



Energy Efficiency in the Refurbishment of High-Rise Residential Buildings

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- ◆ **Project funded by IEA and EuroACE, carried out by the Association for the Conservation of Energy (ACE)**
- ◆ **One in six dwellings** in Europe – 36 million – are in high-rise buildings; **up to 50% of the population** live in them in some countries
- ◆ **19 out of 27 housing ministries** respondent to a major European survey regard **poor energy efficiency** as a “moderate” to “major” problem
- ◆ This project investigates energy efficiency **as part of general refurbishment**

- ◆ The project has **two main parts...**
- ◆ “**Assessing the Situation**” examines the **potential for energy savings** in the high-rise sector
- ◆ “**Finding a Way Forward**” examines the opportunities for and barriers to **achieving that potential**
- ◆ This presentation **focuses on “Assessing the Situation”** and **provides the conclusions from “Finding a Way Forward”**

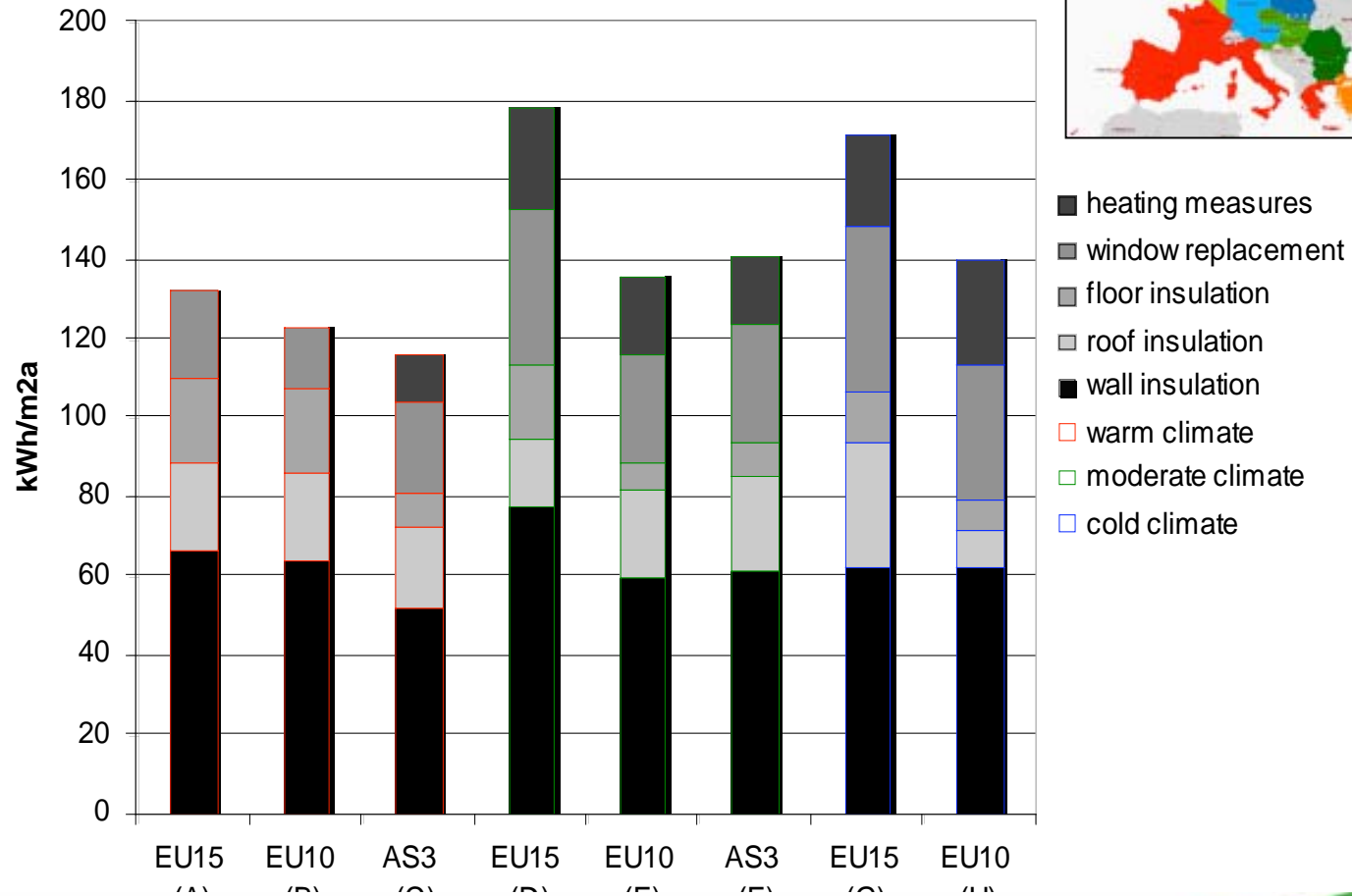
Base regions



- ◆ **Improvements to the building fabric**
 - ◆ Wall insulation
 - ◆ Roof insulation
 - ◆ Floor insulation
 - ◆ Window replacement
- ◆ **Improvements to the heating system**
 - ◆ Thermostatic radiator valves and balancing valves
 - ◆ Boiler replacements

- ◆ **Improvements to the building fabric**
 - ◆ External solar shading
 - ◆ Appropriate insulation strategies to reduce cooling demand
- ◆ **Improvements to the heating system**
 - ◆ Combined heat and power and biomass heating
- ◆ **Reducing cooling demand**
 - ◆ Passive solar design, ventilation, reducing internal heat loads, increasing building albedo
- ◆ **Other measures**
 - ◆ Lighting
 - ◆ Ventilation strategies (natural, heat recovery)

