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

CENTER FOR CLIMATE CHANGE AND SUSTAINABLE ENERGY POLICY

CENTRAL EUROPEAN UNIVERSITY

Prof. Diana Urge-Vorsatz / Sergio Tirado Herrero

Evaluating the Benefits of Low-Income Weatherisation Programmes

Dublin (Ireland). January 27-28, 2011.

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**

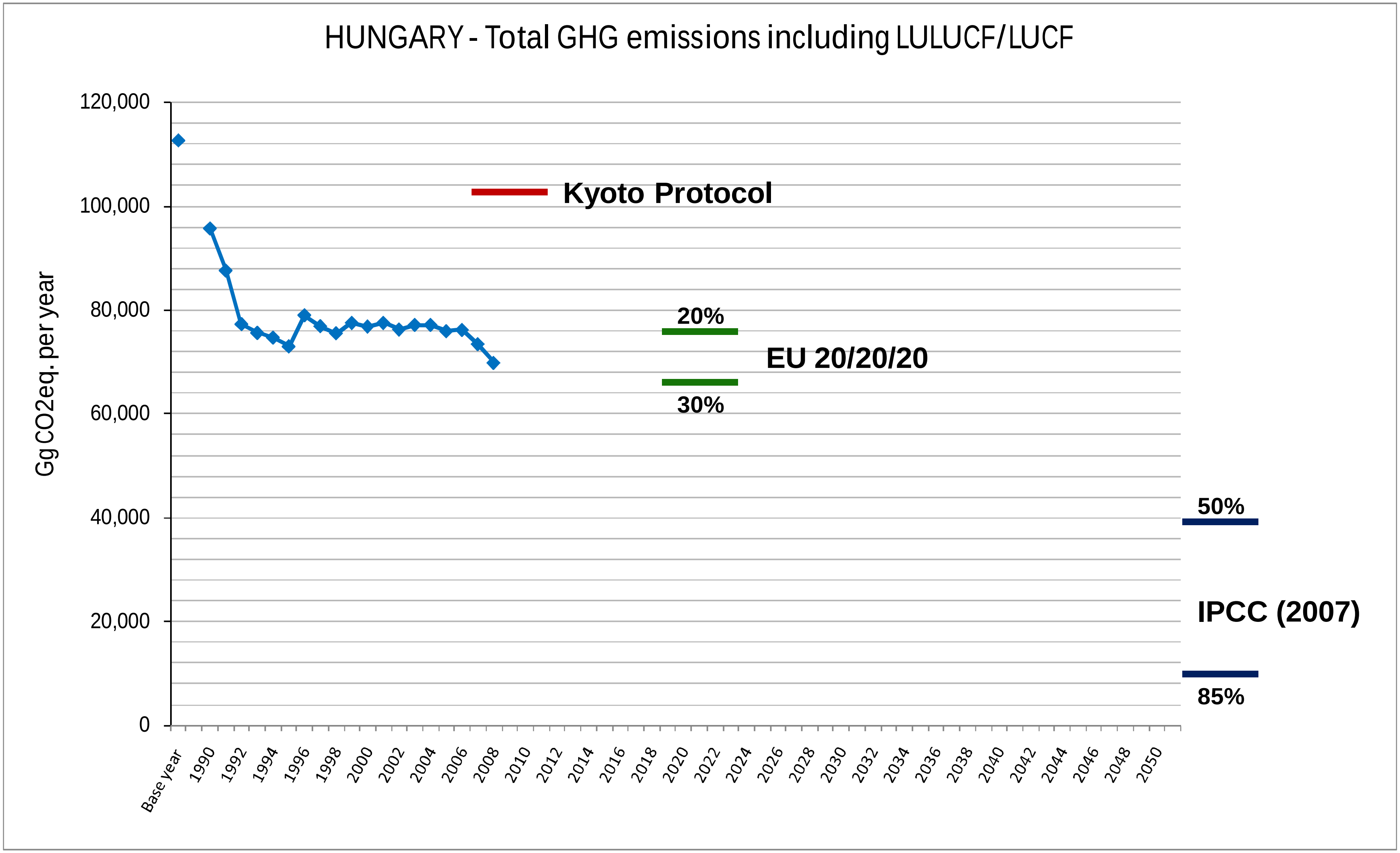
