2021

EnvEcon – Irish Research

Energy Poverty Risk Index
ASHP – Hitting the Hotspots

Energy Policy Pending

Andrew Kelly

TFIAM 50

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.

Paper 1

Home Heating Energy Poverty Risk Index

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

Kelly, Clinch, Kelleher and Shahab (2020)

The Idea

Why?

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**.

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

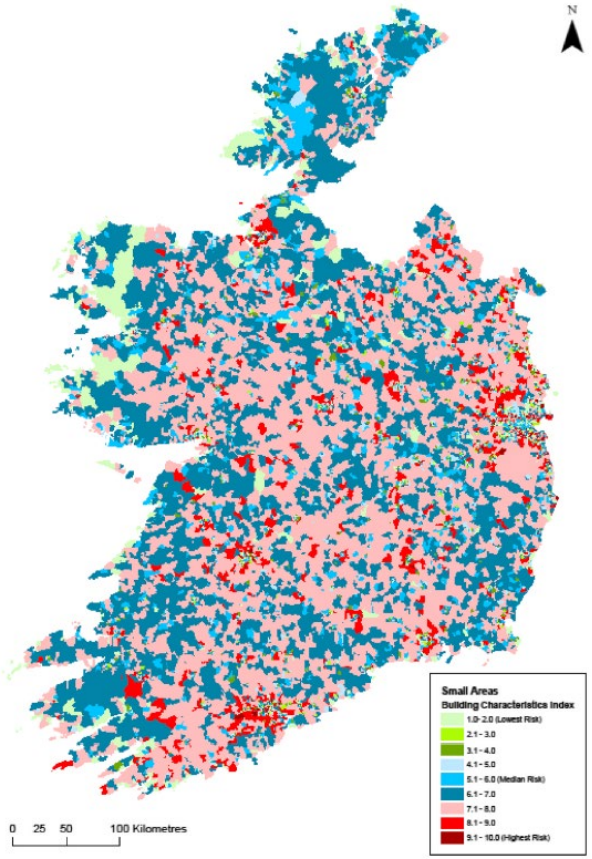
So What?

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**.

