2021

EnvEcon – Irish Research

Energy Poverty Risk Index
ASHP – Hitting the Hotspots

Energy Policy Pending

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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.
Home Heating Energy Poverty Risk Index

https://doi.org/10.1016/j.enpol.2020.111791

Kelly, Clinch, Kelleher and Shahab (2020)
The Idea

Climate and air policy will drive substantial change in residential home heating. Just Transition and Energy Poverty are key concerns and challenges for policy change. Macro level research misses the need for fine scale spatial appraisals. Current methods of energy poverty assessment are simplistic, general and lack data. In order to manage energy poverty risk we must be able to measure it ... and spatially.

Why?

- Develop a credible way to measure relative energy poverty risk.
- Draw upon routine and reliable data not occasional sampled income or surveys.
- Develop an index that can provide results at a fine spatial scale.
- Ensure the system is dynamic to enable scenario runs and policy support.

The Plan

What?

• Develop a credible way to measure relative energy poverty risk.
• Draw upon routine and reliable data not occasional sampled income or surveys.
• Develop an index that can provide results at a fine spatial scale.
• Ensure the system is dynamic to enable scenario runs and policy support.
The Research

How?

Build a **composite spatial index** that recognises **most of what matters** for home heating.

The **building characteristics** (fabric) matter for efficiency – compiled from detailed BERs.

The **heating systems** (fuel) matter for cost and efficiency – compiled from census/BERs.

The **householders** (people) matter for ability to pay – compiled from deprivation index/census.

**Weightings** influenced by literature and focus was placed on **relative risk**.

Metrics were all **available at fine scale** spatially (critical).

The Result

1. A composite index that can be **easily modified and routinely updated**.
2. A transparent structure that affords **metrics for measuring risk and progress**.
3. A system that can **explore alternative policy** impacts (e.g. carbon tax, fuel ban, retrofit).
4. A system that moves from general advice to **specific and fair spatial targeting of actions**.

So What?
HH - EPRI

Results from the HH - EPRI

HH EPRI - Building Characteristics Index

HH EPRI - Heating Requirements Index

HH EPRI - Householder Characteristics Index

Building Characteristics Index

Heating Requirements Index

Householder Characteristics Index
HH - EPRI

Overall HH EPRI Index

Small Area Scenario Zoom A

Small Area Scenario Zoom B
Paper 2

Air Source Heat Pumps – Hitting Air Pollution Hot Spots

Kelly, O’Broin, Kelleher, Clinch

Sousa Santos, Grythe, Svendby, Solberg

EnvEcon and UCD

Nilu

Collaborative work with Nilu and UCD
Climate Policy includes a substantial focus on residential home heating. Ireland still has quite high levels of oil and solid fuel use for home heating ~50%.

The national climate action plan calls for fabric retrofits ~500,000 by 2030 and...

The retrofit of 400,000 air source heat pumps into homes in Ireland.

Oil-fired heating systems will be the focus ...

But a targeted approach to solid fuels should yield air quality dividends in parallel.

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**The Idea**

**Why?**

- Establish a baseline of PM2.5 air pollutant concentrations
- Identify air pollution hot spot towns based on these data.
- Examine what would happen if the 400,000 ASHPs were pro rata oil/solid fuels.
- Show what would happen with selected targeting of N ASHPs into solid fuel clusters.
- Clean out the hotspots? Support a more refined policy?

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**The Plan**

**What?**

• Establish a **baseline** of PM2.5 air pollutant concentrations
• Identify air pollution **hot spot towns** based on these data.
• Examine what would happen if the **400,000 ASHPs were pro rata oil/solid fuels**.
• Show what would happen with **selected targeting of N ASHPs into solid fuel clusters**.
• Clean out the hotspots? Support a more **refined policy**?
The Research

Model and map – with Nilu – **PM$_{2.5}$ concentrations** at a fine scale in Ireland.

Identify certain **hotspot locations** with the **linked data** on heating systems and houses.

Model a scenario where **400,000 ASHPs are delivered pro rata without specific targeting**.

Show the consequent **impact on air pollutant concentrations and GHGs**.

Model and report a **scenario with slight shift to solids and enhanced spatial targeting**.

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**How?**

1. **No impact of substance** on the GHG outcomes of any policy variant. No reason not to...
2. Obviously the greater the leaning towards **solids**, the greater the **air emissions** reduction.
3. Even a **3% targeting** (11,000) of ASHPs to certain towns can substantially clean the hotspots.
4. Hotspot locations often align with areas of **greater relative deprivation**.
5. Targeted scenario can drop **PM$_{2.5}$ ug/m$^3$ by up to 40% (draft)** in hotspot locations.

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**The Result**

**So What?**

1. No impact of substance on the GHG outcomes of any policy variant. No reason not to...
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ASHP Targeting

Baseline PM$_{2.5}$ Heating Season

ASHP Deployment no targeting

ASHP Deployment with targeting

Results from the Analysis
THANK YOU