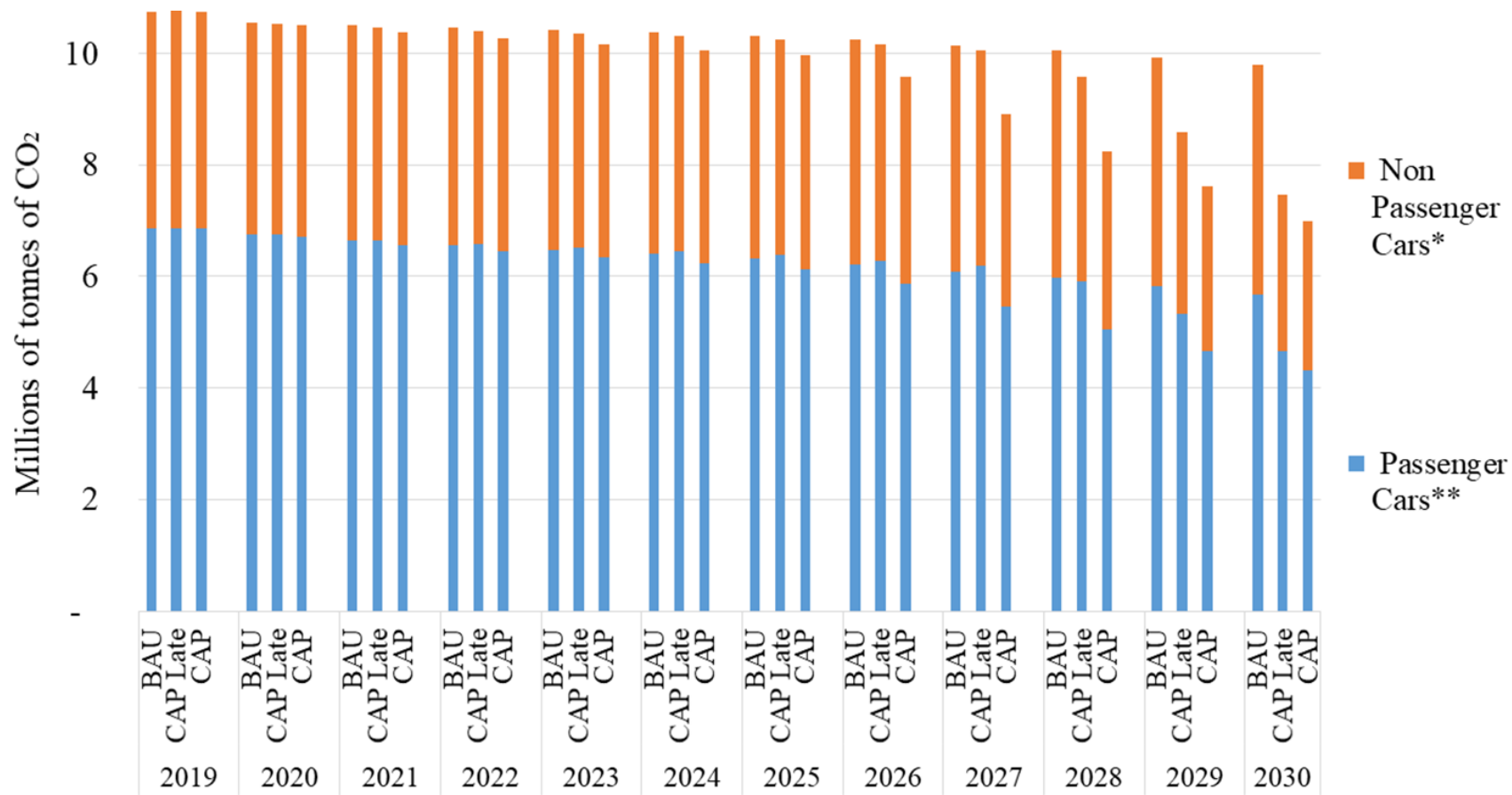
Uptake Pathways



Pathways for Uptake of EVs

Results

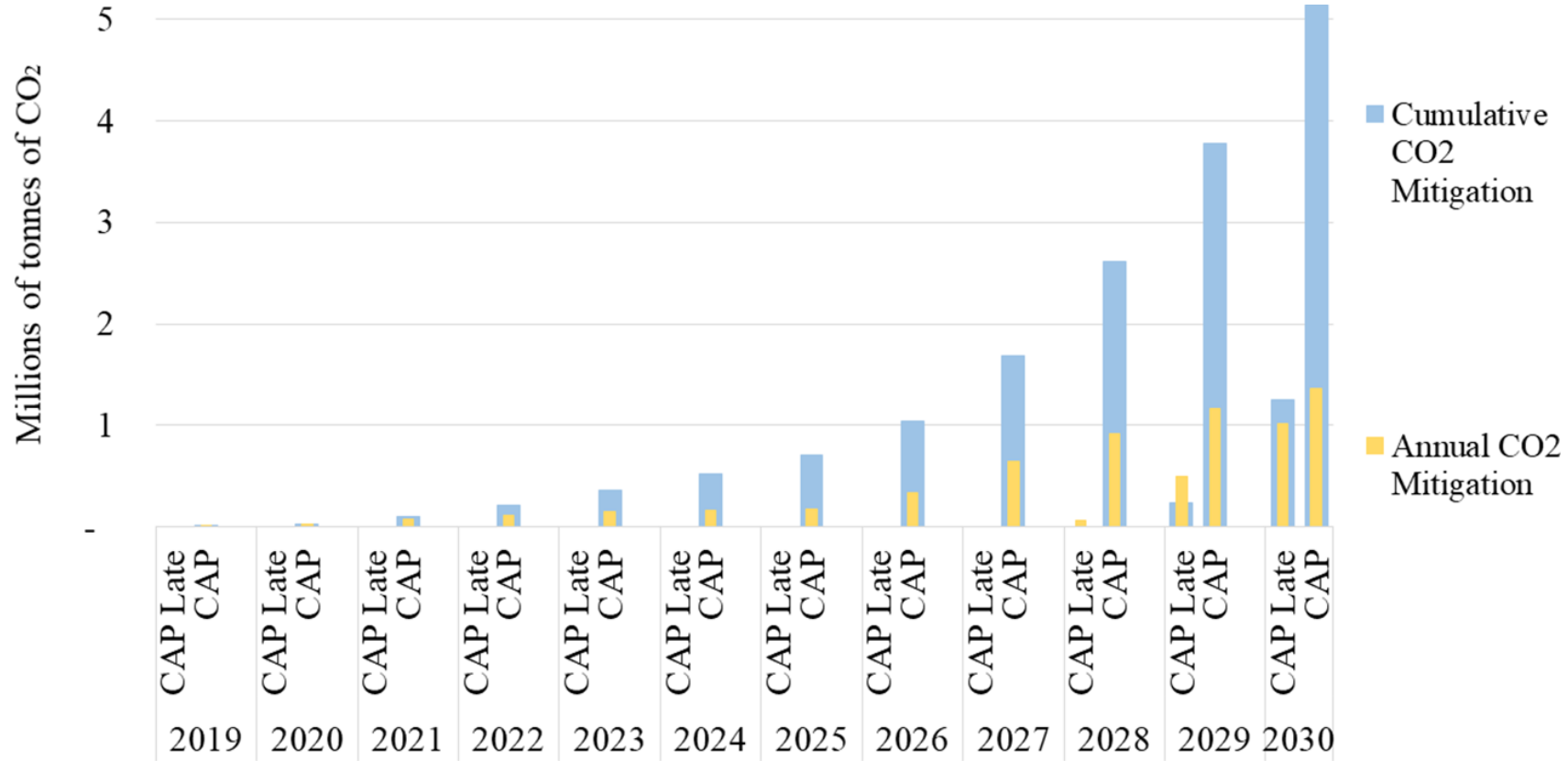
Annual CO2



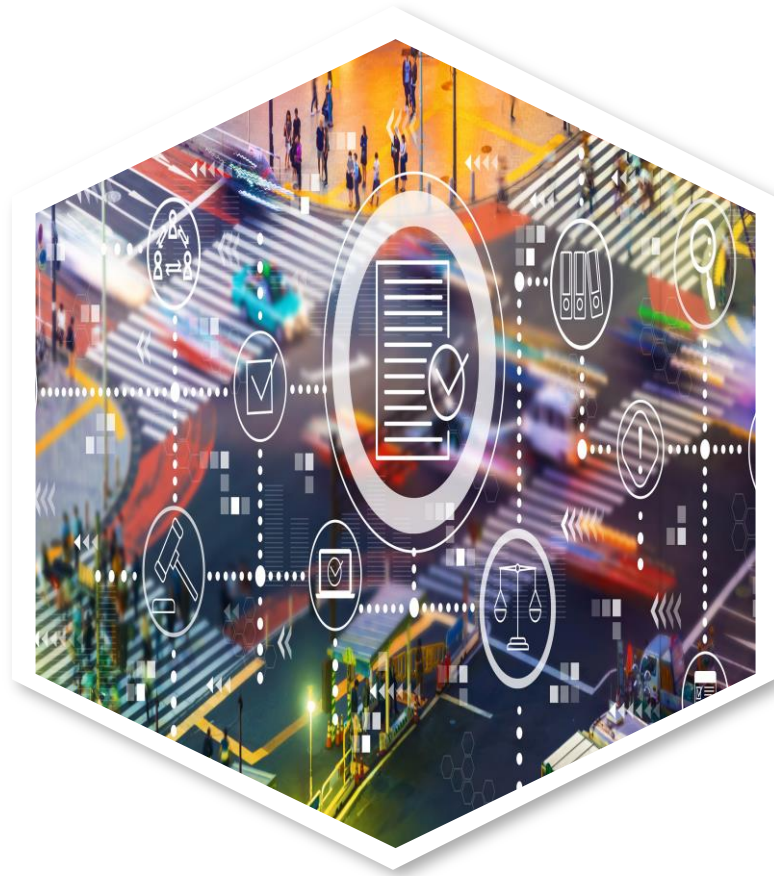
Annual CO2 Changes

Results

Cumulative CO2