HH - EPRI

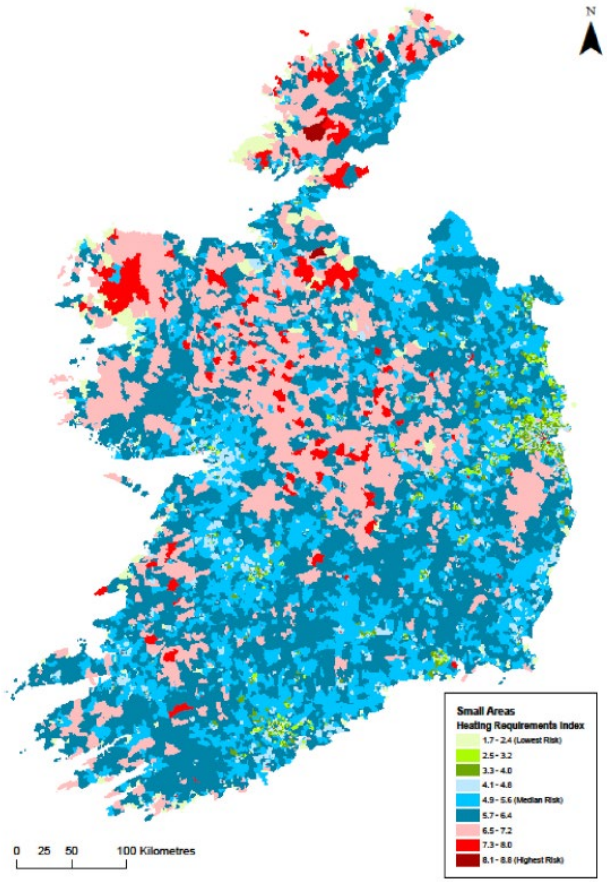
Results from the HH - EPRI

HH EPRI - Building Characteristics Index



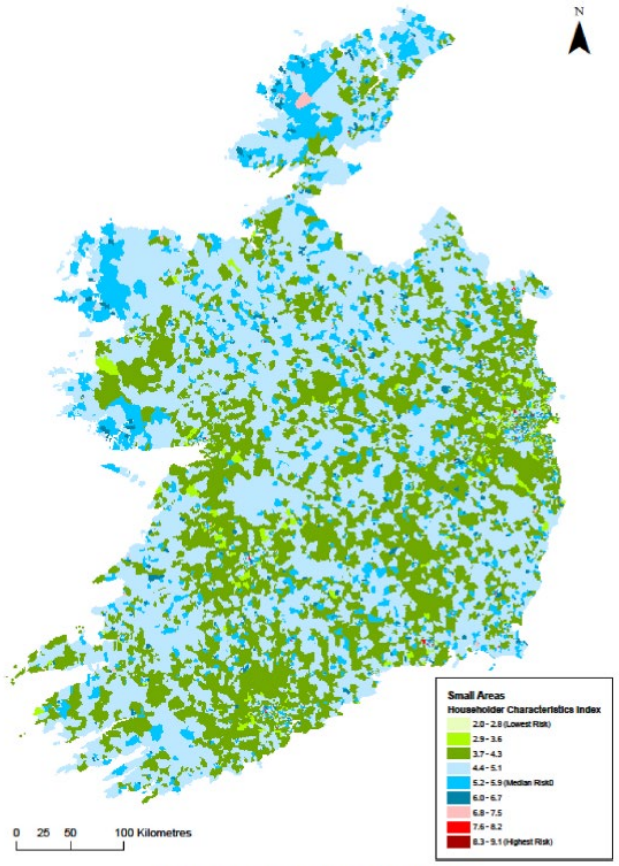
Map 1. Building characteristics index category.

HH EPRI - Heating Requirements Index



Map 2. Heating requirements index category.

HH EPRI - Householder Characteristics Index



Map 3. Householder characteristics index category.

