Employment, energy security and fuel poverty implications of the large-scale, deep retrofitting of the Hungarian building stock.

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Evaluating the Benefits of Low-Income Weatherisation Programmes

Outline

❖ The context: **Hungary’s energy, fuel poverty and employment challenges**

❖ The project: **Employment Impacts of a Large-Scale Deep Building Energy Retrofit Programme in Hungary**
Mitigation targets
Short-, mid- and long-term

HUNGARY - Total GHG emissions including LULUCF/LUCF

Source: UNFCCC
Energy dependency
Net (extra-EU) imports as % of Gross Inland Energy Consumption (2007)
Activity rate
Percentage of the 15-64 yo. employed (2010 Q3)

Source: EUROSTAT
Energy performance of the residential stock
Per unit energy consumption scaled to EU average climate

Source: ODYSSEE
Fuel poverty
Energy prices vs. household incomes

**Consumer Price Index (CPI)**, price index of goods and services considered in CPI calculations, and increase index of wages and pensions (2000-09)
Fuel poverty
Primary indicators (1)

EXPENDITURE APPROACH:
% of energy expenses vs. net income

9.7% of a household’s net income spent on energy, as an average for the period 2000-2007.

Source: KSH
SELF-REPORTED APPROACH

12.4% of the population declare to be unable to keep their homes adequately warm (2005-2009)

Source: EU SILC

- Expenditure-based measurements seems to be higher than self-reported fuel poverty rates
- Self-reported trends do not follow the expected pattern of development for the late 2000s.
Fuel poverty
Secondary indicators (1)

ARREARS ON UTILITY BILLS (self-reported)

FUEL POVERTY-RELATED HOUSING FAULTS* (self-reported)

Source: EU SILC

*Leaking roof, damp walls, floors or foundation, or rot in window frames of floor
Fuel poverty
Secondary indicators (2)

USE OF TRADITIONAL FUELS FOR SPACE HEATING

Source: KSH
District heating and panel buildings

The thermal trap

DH providers do not easily allow to switch to other fuel or company

Prefabricated panel buildings in suburban areas

Fixed flat rate, no individual meters

Inability to control indoor temperature thermal discomfort

Some consumers fail to pay regularly the tariff: indebtedness

Low-income population

Many DH networks are now obsolete and need modernization both on the heat supplier and on the consumers’ side

European Climate Foundation

3CSEP
Who are the most affected?

- **Lower income population**
  - High energy expenses vs. income ratio, lower quality housing

- **Pensioners / Elders**
  - Most EWDs are people over 60 years old
  - Switch off the heating instead of delaying payments

- **Households** connected to district heating (DH)
  - Large fixed costs, inability to get disconnected

- **Mono-parental families**

- **Rural poor**
  - Impact of increased firewood prices related to biomass use in renewable power generation
  - Roma population: electricity theft and illegal firewood collection
Strategies to deal with energy affordability problems

- Maintaining *low indoor temperatures* is only one of the solutions adopted by households...
  - reducing the fraction of the *floor area heated*;
  - *fuel switch*, mostly from natural gas to firewood, a less convenient but cheaper fuel;
  - *payment arrears* and *increased indebtedness* with energy suppliers; and
  - *electricity theft* and *illegal firewood collection*;
  - reducing the consumption of *other basic goods and services* (e.g., education or food);
Outline

- The context: Hungary’s energy, fuel poverty and employment challenges

- The project: Employment Impacts of a Large-Scale Deep Building Energy Retrofit Programme in Hungary
The project in a nutshell

- **Objective**: to gauge the net employment impacts of a large-scale deep building energy-efficiency renovation programme in Hungary

- **Scope of the research**:
  - Type of buildings: *residential* and *public buildings* (no industrial or commercial)
  - Type of renovation: reduce demand for *heating* (no appliances)
  - Employment effects: direct, indirect and induced

- **Expected results**:
  - **Non-employment results**: annual investment costs and energy saving benefits, reduction in energy consumption and CO2 emissions.
  - **Net employment impacts**

- **Two phases**:
  - Preliminary results: 22 March 2010
  - Final report: June 8 2010 (revised results)
Employment effects: overview