European Climate Foundation

3CSEP

Mitigation targets

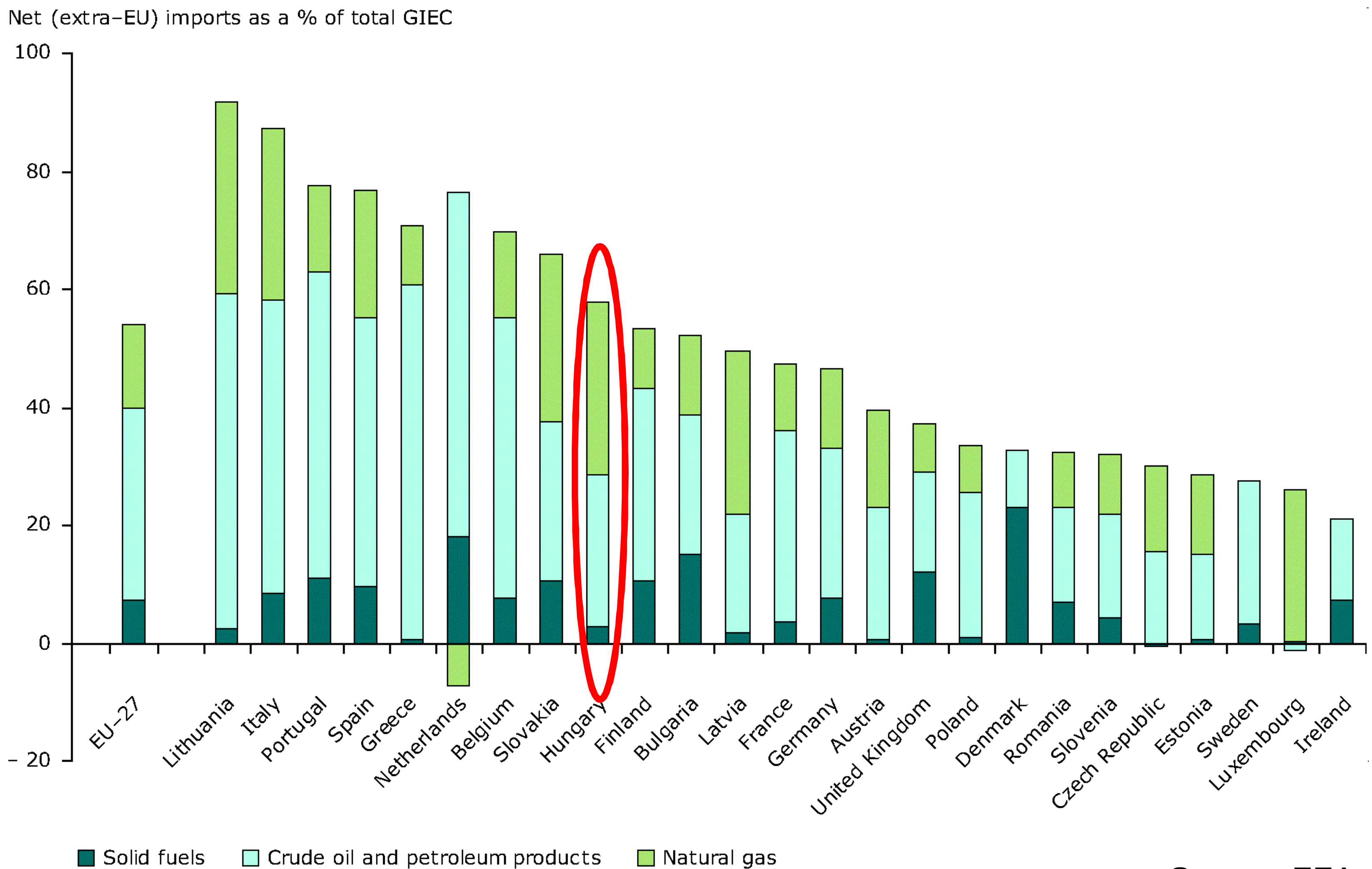
Short-, mid- and long-term

Source: UNFCCC



Energy dependency

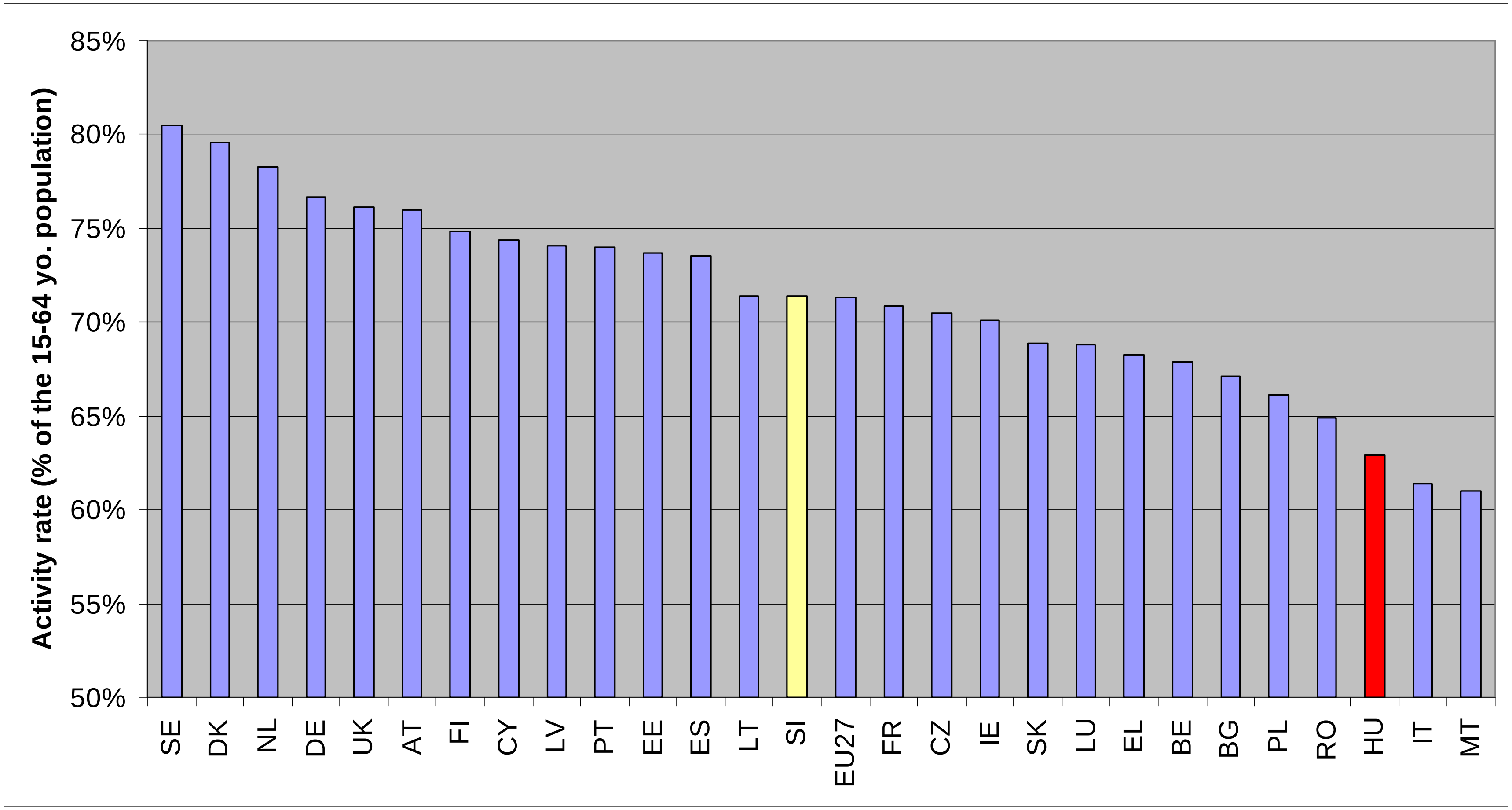
Net (extra-EU) imports as % of Gross Inland Energy Consumption (2007)



Source: EEA

Activity rate

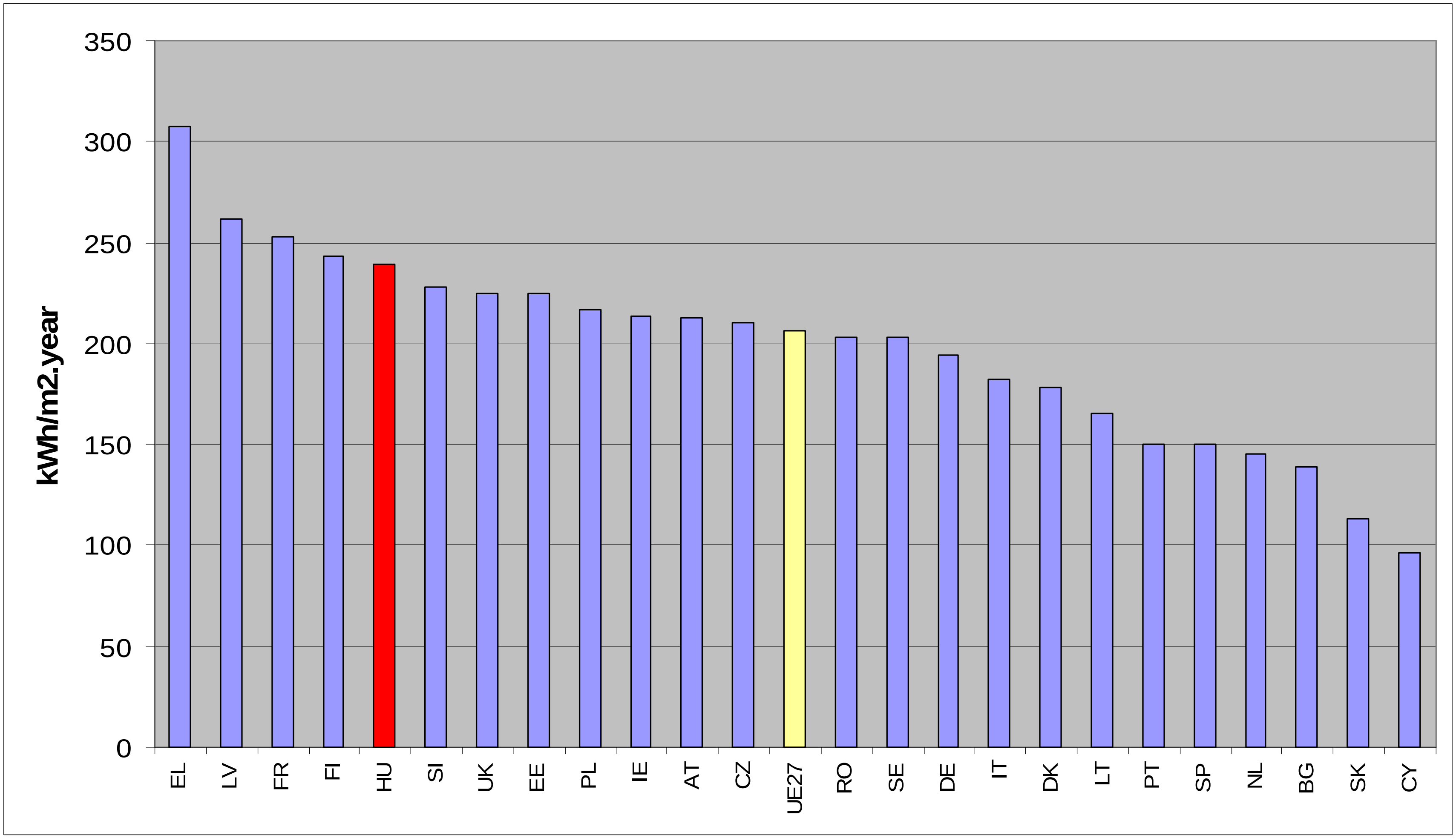
Percentage of the 15-64 yo. employed (2010 Q3)



