Employment impacts and other co-benefits of a Large-Scale Deep Building Energy Retrofit Programme in Hungary and Poland

EU 2020 Objectives in Central and Eastern Europe
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Diana Urge-Vorsatz

CENTER FOR CLIMATE CHANGE AND SUSTAINABLE ENERGY POLICY

CENTRAL EUROPEAN UNIVERSITY
Outline

- Background
- Research aims
- Methodology and novelty
- Key findings
  - Why to go deep: the lock-in effect
- Conclusions and recommendations
Background

- Economic profitability or environmental goals have not been strong enough drivers for EE policy
- Increasing evidence of significant co-benefits, especially for building EE
- These may prove to be stronger entry points into policy-making than the economic/climate rationales
- Hungary and Poland
  - Low activity rate in EU
  - Energy security is major issue (in Hu)
  - Fuel poverty major problem
  - Poor thermal performance of the building stock
Background

Activity rate in the European Union, Q2 2009 (selected countries)

Households' specific energy consumption (kWh/m²a) scaled to EU average climate. Hungary vs. CEE Member States. Average 2000-2007

Source: own elaboration based on data retrieved from the ODYSSEE database
Energy performance of the residential building stock
Per unit energy consumption scaled to EU average climate

Source: ODYSSEE
Purpose

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

- Using a robust methodology
  - Novel hybrid of i/o analysis and upscaling assessment

- to ensure full credibility:
  - Reputable team
  - Broad expert review
# The research team (Hu)

**Principal investigator**

<table>
<thead>
<tr>
<th>Prof. Dr. Diana Ürge-Vorsatz</th>
</tr>
</thead>
</table>

**Further Authors**

- **Daniele Arena** – Project coordinator
- **Sergio Tirado Herrero** – Economics
- **Andrew Butcher** – Hungary building stock model and scenarios
- **Ela Wójcik-Gront** – Poland building stock and model scenarios

**Lead Experts**

- **Prof. Dr. Álmos Telegdy** – Senior Labour Economist
- **Mr. Sándor Fegyverneky** – Chief Government Architect

**Contributing Author**

<table>
<thead>
<tr>
<th>Dr. Tamás Csoknyai</th>
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<tbody>
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<td>– BME</td>
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</table>

**Research Assistants**

<table>
<thead>
<tr>
<th>Éva Kőpataki</th>
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<tbody>
<tr>
<td>Alexandra Jankó</td>
</tr>
<tr>
<td>Research and data collection in Hungary and Austria</td>
</tr>
</tbody>
</table>

[Image of European Climate Foundation]
Methodology

Center for Climate Change and Sustainable Energy Policy

Central European University
Employment Effects: Overview

- Direct impacts
  - Positive on the construction industry
  - Negative on the energy industry

- Indirect impacts
  - Upstream in the supply chain

- Induced impacts
  - Caused by the increased disposable income:
    - From new jobs (directly and indirectly generated)
    - From energy savings

- Qualitative analysis
  - Types of employment generated and skill levels
  - Geographical distribution
  - Durability of the jobs (short/long-term)
  - Supply of labour
Employment Effects: Overview

BUILDINGS RETROFITTING programme

Job losses

ENERGY gen. & distr. sector

Job losses

SUPPLY-CHAIN related sectors

Job losses

CONSTRUCTION sector

Job gains

Job gains

SUPPLY-CHAIN related sectors

Job losses

Households

Additional disposable income

Additional spending and job gains

OTHER sectors

Job gains

DIRECT effects

INDIRECT effects

INDUCED effects
Methodology used

- Mixed: Up-scaling + Input-Output analysis

- Renovation Case Studies
- Labour
- Investments
- Energy savings
- Direct (positive) impacts in construction
- Indirect + induced impacts
- Direct (negative) impacts in energy supply
- Labour intensity
- I/O analysis
## Scenarios considered

<table>
<thead>
<tr>
<th>Name</th>
<th>Scenario</th>
<th>Retrofit rate</th>
<th>Type of retrofits</th>
<th>Forecasted completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-BASE</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>&quot;Business as usual&quot; retrofits</td>
<td>N/A</td>
</tr>
<tr>
<td>S-DEEP1</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>17-18 years</td>
</tr>
<tr>
<td>S-DEEP2</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>26-28 years</td>
</tr>
<tr>
<td>S-DEEP3</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>39-41 years</td>
</tr>
<tr>
<td>S-SUB</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>26-28 years</td>
</tr>
</tbody>
</table>