- **BUILDINGS RETROFITTING programme**
  - Additional disposable income
  - Additional spending and job gains
  - Job losses to **CONSTRUCTION sector**
  - Job gains to **HOUSEHOLDS**

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  - Job gains to **ENERGY gen. & distr. sector**
  - Job losses to **SUPPLY-CHAIN related sectors**

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- **SUPPLY-CHAIN related sectors**
  - Job losses to **OTHER sectors**

- **OTHER sectors**
  - Job gains from **CONSTRUCTION sector**

**Effects**:
- **DIRECT effects**
- **INDIRECT effects**
- **INDUCED effects**
## Scenarios considered

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Description</th>
<th>Retrofit rate</th>
<th>Type of retrofits</th>
<th>Forecasted completion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S-BASE</strong></td>
<td>Baseline scenario: no intervention</td>
<td>1.3% of the total building stock (around 4.5 million square metres a year, equivalent to 55,000 dwellings)</td>
<td>“Business as usual” retrofits</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>S-DEEP1</strong></td>
<td>Deep retrofit with fast implementation rate</td>
<td>Around 20 million square meter (equivalent to 250,000 dwellings) per year</td>
<td>Deep retrofits</td>
<td>18 years</td>
</tr>
<tr>
<td><strong>S-DEEP2</strong></td>
<td>Deep retrofit with medium implementation rate</td>
<td>Around 12 million square meter (equivalent to 150,000 dwellings) per year</td>
<td>Deep retrofits</td>
<td>28 years</td>
</tr>
<tr>
<td><strong>S-DEEP3</strong></td>
<td>Deep retrofit with slow implementation rate</td>
<td>Around 8 million square meter (equivalent to 100,000 dwellings) per year</td>
<td>Deep retrofits</td>
<td>41 years</td>
</tr>
<tr>
<td><strong>S-SUB</strong></td>
<td>Suboptimal retrofit with medium implementation rate</td>
<td>Around 12 million square meter (equivalent to 150,000 dwellings) per year</td>
<td>Suboptimal retrofits</td>
<td>28 years</td>
</tr>
</tbody>
</table>

![Retrofit depth diagram](image-url)
Methodology: building stock model

- **Data on the building stock**
  - # units, size, specific energy consump. for heating
  - Novikova (2008), Korytarova (forthcoming)
  - *Ramp-up* period: progressive implementation rates

- **Costs of suboptimal and deep renovations**
  - Lit. review, case studies (Hungary and Austria)
  - Decreasing cost for deep renovations: learning factors

- **Energy prices**
  - Increase in real energy prices estimated from KSH and IEA.
Methodology: employment impacts

- **Mixed**: Up-scaling + Input-Output analysis

- Renovation Case Studies
  - Labour
  - Investments
  - Energy savings

- Up-scaling
- I/O analysis
- Labour intensity

- Direct (positive) impacts in construction
- Indirect + induced impacts
- Direct (negative) impacts in energy supply
Carbon emission reductions

CO2 Emissions - Residential and Public Buildings
Including Buildings Built After 2010

- S-BASE
- S-DEEP1
- S-DEEP2
- S-DEEP3
- S-SUB

45% locked-in

85% savings
Reduced annual and peak imports of natural gas. Once fully implemented, deep renovation scenarios:

- Save up to 39% of Hungary’s NG imports (2006-2008 levels).
- NG savings are at the same order of magnitude as Hungary’s domestic NG production (2006-2008 levels).