Source: EUROSTAT

Energy performance of the residential stock

Per unit energy consumption scaled to EU average climate

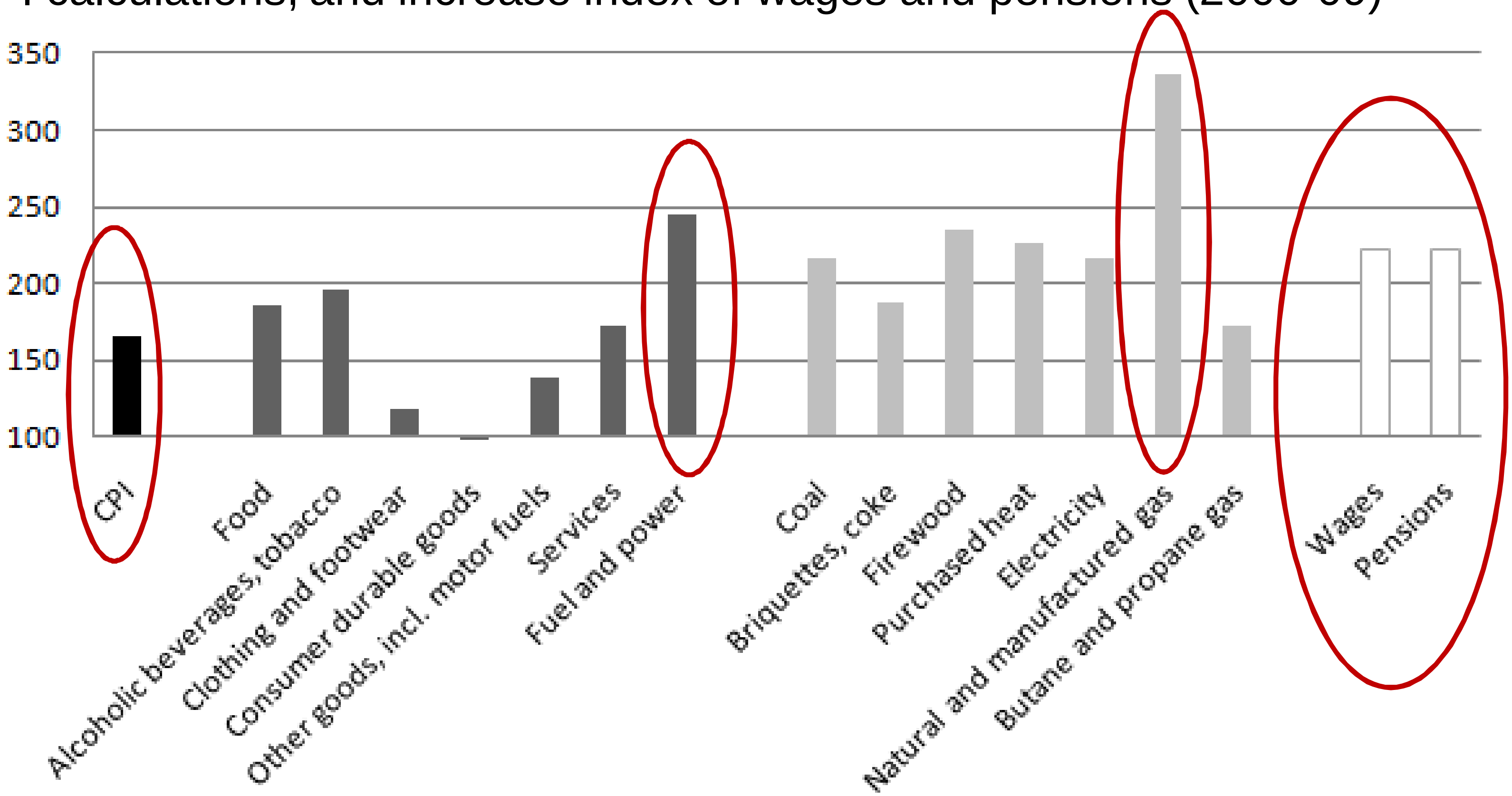


Source: ODYSSEE

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)



European Climate Foundation

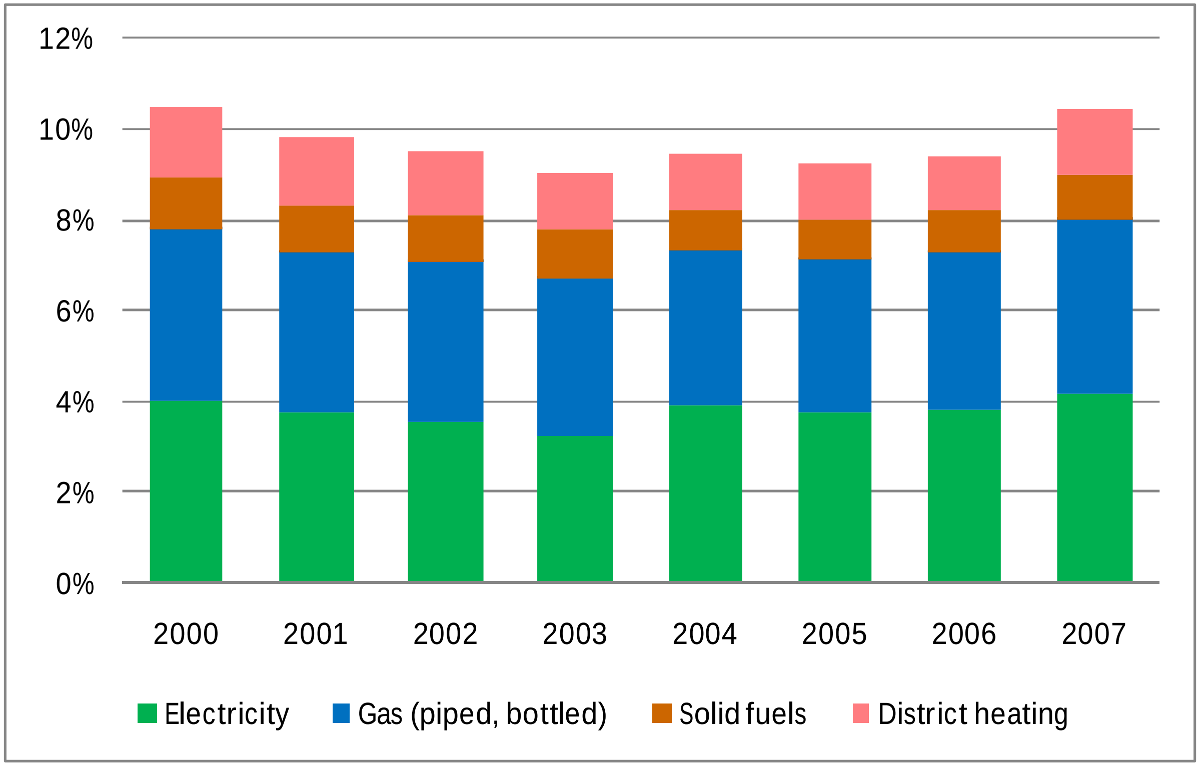
3CSEP

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

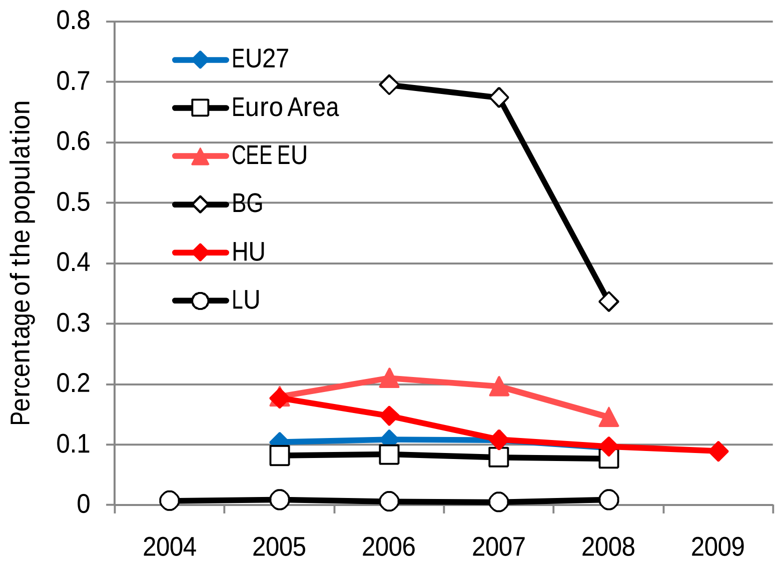
European Climate Foundation

3CSEP

Fuel poverty

Primary indicators (1)

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.