### Energy efficiency gains (% of kWh/sqm/y)

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

### Retrofit Rate (% of building stock)

- 1%
- 3%
- 6%
- 90%
Summary: key findings
Scenario results: Hungary heating and cooling final energy use until 2050

- 85% of energy is saved in deep scenarios
- 45% of the savings remain locked-in by the suboptimal scenario
Scenario results: Poland heating and cooling related CO2 emissions until 2050

- 86% of energy is saved in deep scenarios
- 50% of the savings remain locked-in by the suboptimal scenario
Total net employment impacts: snapshot in 2020 for Hungary

- **Direct effects**
  - Calculated with bottom-up method
  - Shown in the previous slides

- **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**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Thousands FTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-BASE</td>
<td></td>
</tr>
<tr>
<td>S-DEEP1</td>
<td></td>
</tr>
<tr>
<td>S-DEEP2</td>
<td></td>
</tr>
<tr>
<td>S-DEEP3</td>
<td></td>
</tr>
<tr>
<td>S-SUB</td>
<td></td>
</tr>
</tbody>
</table>

- 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
Total (direct and indirect) impacts for Polish renovation scenarios

- Induced impacts from energy savings
- Induced impacts from lost jobs created by reduced demand for energy
- Indirect impacts from reduced demand for energy
- Induced impacts from additional jobs created by investments in construction
- Indirect impacts from investments in construction
- Direct impacts on energy supply sector
- Direct impacts on construction sector
Hungary: Direct employment impact investment comparison

- Labour intensity in renovations is much higher than labour intensity in many other sectors
- E.g. many more jobs would be created with these programmes than if the money was spent in building highways
Energy Security Benefits

- Reduced import of Natural Gas
  - deep renovation scenarios can save up to 39% of the current natural gas imports
  - In January (peak for imports) the energy savings achieved by 2030 would be equivalent to between 59% (S-DEEP1 scenario), 26% (S-DEEP3 scenario) and 18% (S-SUB scenario) of the natural gas imports recorded for that month

![Chart showing natural gas saved in January 2030 in different scenarios compared to January imports (average 2006-2008)]
Cumulative (undiscounted) investments and savings

- Total investments needed to refurbish the whole building stock:
  - S-DEEP1: 60 Bln EUR
  - S-DEEP2: 50 Bln EUR
  - S-DEEP3: 44 Bln EUR
  - S-SUB: 28 Bln EUR
- Cumulative savings substantially outstrip the investment needs in the longer run. By 2050:
  - S-DEEP1: 97 Bln EUR (vs. 60)
  - S-DEEP2: 81 Bln EUR (vs. 50)
  - S-DEEP3: 60 Bln EUR (vs. 44)
  - S-SUB: 37 Bln EUR (vs. 28)

<table>
<thead>
<tr>
<th></th>
<th>Cumulative investments</th>
<th>2025</th>
<th>2050</th>
<th>2075</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-DEEP1</td>
<td>Cumulative investments</td>
<td>50.47</td>
<td>59.83</td>
<td>59.83</td>
</tr>
<tr>
<td></td>
<td>Cumulative savings</td>
<td>14.13</td>
<td>97.00</td>
<td>197.73</td>
</tr>
<tr>
<td>S-DEEP2</td>
<td>Cumulative investments</td>
<td>30.29</td>
<td>50.05</td>
<td>50.05</td>
</tr>
<tr>
<td></td>
<td>Cumulative savings</td>
<td>8.48</td>
<td>80.56</td>
<td>179.39</td>
</tr>
<tr>
<td>S-DEEP3</td>
<td>Cumulative investments</td>
<td>20.20</td>
<td>42.20</td>
<td>43.58</td>
</tr>
<tr>
<td></td>
<td>Cumulative savings</td>
<td>5.65</td>
<td>59.56</td>
<td>156.06</td>
</tr>
<tr>
<td>S-SUB</td>
<td>Cumulative investments</td>
<td>13.53</td>
<td>28.17</td>
<td>28.17</td>
</tr>
<tr>
<td></td>
<td>Cumulative savings</td>
<td>3.94</td>
<td>37.43</td>
<td>83.34</td>
</tr>
</tbody>
</table>
Financing