Results ... Energy savings

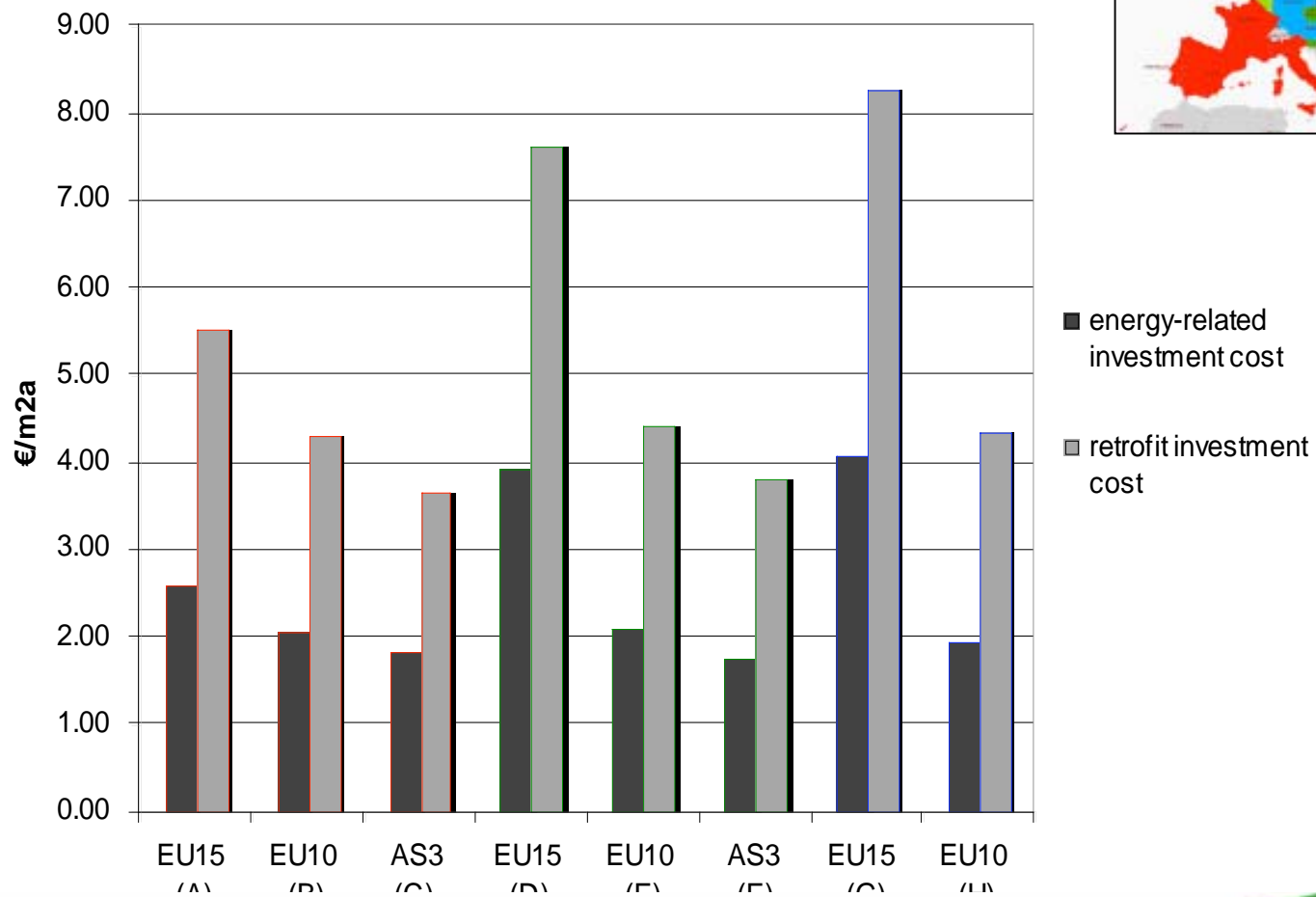




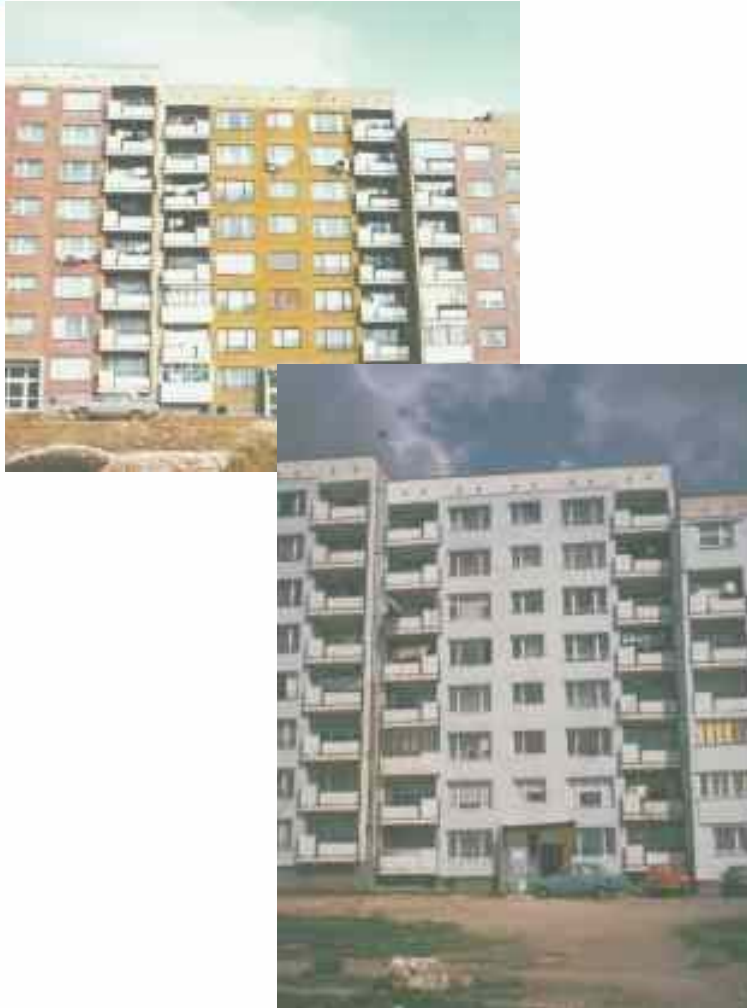
◆ Raise the Roof, St Petersburg, Russia

- ◆ Public private partnership
- ◆ Added extra storey with aim of financing refurbishment
- ◆ Large energy savings