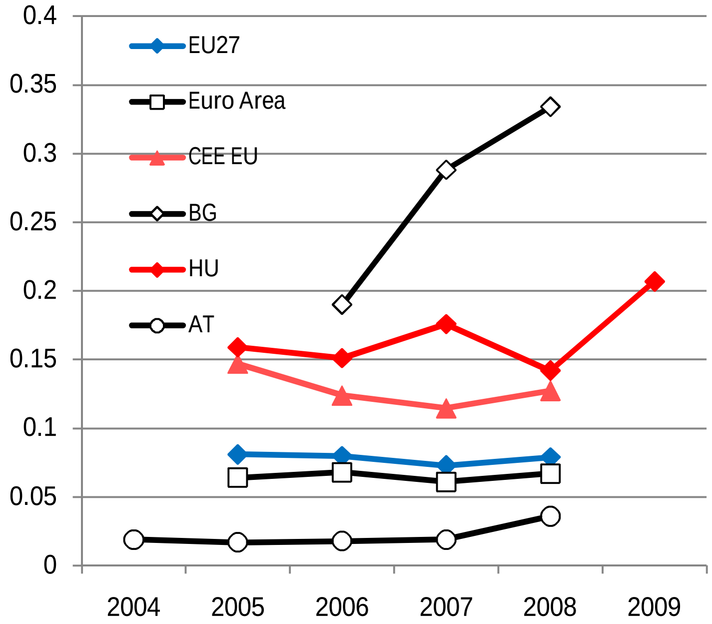
European Climate Foundation

3CSEP

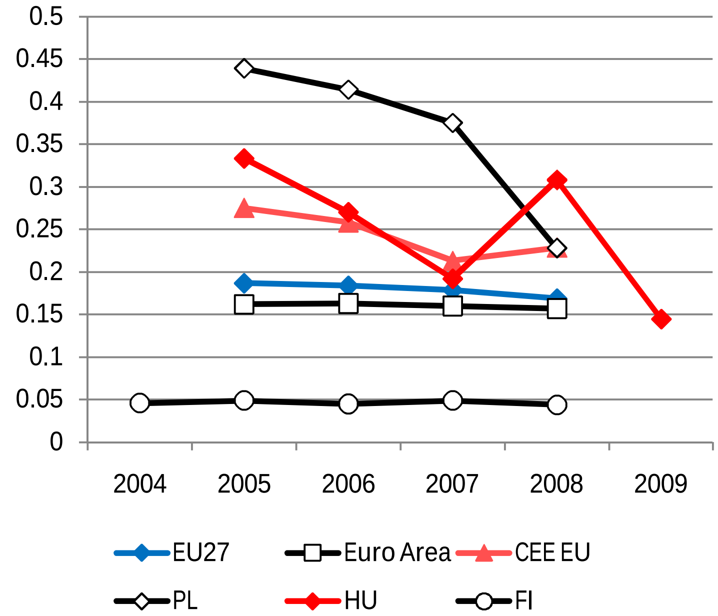
Fuel poverty

Secondary indicators (1)

ARREARS ON UTILITY BILLS (self-reported)



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



<u>Source</u>: EU SILC

*Leaking roof, damp walls, floors or foundation, or rot in window frames of floor

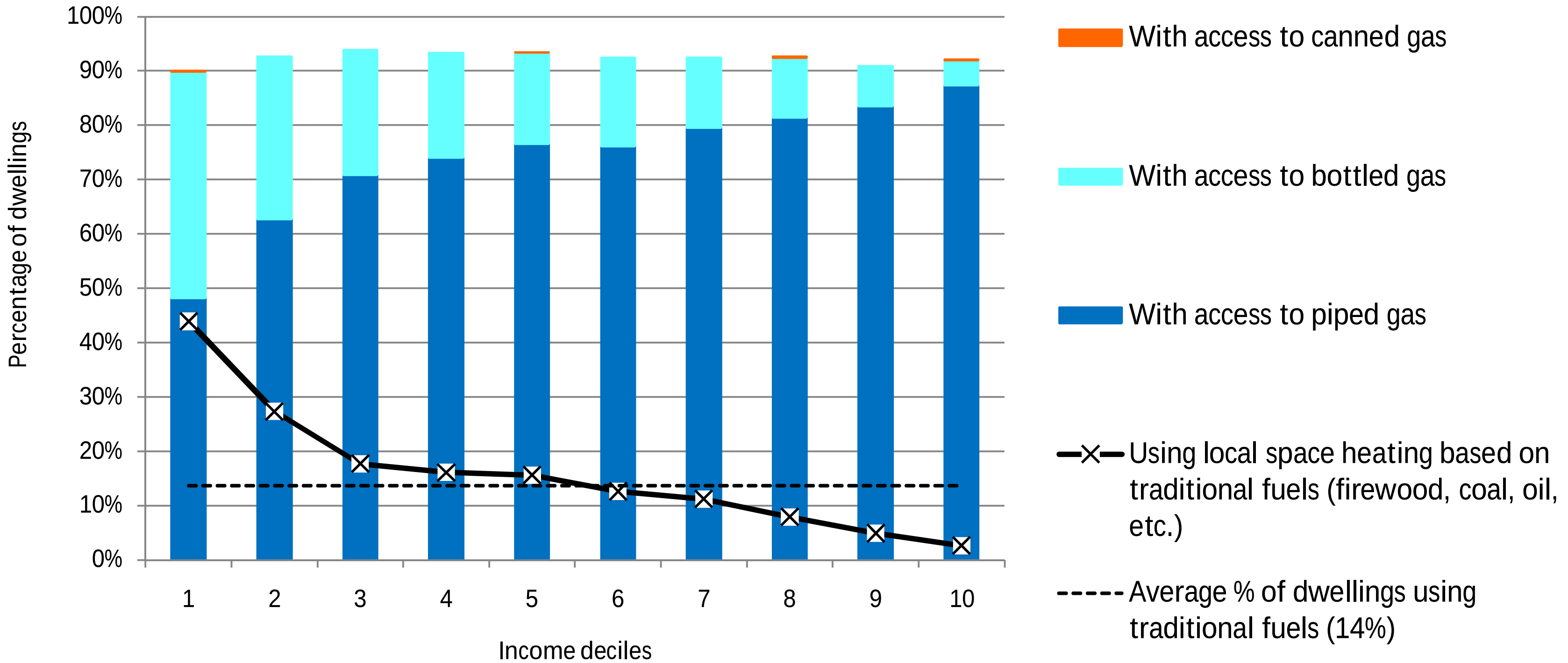
European Climate Foundation

3CSEP

Fuel poverty

Secondary indicators (2)