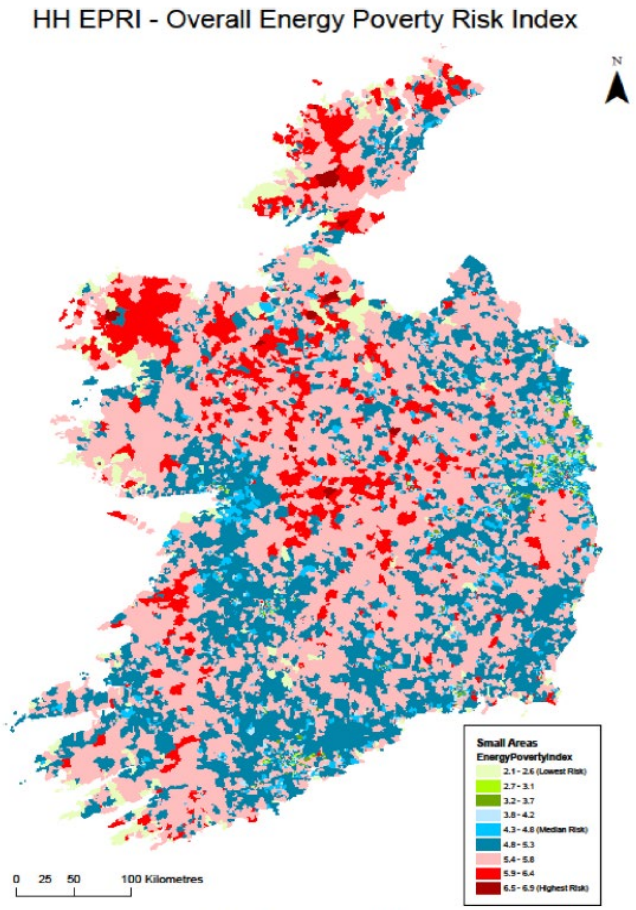
Building Characteristics Index

Heating Requirements Index

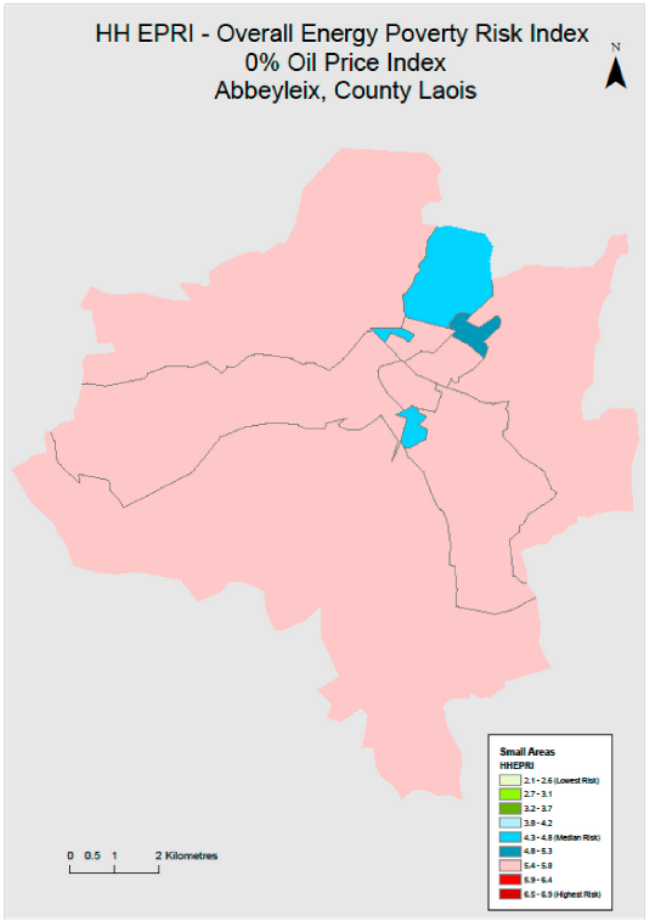
Householder Characteristics Index

HH - EPRI

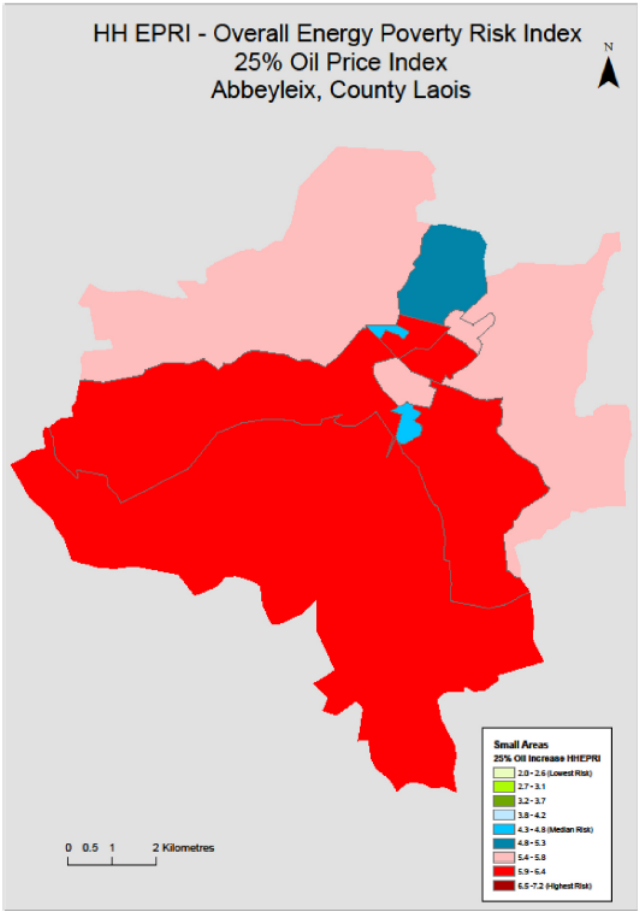
National Scale and Zoom to Clusters of 50-100 Houses for Scenarios



Map 4. Energy poverty risk index.