Results ... Investment cost



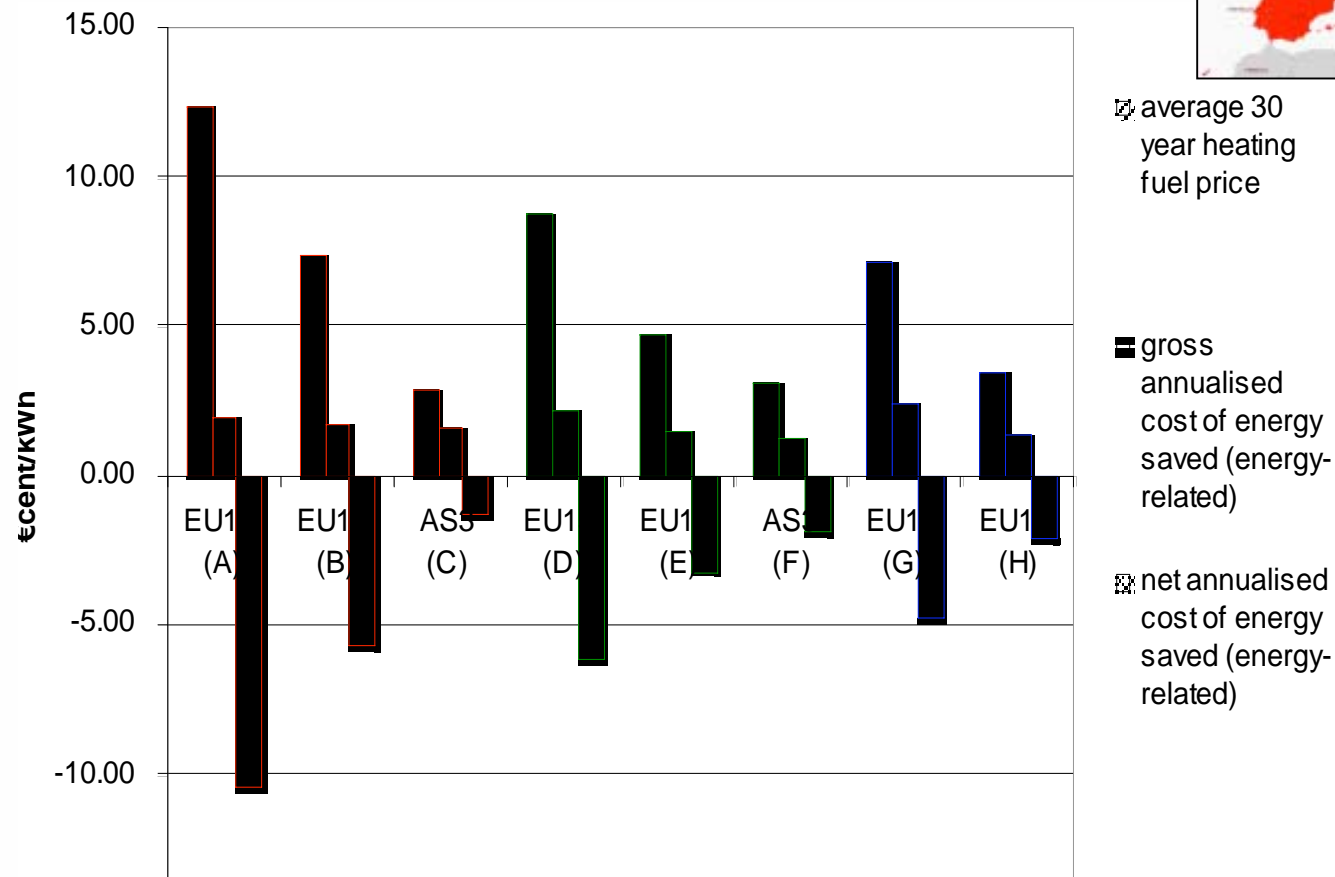
Example 2



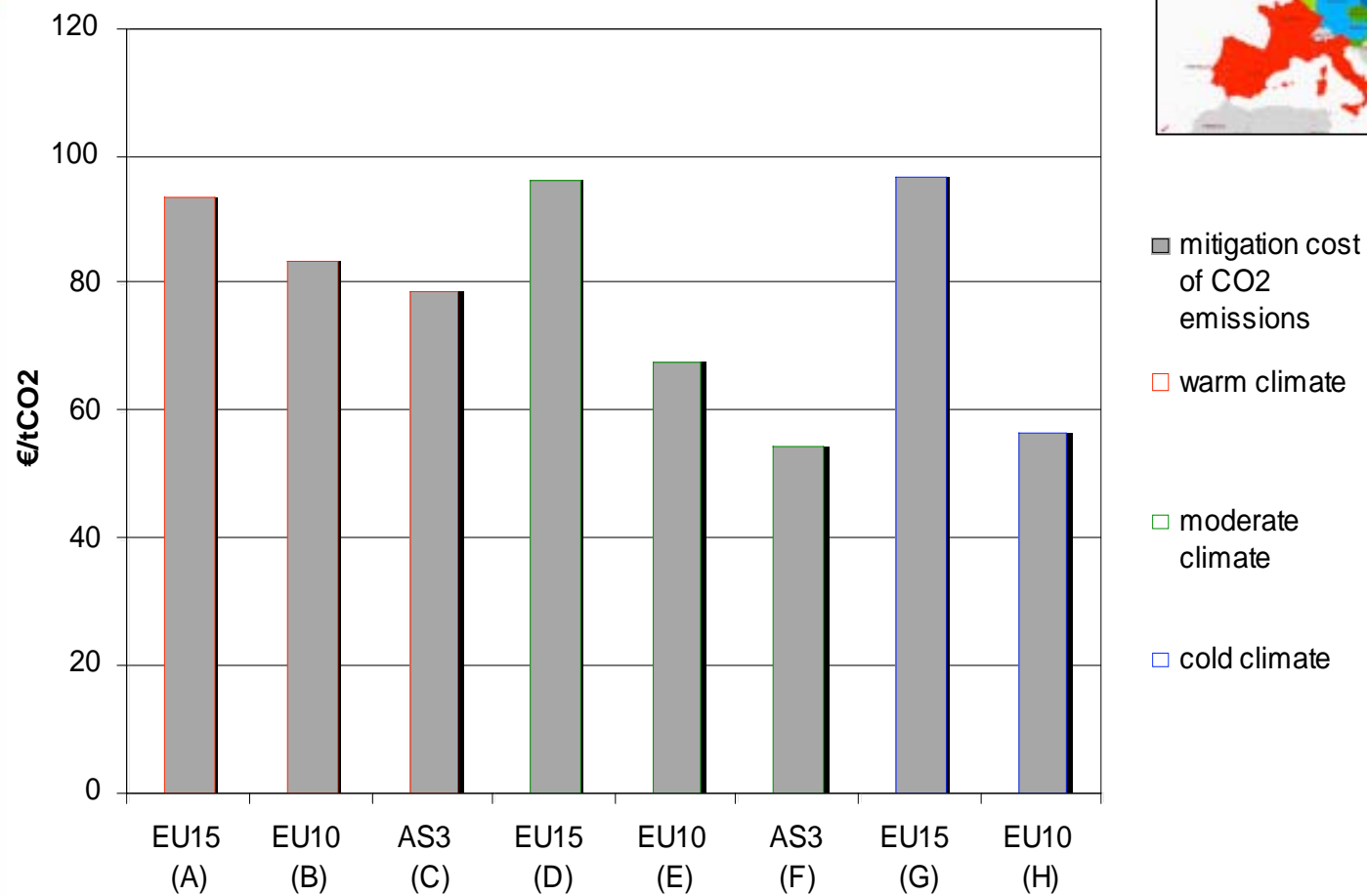
◆ “Block One”, Radomir, Bulgaria

- ◆ 9 year payback period
- ◆ PHARE-funded pilot, public private partnership
- ◆ Resident consultation at design stage, and resident satisfaction survey afterwards

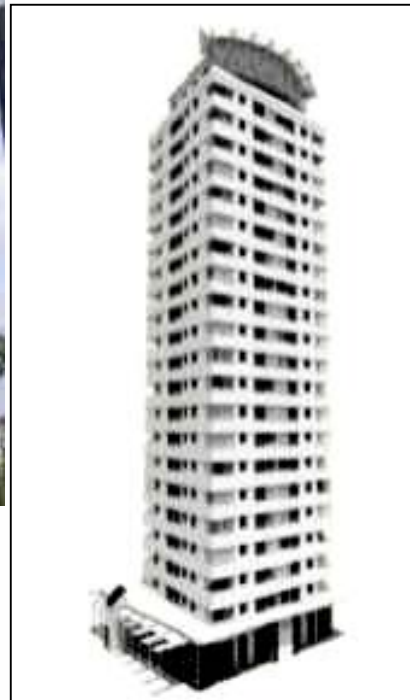
Results ... Cost-effectiveness



Results ... CO₂ mitigation cost



Example 3



◆ Glastonbury House, London, United Kingdom

- ◆ Use of renewables: CHP and wind turbine
- ◆ Strong resident involvement: robust consultation and virtual reality tool

Results ... CO₂ abatement



- ◆ **Large energy-saving and CO₂ reduction potential**
 - ◆ Highest in CEE countries
 - ◆ Average of 28% energy-saving potential
 - ◆ Reduction of final energy demand by 1.5%
 - ◆ Reduction of emissions by 35 MtCO₂

◆ In assessing cost effectiveness, the wider benefits for...