Cumulative 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



Why?

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**

- 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 Plan

What?



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
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**.

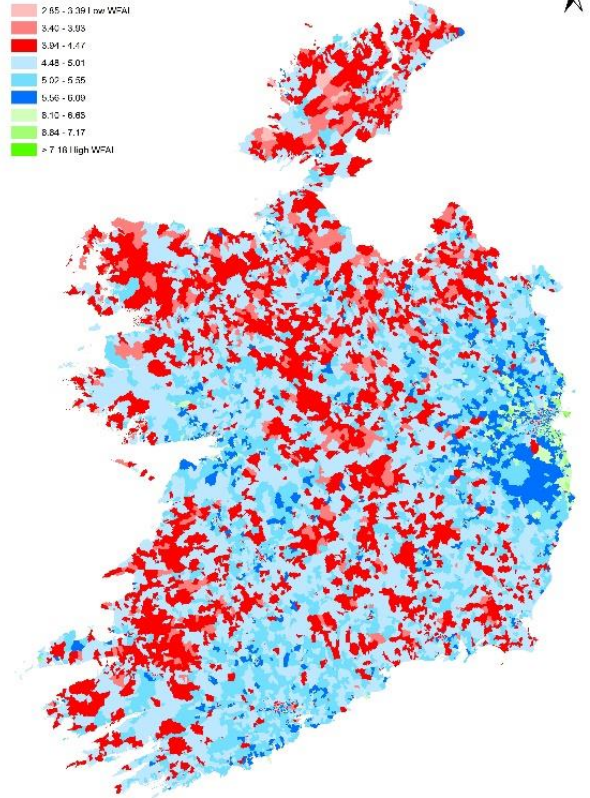
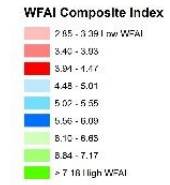
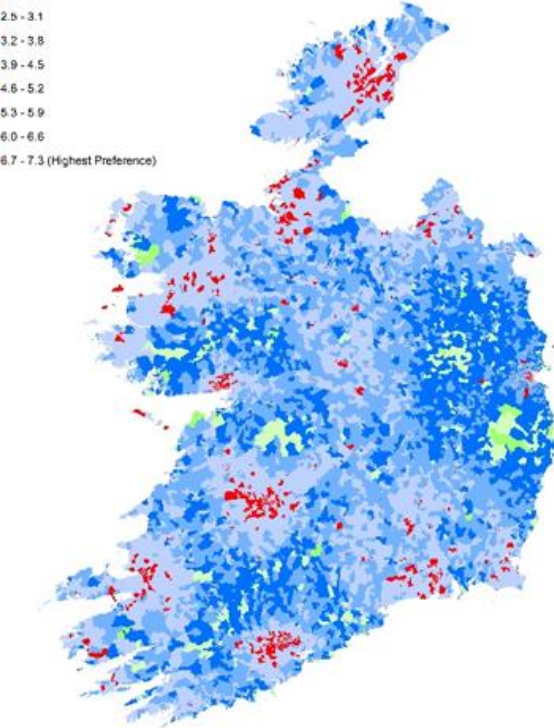
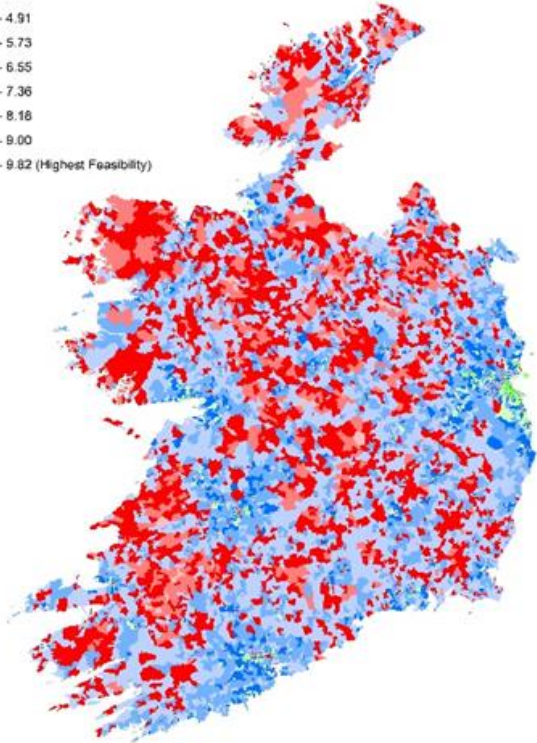
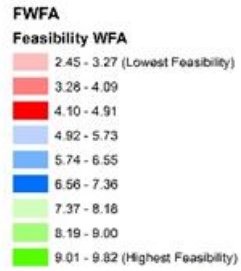
The Result