❖ Such programme will need a vast amount of financing
  ❖ E.g. in 2020:
    ❖ S-DEEP1 – 3.5 B€\textsubscript{2005} (13\% of 2009 HU budget)
    ❖ S-DEEP2 – 2.1 B€\textsubscript{2005} (8\% of 2009 HU budget)
    ❖ S-DEEP3 – 1.4 B€\textsubscript{2005} (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:
  ❖ the EU (up to 400M€ per year)
  ❖ Redirecting the current energy subsidies (about 800M€ per year)
  ❖ An ESCO-type scheme of financing in which part of the savings go into repaying the investment costs
Energy subsidies in Hungary

- **Biofuel**: relatively little CO2 emission mitigation at a high cost
- **District heating VAT discount**: further decreases energy efficiency
- **Coal subsidy**: artificially increases the competitiveness of high carbon intensity energy
- **Gas subsidy**: decreases energy efficiency and competitiveness of renewable heat
- **Feed-in tariff for co-generation**: predominantly subsidy of gas based co-generation, decreases competitiveness of renewable heat

- 300 Bn HUF state investment to a new lignite plant.
- 1 Mt additional CO2 emission compared to a BAT gas turbine

Source: slides from Mr. Laszlo Varro, Strategy Director at MOL
## Investment vs. cumulative savings in Poland

<table>
<thead>
<tr>
<th>Cumulative investments vs. cumulative savings (Billion Euros)</th>
<th>2025</th>
<th>2050</th>
<th>2080</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S-DEEP1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative investments</td>
<td>45</td>
<td>103</td>
<td>157</td>
</tr>
<tr>
<td>Cumulative savings</td>
<td>7</td>
<td>67</td>
<td>244</td>
</tr>
<tr>
<td><strong>S-DEEP2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative investments</td>
<td>74</td>
<td>171</td>
<td>179</td>
</tr>
<tr>
<td>Cumulative savings</td>
<td>11</td>
<td>111</td>
<td>332</td>
</tr>
<tr>
<td><strong>S-DEEP3</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative investments</td>
<td>103</td>
<td>196</td>
<td>196</td>
</tr>
<tr>
<td>Cumulative savings</td>
<td>15</td>
<td>145</td>
<td>367</td>
</tr>
<tr>
<td><strong>S-SUB</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumulative investments</td>
<td>28</td>
<td>71</td>
<td>71</td>
</tr>
<tr>
<td>Cumulative savings</td>
<td>7</td>
<td>69</td>
<td>180</td>
</tr>
</tbody>
</table>
Summary of results: conclusions

- Deep renovation scenarios give higher climate and energy benefits compared to suboptimal renovation scenarios
  - Deep retrofit scenarios save 85% of energy use and relative carbon emissions by 2030, vs. 45% in a suboptimal; 50% lock-in in the Polish case
  - Thus, the deep scenario avoids a 40% lock-in with serious climate, security and fuel poverty implications
  - Deep retrofit scenarios can reduce up to 39% of annual natural gas needs in 2030, 59% in the critical month of January (compared to average 2006-2008 values), vs. 10% in the suboptimal scenario
  - A deep retrofit scenario essentially eradicates fuel poverty

- Employment impacts are highly positive in the short to medium term, especially for deep renovation scenarios
  - 131,000 jobs created in S-DEEP1, 78,000 in S-DEEP2, 52,000 in S-DEEP3,
    - Around 38% are indirect and induced effects in other sectors
  - Labour intensity in deep retrofit is higher than if the money was invested in other initiatives (e.g., 5 times higher than road construction)

- The major issue is financing
  - But sufficient financing could be made available from identified sources without any new taxes
Summary of results: recommendations

- The recommendation is to promote a deep renovation scenario with a less ambitious rate of renovation
  - The climate, energy security and fuel poverty lock-in effect is avoided
  - e.g. *S-DEEP3* – (2.3% of the floor area, 100,000 dwellings-equivalent)
  - 52,000 jobs created by 2020 (initially more)
  - App. 1 billion Euros annual investment
- The impacts are slightly lower but sustained: no shock in the economy and in the industry
  - The slower rate of renovation allows for a “smooth” transition period
  - Time is allowed for the firms to learn, train employees and increase production of materials
  - The learning factor ensures that the costs become lower throughout the years
    - The investment shock is reduced
    - Less money is “locked in” on renovations which could have been less expensive in following years
  - Labour supply issues and wage effects are reduced