◆ Energy supply-side and energy security

- ◆ *Avoided investment in energy generation and distribution*

- ◆ *Increased system reliability*

- ◆ *Resource conservation*

- ◆ *Enhanced price stability*

◆ Employment

◆ Resident comfort and wellbeing

...must also be taken into account

◆ In a nutshell

- ◆ Large energy and CO₂ savings potential
- ◆ Energy saving most cost-effective in EU15 (for now)
- ◆ CO₂ abatement most cost-effective in EU10 and AS3

◆ Recommendations

- ◆ EU10 and AS3 require and deserve support, but as yet no **structural funds** for housing or demand-side management – new European funds to **accelerate sustainable refurbishment** needed
- ◆ **Consistent methodologies** for quantifying wider benefits of energy efficiency improvement
- ◆ Refer to **body of experience** and **close knowledge gaps** to identify most **innovative forms of financing**
- ◆ **Synchronise objectives** of authorities involved in housing and energy
- ◆ EU10/AS3 need to **prepare for energy market liberalisation** (individual metering)
- ◆ **Fill gaps** in tenement legislation
- ◆ Warm climate countries must **address cooling demand** as well
- ◆ **Make residents' involvement a requirement** for refurbishment grants
- ◆ **Link all actions to implementation of the Buildings and Energy Services Directives**

More information

◆ Six case studies have been prepared, highlighting practical approaches...



- ◆ ...regional data summaries, third-party resources and the full project report will be available on the project website...



- ◆ **The High-Rise project homepage will go live on the EuroACE website this autumn**
- ◆ **Meanwhile please contact Winton Smith or Pedro Guertler at ACE in London with any queries (winton@ukace.org, pedro@ukace.org)**