Map 9. Spatial distribution of EPRI in Abbeyleix before 25% oil price increase.



Map 10. Spatial distribution of EPRI in Abbeyleix after 25% oil price increase.

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 — **EnvEcon and UCD**

Sousa Santos, Grythe, Svendby, Solberg — **Nilu**

Collaborative work with Nilu and UCD

EnvEcon Decision Support

NILU

UCD DUBLIN

The Idea

Why?

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.

The Plan

What?

- Establish a **baseline** of $PM_{2.5}$ 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

How?

Model and map – with Nilu – **PM2.5 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**.

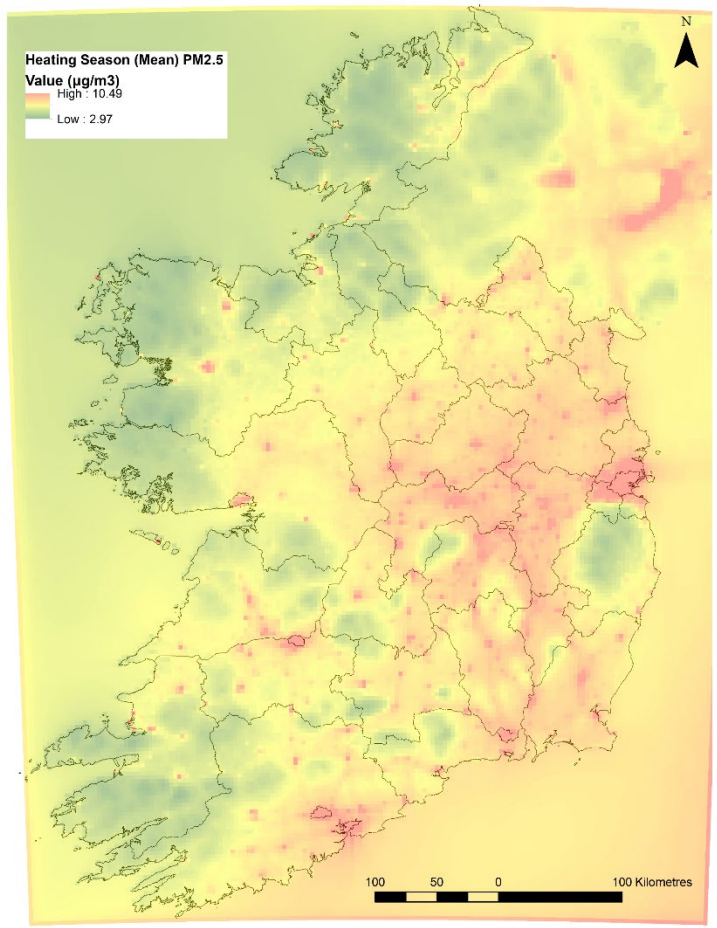
The Result