USE OF TRADITIONAL FUELS FOR SPACE HEATING



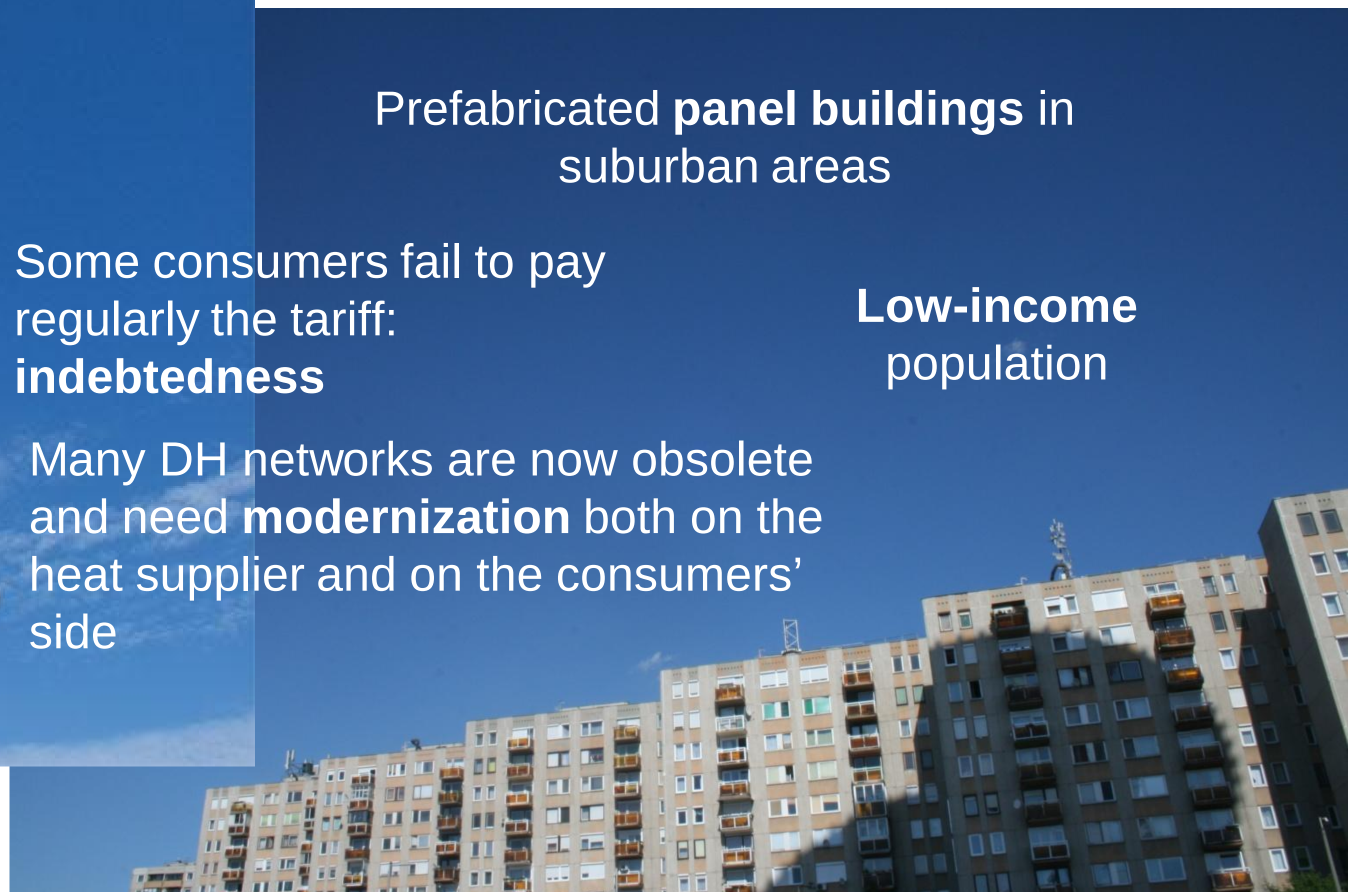
Source: KSH

European Climate Foundation

3CSEP

District heating and panel buildings

The thermal trap



Inability to control indoor temperature **thermal discomfort**

Fixed flat rate, no individual meters

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

Prefabricated **panel buildings** in suburban areas

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

- Mantaining **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);

European Climate Foundation

3CSEP

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**

European Climate Foundation

3CSEP

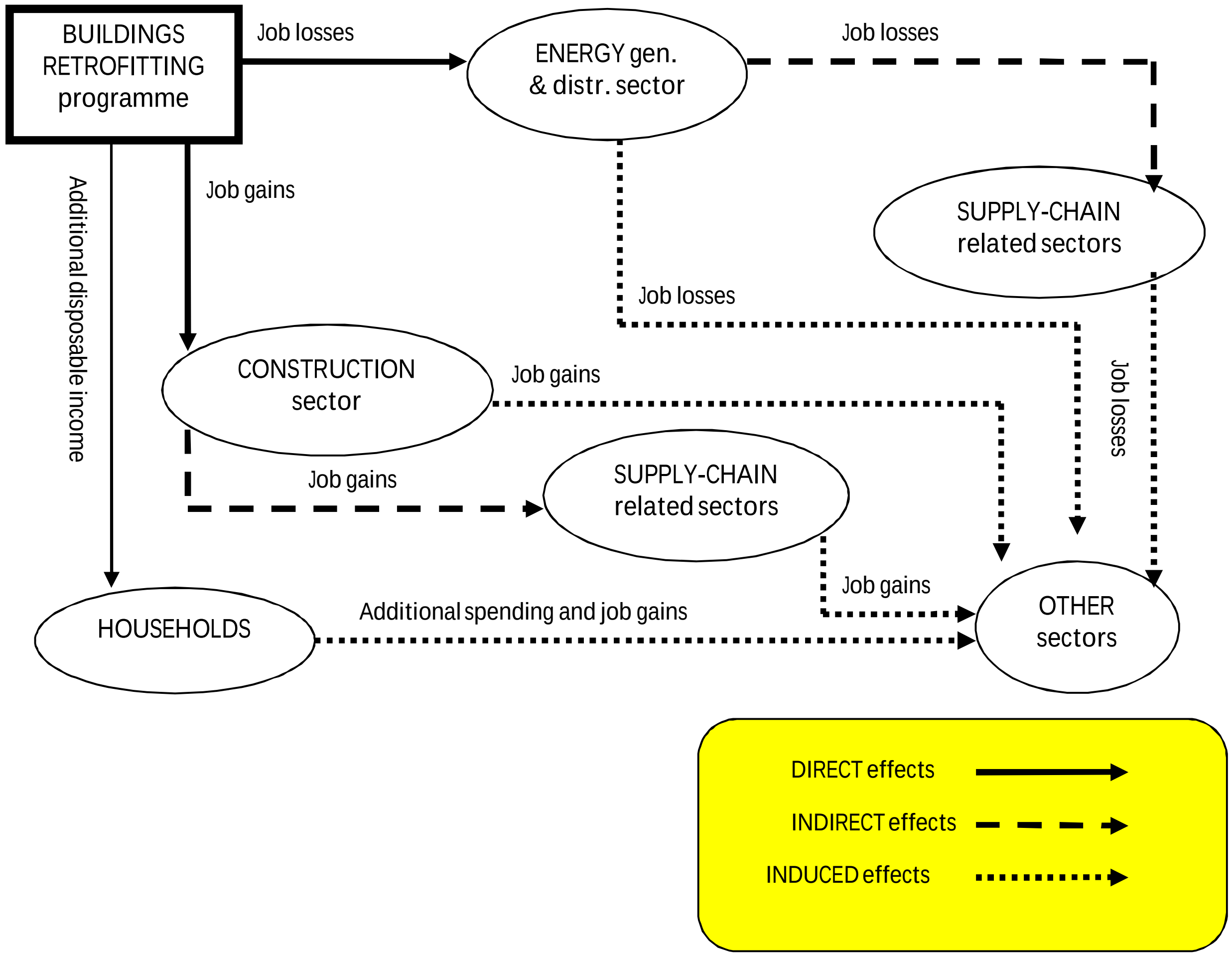
The project in a nutshell

- **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)