Thank you for your attention

http://3csep.ceu.hu/
vorsatzd@ceu.hu and 3csep@ceu.hu
Supplementary slides

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Scenario results: annual investment needs vs. savings

- Annual savings become higher than the investment needs in 20 years
Energy Security Benefits (2)

- **Reduced import of Natural Gas**
  - deep renovation scenarios can save up to 39% of the current natural gas imports
  - In January (peak for imports) the energy savings achieved by 2030 would be equivalent to between 59% (S-DEEP1 scenario), 26% (S-DEEP3 scenario) and 18% (S-SUB scenario) of the natural gas imports recorded for that month.
Energy dependency
Net (extra-EU) imports as % of Gross Inland Energy Consumption (2007)

Source: EEA
Scenario results: energy cost savings

- Energy savings generated each year by all retrofits implemented until that year

![Energy cost savings generated by all the retrofits implemented](image)
Scenario results: Investments for the programme

- Initial 5-year ramp-up period
- Subsequent decrease thanks to learning factor
Cumulative investments and savings by scenario in 2025, 2050 and 2075 (undiscounted)
<table>
<thead>
<tr>
<th>Thousands FTE</th>
<th>S-BASE</th>
<th>S-DEEP1</th>
<th>S-DEEP2</th>
<th>S-DEEP3</th>
<th>S-SUB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Million EUR invested in 2020</td>
<td>224</td>
<td>3,506</td>
<td>2,104</td>
<td>1,402</td>
<td>1,040</td>
</tr>
<tr>
<td>Direct impacts on construction sector</td>
<td>8</td>
<td>91</td>
<td>54</td>
<td>36</td>
<td>31</td>
</tr>
<tr>
<td>Direct impacts on energy supply sector</td>
<td>0</td>
<td>-3</td>
<td>-2</td>
<td>-1</td>
<td>-1</td>
</tr>
<tr>
<td>Indirect impacts from investments in construction</td>
<td>2</td>
<td>29</td>
<td>18</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>Induced impacts from additional jobs created by investments in construction</td>
<td>1</td>
<td>21</td>
<td>13</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Indirect impacts from reduced demand for energy</td>
<td>0</td>
<td>-6</td>
<td>-4</td>
<td>-2</td>
<td>-2</td>
</tr>
<tr>
<td>Induced impacts from lost jobs created by reduced demand for energy</td>
<td>0</td>
<td>-5</td>
<td>-3</td>
<td>-2</td>
<td>-1</td>
</tr>
<tr>
<td>Induced impacts from energy savings</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total net employment impacts in 2020</td>
<td>11</td>
<td>131</td>
<td>78</td>
<td>52</td>
<td>43</td>
</tr>
</tbody>
</table>
Direct employment impacts in construction per skill: snapshot in 2020

The effects on professional labour are highest in the deep renovation scenarios.
Total net employment impacts divided by sector: snapshot in 2020

<table>
<thead>
<tr>
<th>Sectors</th>
<th>Thousands FTE</th>
<th>S-BASE</th>
<th>S-DEEP1</th>
<th>S-DEEP2</th>
<th>S-DEEP3</th>
<th>S-SUB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, hunting, forestry and fishing</td>
<td>0.1</td>
<td>0.5</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>0.0</td>
<td>0.7</td>
<td>0.4</td>
<td>0.3</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>0.7</td>
<td>10.5</td>
<td>6.3</td>
<td>4.2</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td>Electricity, gas and water supply</td>
<td>-0.1</td>
<td>-3.1</td>
<td>-1.8</td>
<td>-1.2</td>
<td>-0.8</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>7.7</td>
<td>91.8</td>
<td>55.1</td>
<td>36.7</td>
<td>31.7</td>
<td></td>
</tr>
<tr>
<td>Wholesale and retail trade, restaurants and hotels</td>
<td>0.3</td>
<td>3.6</td>
<td>2.2</td>
<td>1.4</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>Transport, storage and communications</td>
<td>0.3</td>
<td>4.2</td>
<td>2.5</td>
<td>1.7</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Finance, insurance, real estate and business services</td>
<td>0.5</td>
<td>5.8</td>
<td>3.5</td>
<td>2.3</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Community, social and personal services</td>
<td>1.5</td>
<td>16.7</td>
<td>10.0</td>
<td>6.7</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>11.0</td>
<td>130.7</td>
<td>78.4</td>
<td>52.3</td>
<td>43.4</td>
<td></td>
</tr>
</tbody>
</table>