Reduced peak imports in January equivalent to 59% the natural gas imports recorded for that month in 2006-2008.
Annual investment costs vs. energy saving benefits

- Annual savings become higher than the investment needs in 20 years
Financing

- Such programme will need a vast amount of **financing**
  - E.g. in 2020:
    - S-DEEP1 – 3.5 B€ (13% of 2009 HU budget)
    - S-DEEP2 – 2.1 B€ (8% of 2009 HU budget)
    - S-DEEP3 – 1.4 B€ (5% of 2009 HU budget)
- The **energy savings** are **higher** than the **investments**, but they **accrue later**
- However, at least part of the initial funds can come from:
  - An **ESCO-type scheme of financing** in which part of the savings go into repaying the investment costs.
  - **EU funds** (e.g., 15% of the funds allocated 2007-13 would provide 400M€ per year)
  - Partially redirecting the **current energy subsidies** (about 800M€ per year)
Net employment impacts
Snapshot in 2020

- Direct effects
  - Calculated with bottom-up method
- Indirect + induced effects
  - Application of I/O tables
  - Indirect + induced impacts have the same order of magnitude as the direct impacts

Total employment impacts for 2020

- Induced impacts from energy savings
- Induced impacts from lost jobs created by reduced demand for energy
- Indirect impacts from reduced demand for energy
- Direct impacts on energy supply sector
- Induced impacts from additional jobs created by investments in construction
- Indirect impacts from investments in construction
- Direct impacts on construction sector
- Total impacts
The initial increase shows the ramp-up period

The subsequent decrease is due to the learning factor
- Productivity increases: costs and labour intensities decrease
- There is practically no learning factor in S-BASE and S-SUB: the technologies are mature
Fuel poverty alleviation

- **S-SUB** renovations (50% energy use reduction)
  - Partial reduction of fuel poverty rates
- **S-DEEP** renovation (85% energy use reduction)
  - Potential eradication of fuel poverty

“The most sustainable way to eradicate fuel poverty is to *fuel poverty-proof* the housing stock, which means that a dwelling will be sufficiently energy efficient *that regardless* of who occupies the property, there is a low probability *that they will be in fuel poverty*”

Source: UK DTI 2006, p. 31
Further issues

- **Distributed geographic effects**
  - Buildings renovated *throughout the country*; work mainly done by SMEs
  - *Induced consumption* also very distributed

- **Durability of effects**
  - The programme lasts **20 to 40 years**, effectively a *worker’s lifetime*

- **Employment effects** in the energy sector *overestimated*
  - *Large fixed costs*; job losses probably in “lumps”
  - *Rebound effect*: increased energy demand due to enhanced consumption

- **Constraints** in the *supply of labour and materials*
  - *Unemployed* and *inactive population* to provide the required labour
  - Possible increase in *labour* and *material costs*

- **Real estate**
  - Increased *financial value* and *lifetime* of renovated buildings
Conclusions and recommendations

- Deep renovation scenarios deliver **higher climate and energy benefits** as compared to suboptimal renovation scenarios
  - They save **85% of previous energy use** and **carbon emissions** and **avoid locking-in 45%** of 2010 emissions
  - Substantial reduction in **annual and peak** (January) gas imports
  - Potential eradication of **fuel poverty** if implemented to a full extent

- Employment impacts are **highly positive in the short to medium term**, especially for **deep renovation** scenarios
  - Up to **70,000-180,000 FTE** in the peak year (2015)
  - Around **38%** are **indirect and induced effects** in other sectors
  - Labour intensity of retrofits higher than the construction sector’s
  - Induced effects stay once renovations have finished

- The major issue is **financing**
  - Current **energy subsidies**, **EU funds** and **pay-as-you-save scheme**.

- A less **ambitious rate of renovation is recommended**
  - Avoid **shortages** in the **labour supply**: less jobs but sustained
  - Avoid **investment shock**: from 2 bln. to 1 bln. € per year
From research to policy-making…

- **Timeframe** of the project
  - March-June 2010 (commissioned by ECF Feb. 2010)
  - General elections in Hungary: April 11-25, 2010
  - **New government** formed on May 29, 2010.
  - Presentation of results: June 8, 2010

- **Policy impact**
  - Late June 2010: the new Hungarian government announces a **new, more ambitious renovation programme** for the residential sector:
    - 100,000 units per year, increasing up to 150-200,000 units per year
    - *Complex* renovations: 70-80% target energy savings (previously up to 50%)
    - **Hungary** taking **leadership** in advanced EE solutions for the buildings sector
Employment Impacts of a Large-Scale Deep Building Energy Retrofit Programme in Hungary

Thank you for your attention

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