European Climate Foundation

3CSEP

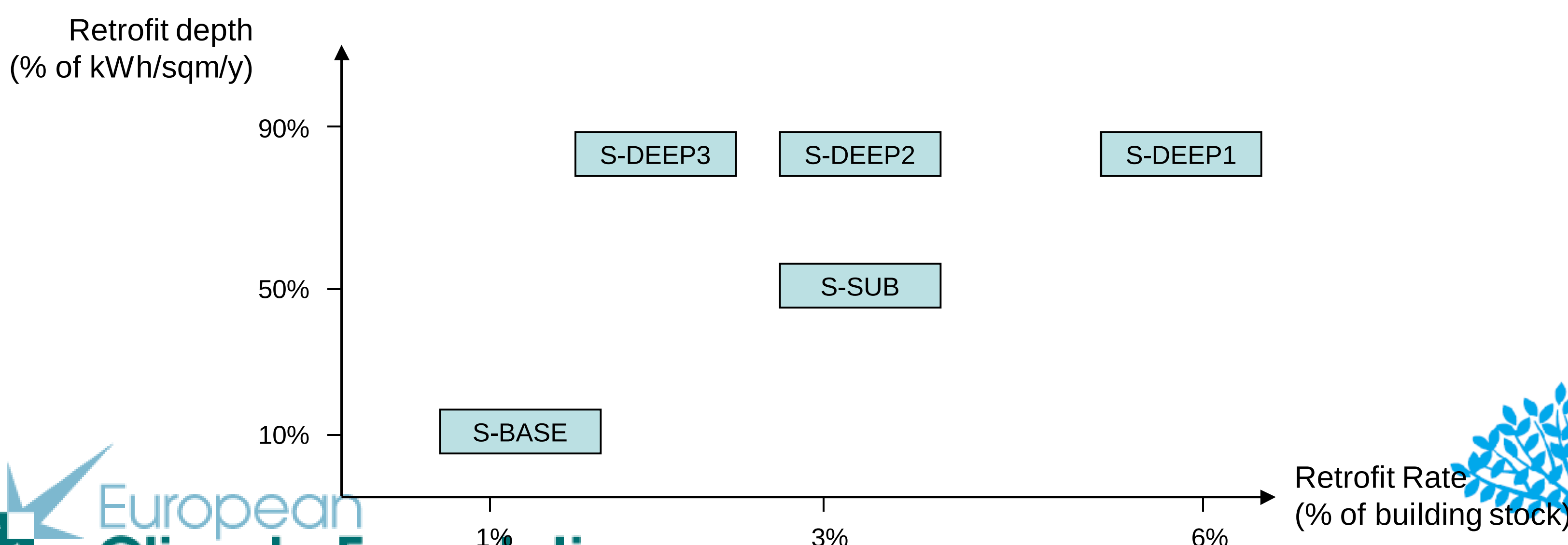
Employment effects: overview



3CSEP

Scenarios considered

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



European Climate Foundation

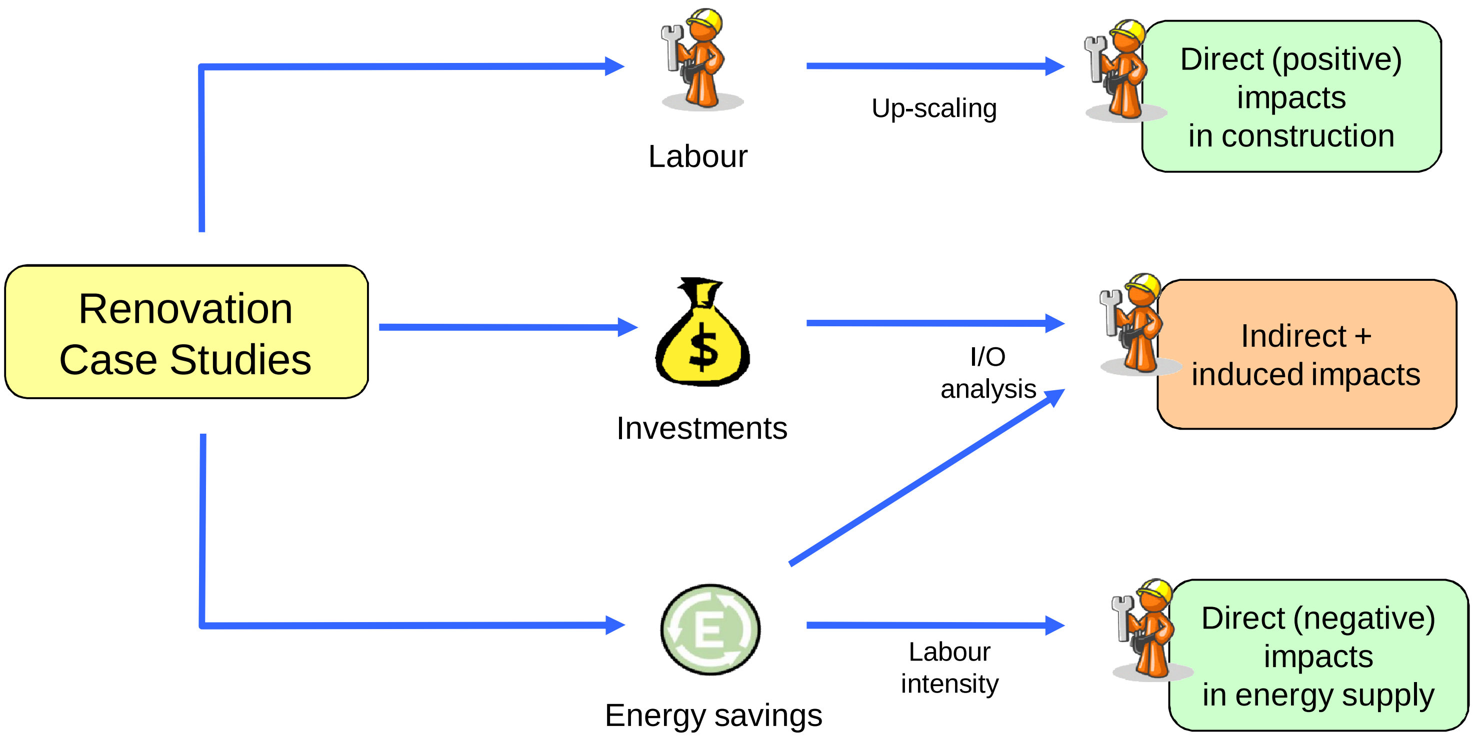
3CSEP

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

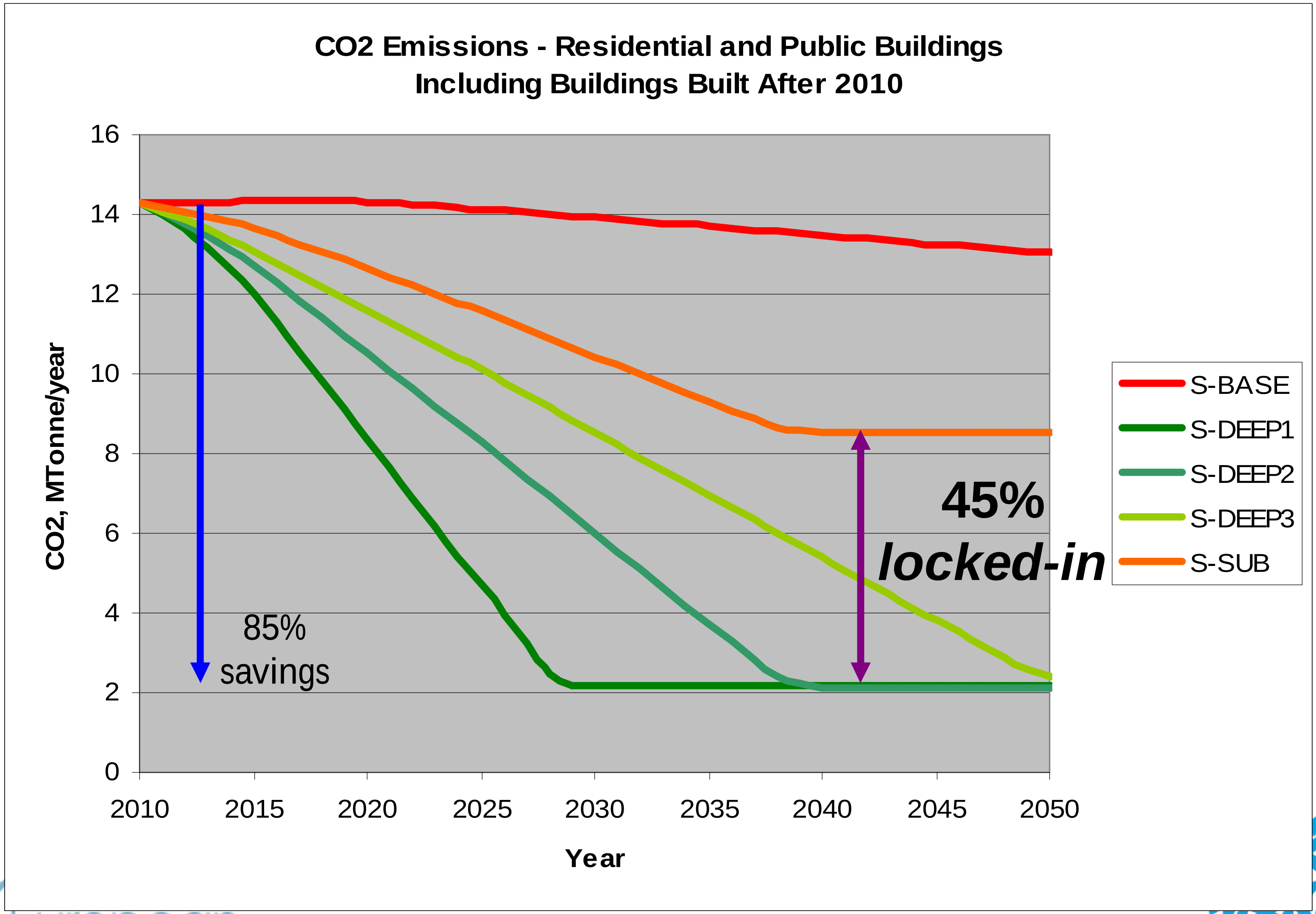
- **Mixed**: Up-scaling + Input-Output analysis