Total employment impacts per sector for a specific year: 2020
Summary: Key findings

- **Energy use and CO2 emissions reduction**
  - Up to 85% of Hungarian heating energy use and the corresponding CO2 emissions can be avoided by a consistent and wide-spread deep retrofit programme.
  - A suboptimal scenario (saving only 40% of energy use) locks in 45% of 2010 building heating-related emissions at the end of the programme.
  - This makes medium-term national emission reduction targets (75 – 85%) very difficult and expensive to achieve.

- **Energy security enhancement**
  - A deep retrofit programme can reduce significantly Hungary’s natural gas import dependence (in % of 2006-2008 average NG imports):
    - Up to 39% annual import needs by 2030.
    - Up to 59% of the January import needs (the most critical month for energy security).
  - A suboptimal retrofit programme would lack the same strength:
    - Only 10% of natural gas imports saved in 2030.
    - Peak (January) savings reduced to 18%.
Summary: Key findings 2.

- Employment benefits
  - Up to 131,000 net jobs created by 2020, including the losses in the energy supply sector
    - This value is 184,000 in 2015
    - 38% of this value: indirect and induced effects in other sectors than construction
  - Suboptimal scenario: 43,000 jobs
- Deep renovation activities are much more labour intensive than other economic recovery activities
  - e.g. 5 times more jobs are created than with the same investments in road construction
- The corresponding investment needs are also higher
  - For the most ambitious programme (5.7% floor area/yr):
    - 4.5 Bln EUR/year initially, and 2.8 Bln EUR/year towards the end; vs. 2 bln/year for a gradual program (2.3% floor area renovated/year), declining to 1 bln/year
    - Cumulative undiscounted investments: 59 Bln EUR, vs. 44 in a more gradual program
    - Cumulative undiscounted savings: 97 Bln EUR by 2050
Summary: Recommendation

- Recommendation: deep renovation programme with more gradual implementation
  - App. 8 million sqm per year, 2.3% of the floor area, 100,000 dwellings-equivalent
  - 52,000 jobs created by 2020
  - Initial costs peak at 2 Bln EUR per year, and are reduced to less than 1 Bln EUR in the final phases of the programme
    - Take advantage of the initial learning period
  - App. 1 billion Euros public funds per year could potentially be made available
    - Partly from EU funding
    - Partly from redirecting current energy subsidies
- Pay-as-you-save schemes and other innovative financing schemes also relieve the financing burden
- More gradual implementation means less shock for the labour market
- For all scenarios:
  - Employment created is long-term
  - New jobs will be distributed across the country
- Public administration should be heavily involved
  - To the achievement of deep savings through deep renovations
  - To reduce the risks of supply bottlenecks
Scenario results: renovation costs

- Investments for renovations
  - Use of best practices to estimate the cost per sqm in every scenario, for every building type
  - SOLANOVA case study (Dunaujvaros):
    - Pilot project for deep renovation in a panel building
    - The only deep renovation project available in Hungary
    - 90% energy savings
    - 42 dwellings, 2300 sqm
    - Cost: 250€ per sqm
  - Examples abroad: Mostly in Austria and Germany
  - Transfer of results to Hungary
Evolution of investments per sqm, with learning factor

- Baseline and suboptimal costs remain fixed (mature technology)
- Deep renovation costs decrease until they reach double baseline renovation costs
Scenario results: CO2 emission reductions until 2050: 45% locked in by suboptimal scen
Energy Security Benefits

- Reduced import of Natural Gas
  - At the end of their implementation, the deep renovation scenarios can save up to 39% of the current natural gas imports
  - The natural gas saved in 2030 is the same order of magnitude as Hungary’s NG production (2008 levels)

![Chart showing natural gas saved (year 2030) compared to 2006-2008 imports and production]
Energy Security Benefits (2)