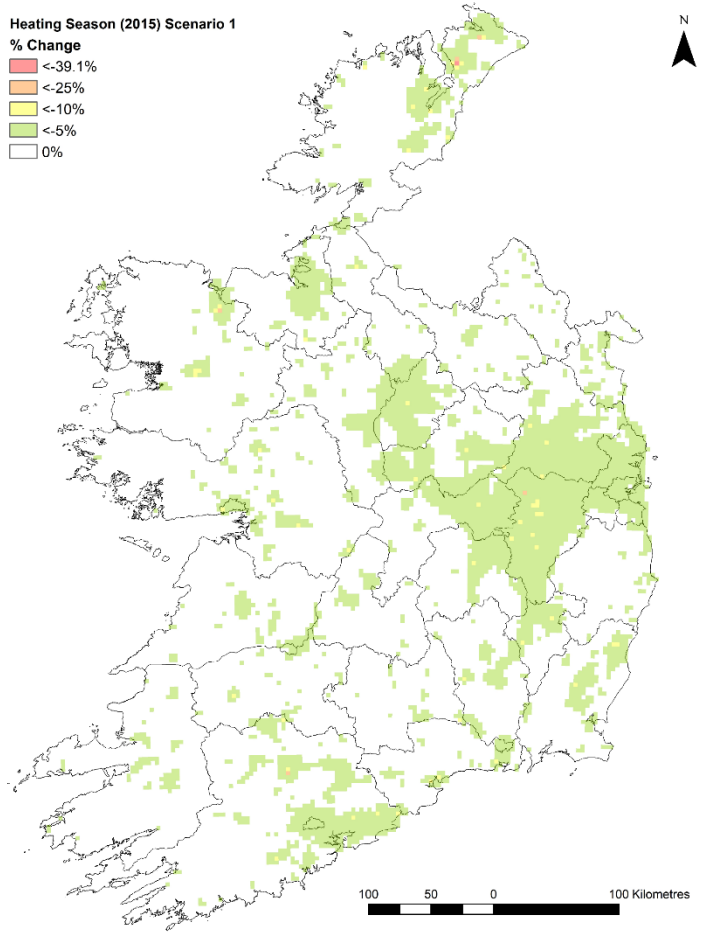
So What?

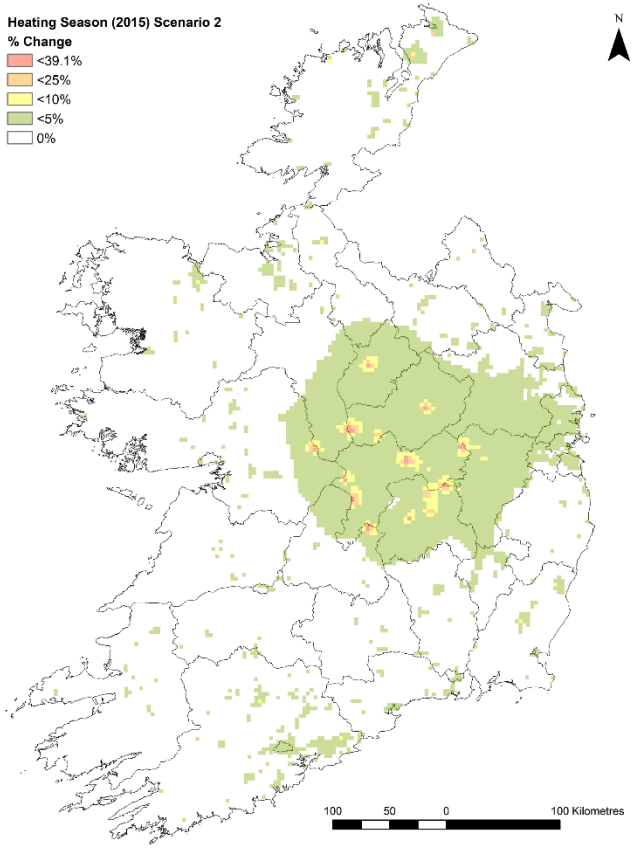
1. **No impact of substance** on the **GHG** outcomes of any policy variant. No reason not to…
2. Obviously the greater the leaning towards **solids**, the greater the **air emissions** reduction.
3. Even a **3% targeting** (11,000) of ASHPs to certain towns can substantially clean the hotspots.
4. Hotspot locations often align with areas of **greater relative deprivation**.
5. Targeted scenario can drop **PM2.5 ug/m3 by up to 40% *(draft)* in hotspot locations**.

ASHP Targeting

Results from the Analysis







Baseline $PM_{2.5}$ Heating Season

ASHP Deployment no targeting

ASHP Deployment with targeting

THANK YOU

EnvEcon

Decision Support