European Climate Foundation

3CSEP

Carbon emission reductions

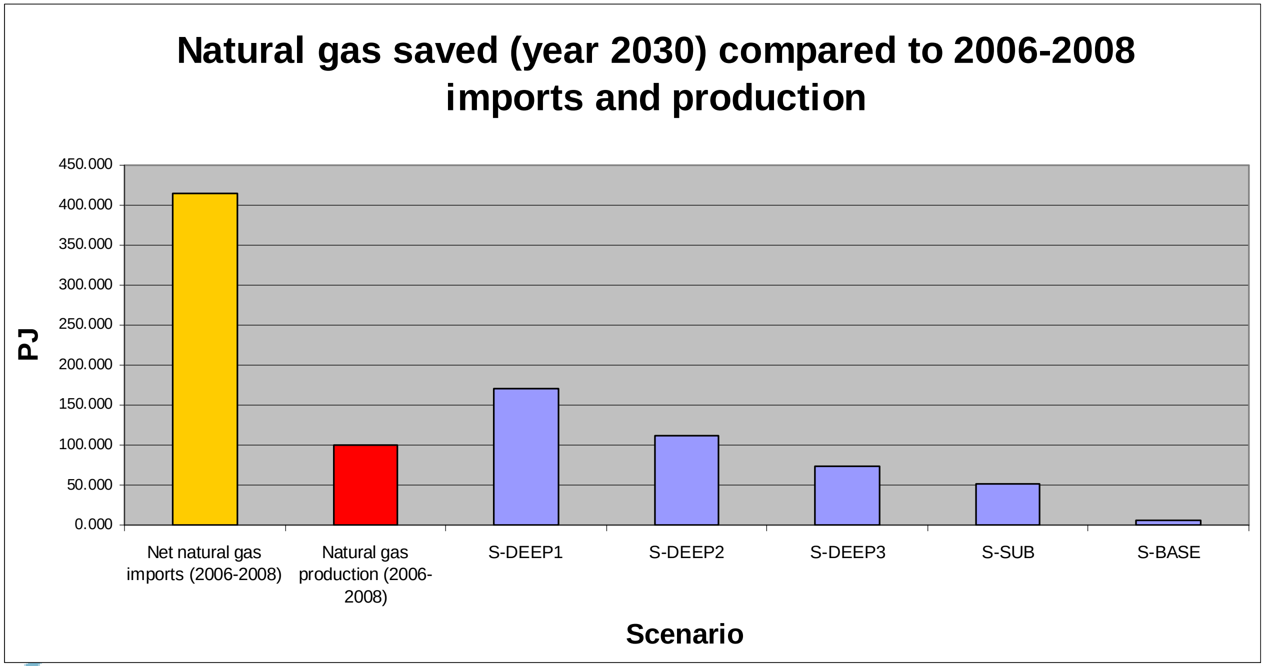


European
Climate Foundation

3CSEP

Energy dependency reduction

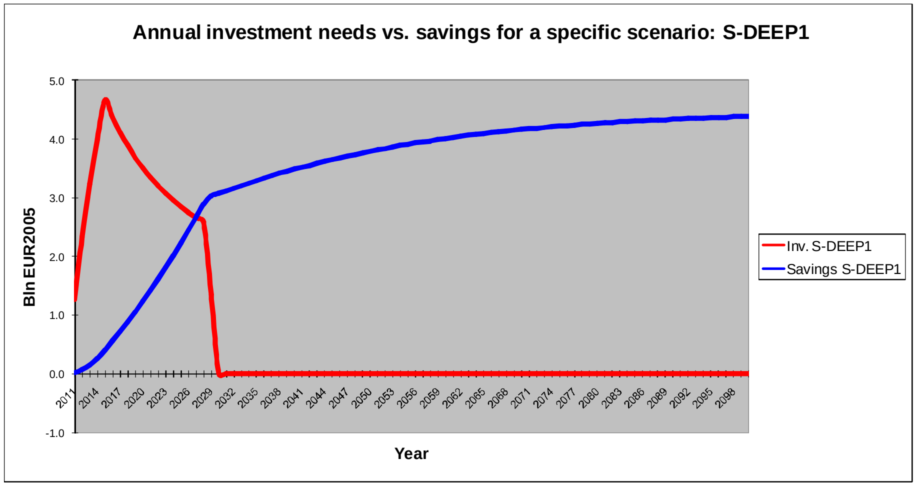
- Reduced **annual** and **peak imports** of natural gas. Once fully implemented, **deep renovation scenarios**:
  - Save up to **39%** of Hungary's NG imports (2006-2008 levels).
  - NG savings are at the same order of magnitude as Hungary's **domestic NG production** (2006-2008 levels).
  - Reduced peak imports in **January** equivalent to **59%** the natural gas imports recorded for that month in 2006-2008.