So What?



Working from Anywhere Index

Feasibility, Preference and Composite



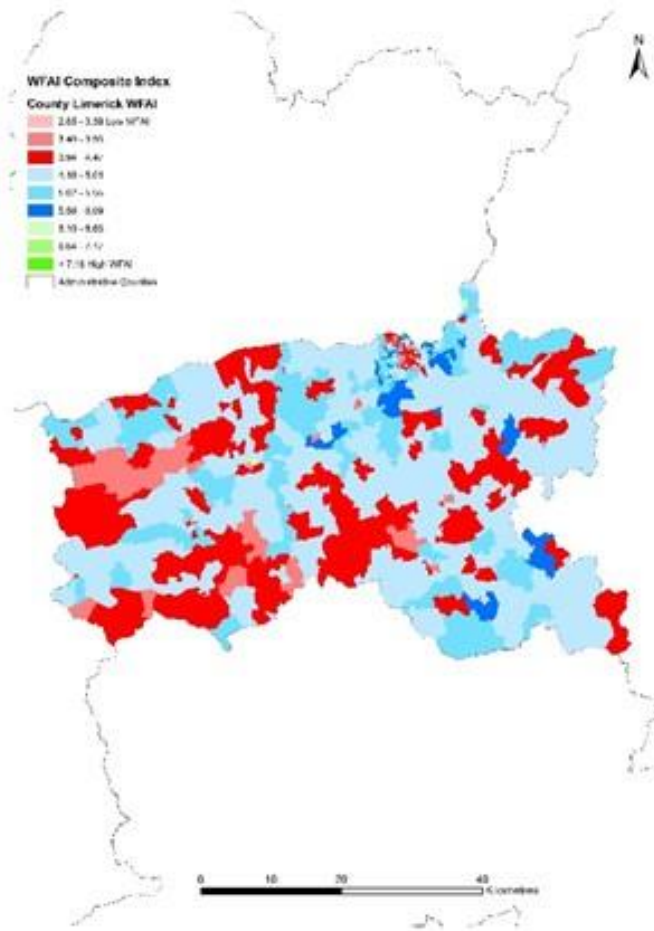
Feasibility WFA

Preference WFA