In January (peak month for imports) the energy savings achieved by 2030 would be equivalent to between 59% (S-DEEP1 scenario), 26% (S-DEEP3 scenario) and 18% (S-SUB scenario) of the natural gas imports recorded for that month.
Scenario results: Energy savings by building category

Final Heating Energy Use - Residential and Public Buildings
S-BASE Scenario

Final Heating Energy Use - Residential and Public Buildings
S-SUB Scenario
Scenario results: Energy savings by building category
Net employment impacts in construction: medium-term view

- The initial increase shows the ramp-up period
- The subsequent decrease is due to the learning factor
  - Productivity increases
  - Therefore costs and labour intensities decrease
  - There is practically no learning factor in S-BASE and S-SUB: the technologies are mature
Further issues

- Distributed geographic effects
  - The buildings are renovated throughout the country
  - Work is mainly done by SMEs
  - Induced consumption is also distributed

- Durability of effects
  - Such a programme lasts 20-30 years, effectively a worker’s lifetime

- Employment effects in the energy sector
  - Large fixed costs in the energy sector: Job losses are probably in “lumps” – e.g. power stations still need people to maintain them, even if the demand is lowered
  - Some increase in energy demand is expected from other sectors (e.g. commercial, manufacturing) which will compensate the losses from residential sector
Further issues (2)

- Supply of labour
  - There is availability of labour in Hungary for all skill levels
    - Entrepreneurs, professionals
    - Skilled, unskilled – among unemployed and inactive
  - However, these workers need to be attracted to the construction industry
    - Training
    - “Promotion” of the sector
    - Possibly higher wages (at least in the beginning)
  - Population aging
  - What if there is no sufficient labour supply?
    - Guest workers might be brought in

- Such a large-scale program is likely to raise the wage level in the country
  - Increases the costs of the project
  - Increases the costs of other investments (because opportunity costs are higher)
  - But also increases consumption (hence more induced effects)

- Supply of materials
  - Manufacturing must keep up with the increased demand from construction sector
Further issues (3)

- **Grey labour**
  - Opportunity for the State to increase the control on grey labour in construction

- **Fuel poverty**
  - Such a programme has the potential of eradicating fuel poverty
  - Great attention has to be put in financing, especially for the lower income households

- **Real estate markets**
  - The value of buildings increases
  - The lifetime of buildings is extended
Background

- Inefficiency of Hungarian buildings
  - Largest potential for energy consumption reduction among end-use sectors
  - Contribute 50% of energy-related emissions in Hungary
  - Only Slovenia and Latvia are less energy-efficient in residential heating

Households’ specific energy consumption (kWh/m²a) scaled to EU average climate. Hungary vs. CEE Member States. Average 2000-2007
Source: own elaboration based on data retrieved from the ODYSSEE database
Natural Gas Saved in Year 2030 by Retrofit Scenarios in Poland

![Bar chart showing natural gas consumption in PJ for different scenarios. The chart compares imported and domestic natural gas consumption across various scenarios.]
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

Low-income population

Inability to control indoor temperature thermal discomfort

Fixed flat rate, no individual meters

Some consumers fail to pay regularly the tariff: indebtedness

Many DH networks are now obsolete and need modernization both on the heat supplier and on the consumers’ side
Evolution of direct employment impact in Polish construction sector
Study impact

- The Energy Efficiency Building Program's policy targets for the 2011-2020 period:
- Reconstruction of at least 50,000 traditionally built houses and 30,000 panels, and building of 22,000 new energy-efficient homes.
- Renovation of 3.2 thousands public buildings on average annually.
- The average investment rate of energy savings should be at least 60% in the case of new buildings. The aim of the incentives is to encourage more energy efficient constructions than it is written down in the prescriptions. The target is 25 kWh/m² year.
- The buildings' energy performance plays a key role amongst the energy efficiency measures as these measures represent the greatest possible savings. The improvement of the buildings' energy efficiency will probably create 60-70 thousand of new jobs.
Energy Security Benefits

- Reduced import of Natural Gas
  - At the end of their implementation, the deep renovation scenarios can save up to 39% of the current natural gas imports.
  - The natural gas saved in 2030 is the same order of magnitude as Hungary’s NG production (2008 levels).
Poland

![Bar chart showing the distribution of unskilled labour, skilled labour, and professionals across different scenarios in Poland.](chart.png)