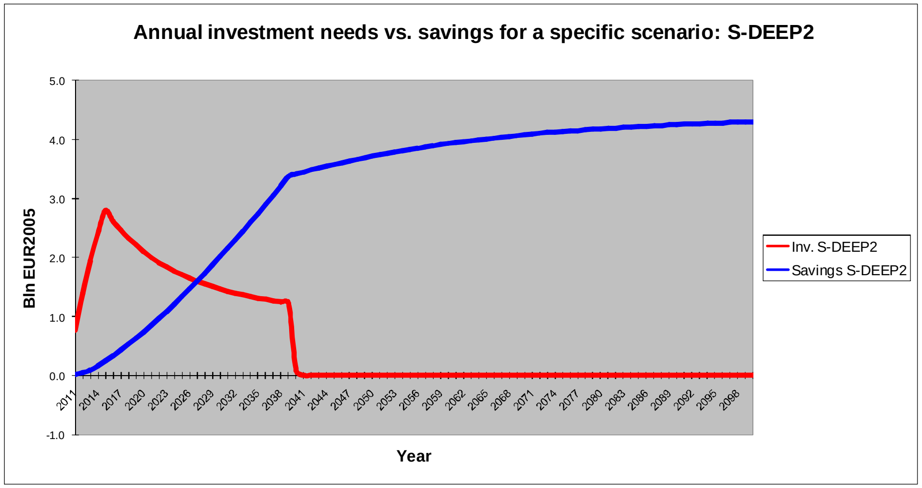


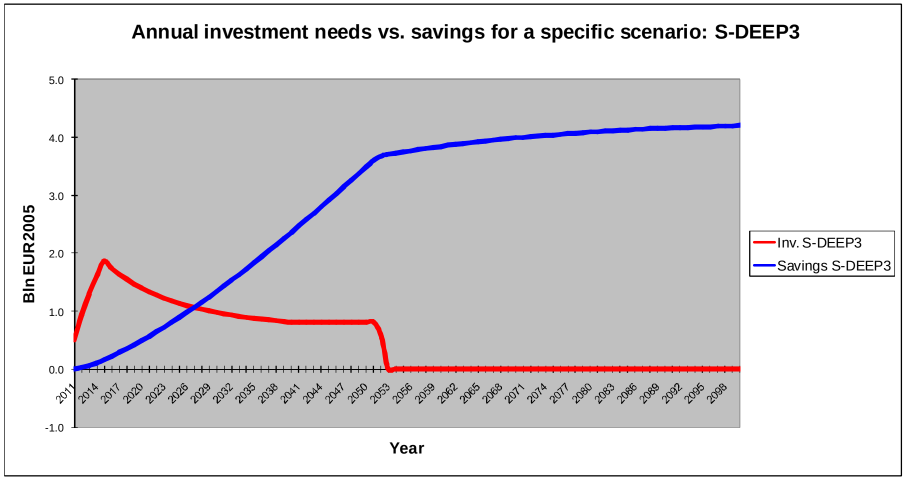
European Climate Foundation

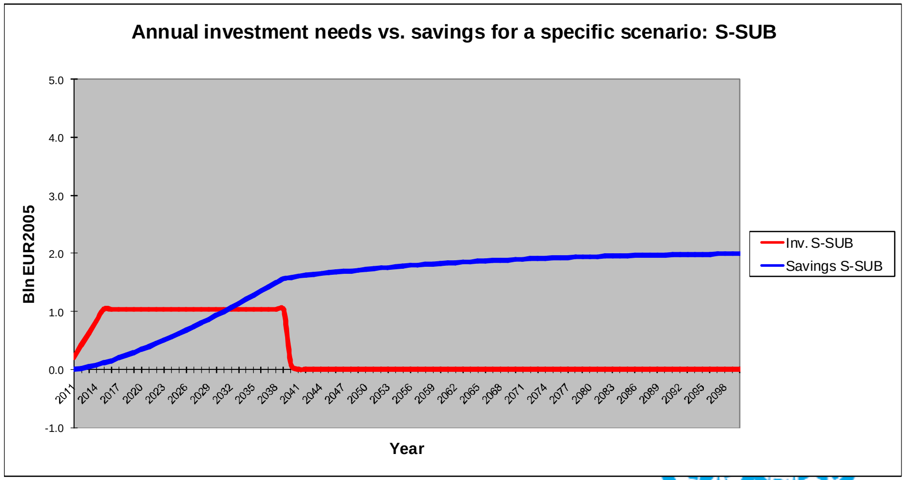
3CSEP

Annual investment costs vs. energy saving benefits









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

European Climate Foundation

3CSEP

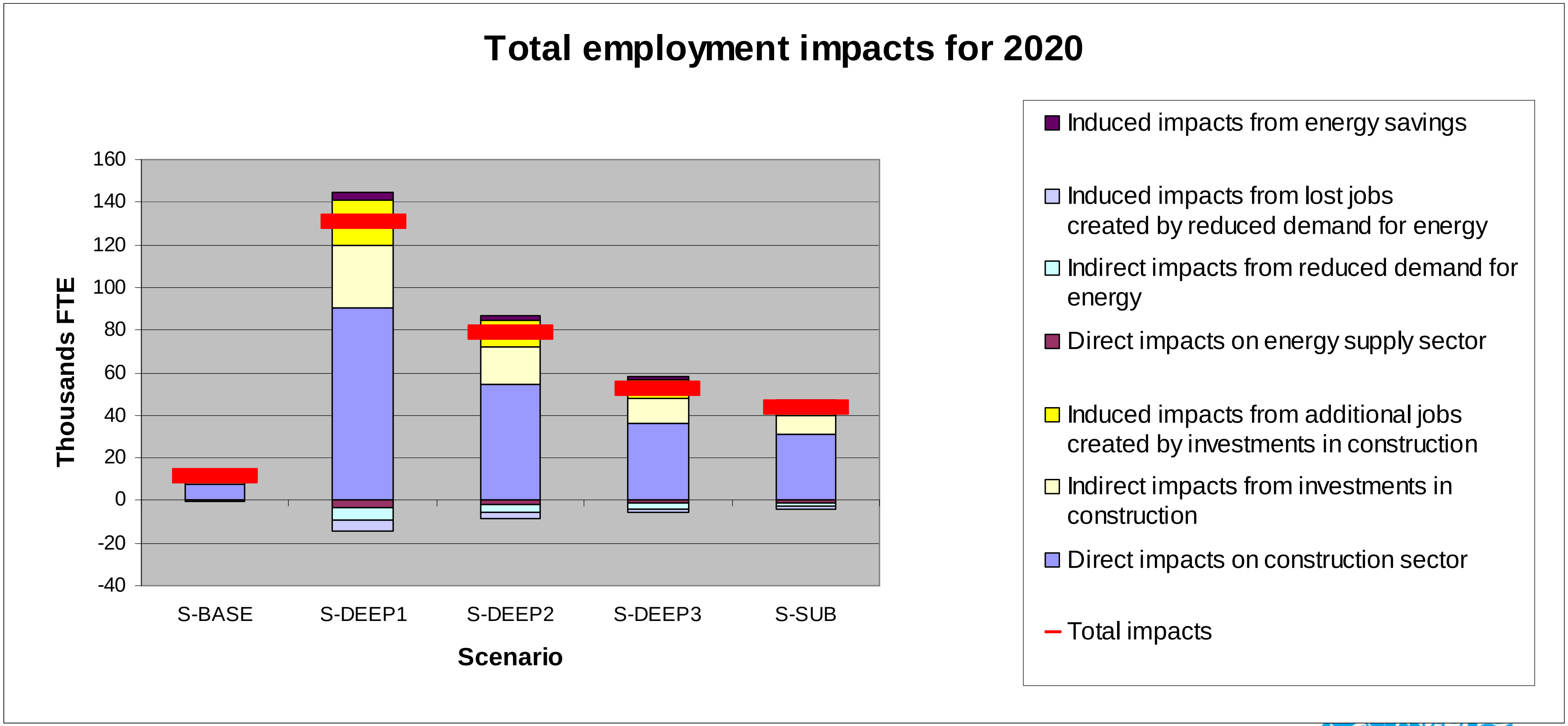
Financing

- 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

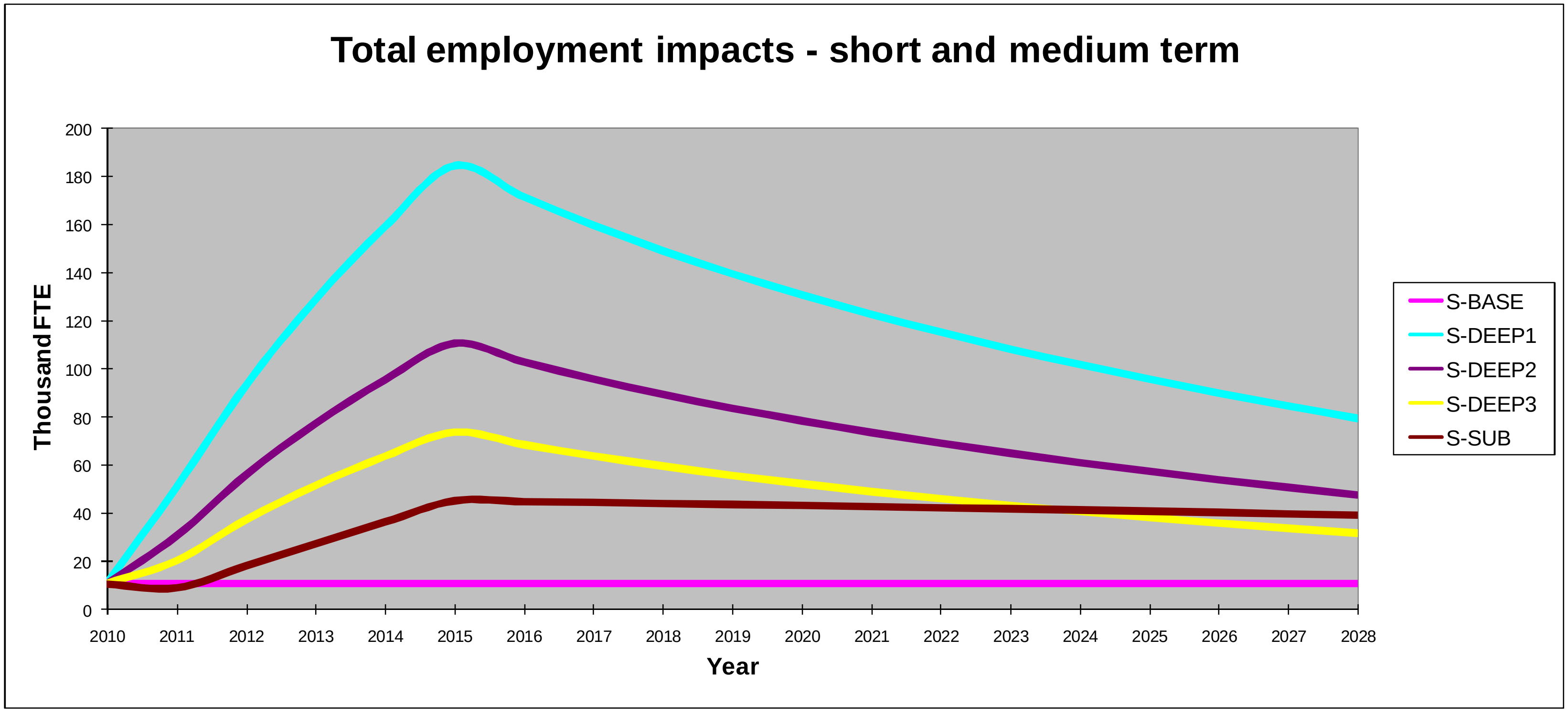


European Climate Foundation

3CSEP

Net employment impacts

Short and medium-term view



- 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

European Climate Foundation

3CSEP

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

European Climate Foundation

3CSEP

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

European Climate Foundation

3CSEP

From research to policy-making…

- **Timeframe** of the project
  - March-June 2010 (comissioned 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 governmnent 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

European Climate Foundation

3CSEP

Employment Impacts of a Large-Scale Deep Building Energy Retrofit Programme in Hungary

CENTER FOR CLIMATE CHANGE AND SUSTAINABLE ENERGY POLICY

CENTRAL EUROPEAN UNIVERSITY

Thank you for your attention

http://3csep.ceu.hu/

3csep@ceu.hu