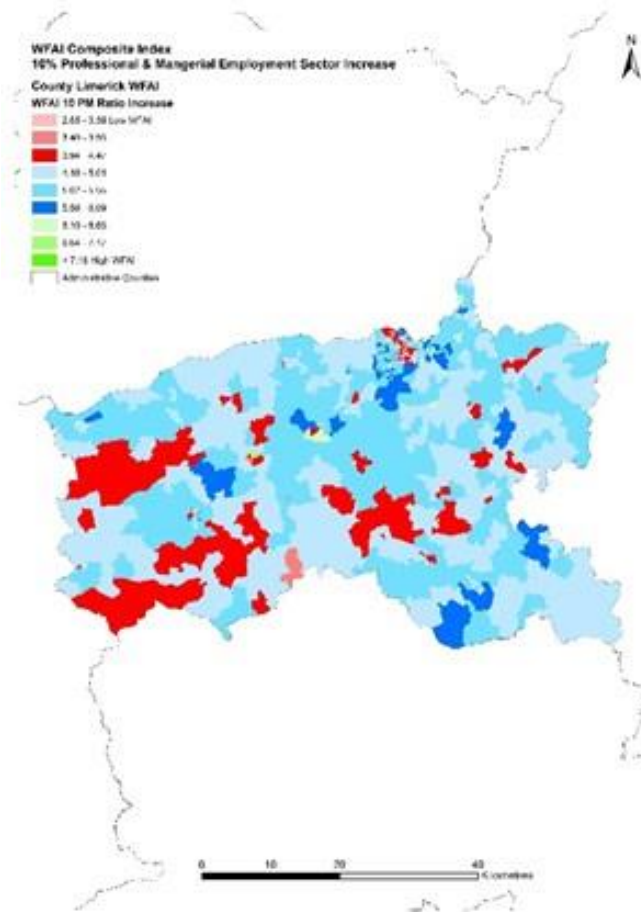
Composite WFA

Working from Anywhere Index

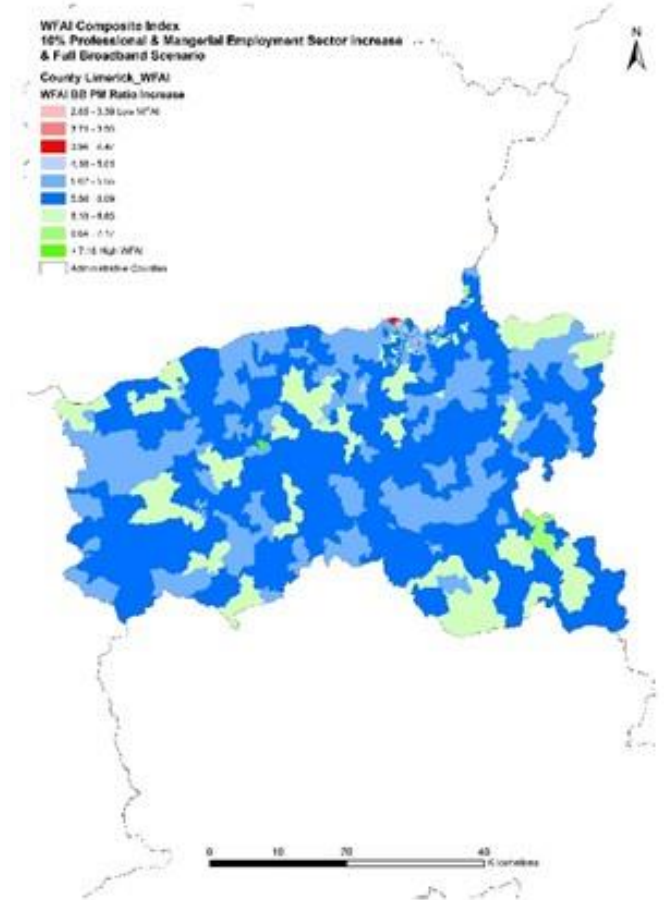
Impact of shifting employment types and broadband access



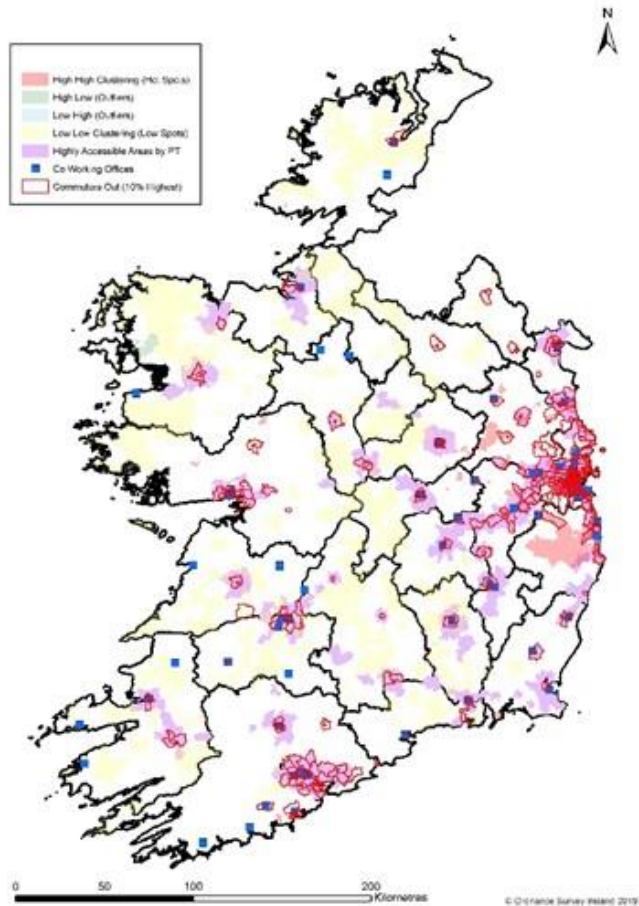
County Limerick



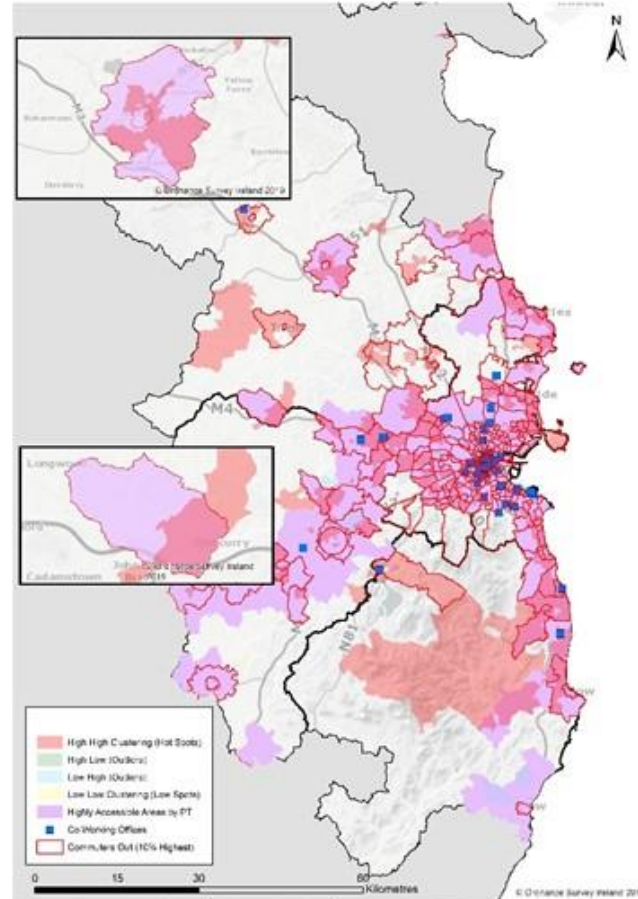
10% Boost in Professional/Managerial



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



Commuting Hotspots



Targeting Hub 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

Working from Anywhere Index

Groupings and activity of different WFAI Levels

WFAI Category	Total Car Drivers Work (Census 2016)	Average Commute Distance Car One Day One Way (KM)	Current Commute Situation – No WFH Scenario: Annual Total Commute Distance (Million KM)	Proportion of Current Annual Total Commute Distance Travelled <i>* Only Commute Distance (~30% of Total Travel is work related)</i>	2 days a week WFH Scenario: Saved Annual Total Commute Distance (Million KM)
High-High WFAI	3,301	13.2km	22.04 million km	0.24%	8.82 million km
High-Medium WFAI	34,855	12.3km	216.93 million km	2.36%	86.77 million km
High-Low WFAI	121,025	12.5km	765.48 million km	8.30%	306.19 million km
Medium-High WFAI	169,984	14.7km	1,264.38 million km	13.70%	505.75 million km
Medium WFAI	295,735	16.5km	2,469.10 million km	26.84%	987.63 million km
Medium-Low WFAI	329,660	17.0km	2,835.74 million km	30.86%	1,134.29 million km
Low-High WFAI	164,148	16.5km	1,370.47 million km	14.85%	548.18 million km
Low-Medium WFAI	32,429	15.3km	251.06 million km	2.73%	100.42 million km
Low-Low WFAI	1,494	14.6km	11.03 million km	0.12%	4.41 million km

The 9 WFAI Categories

- 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

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

2 Days a Week WFA Scenario

- 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



EnvEcon

Decision Support