Choice-decision determinants for the (non-)adoption of energy-efficient technologies in households

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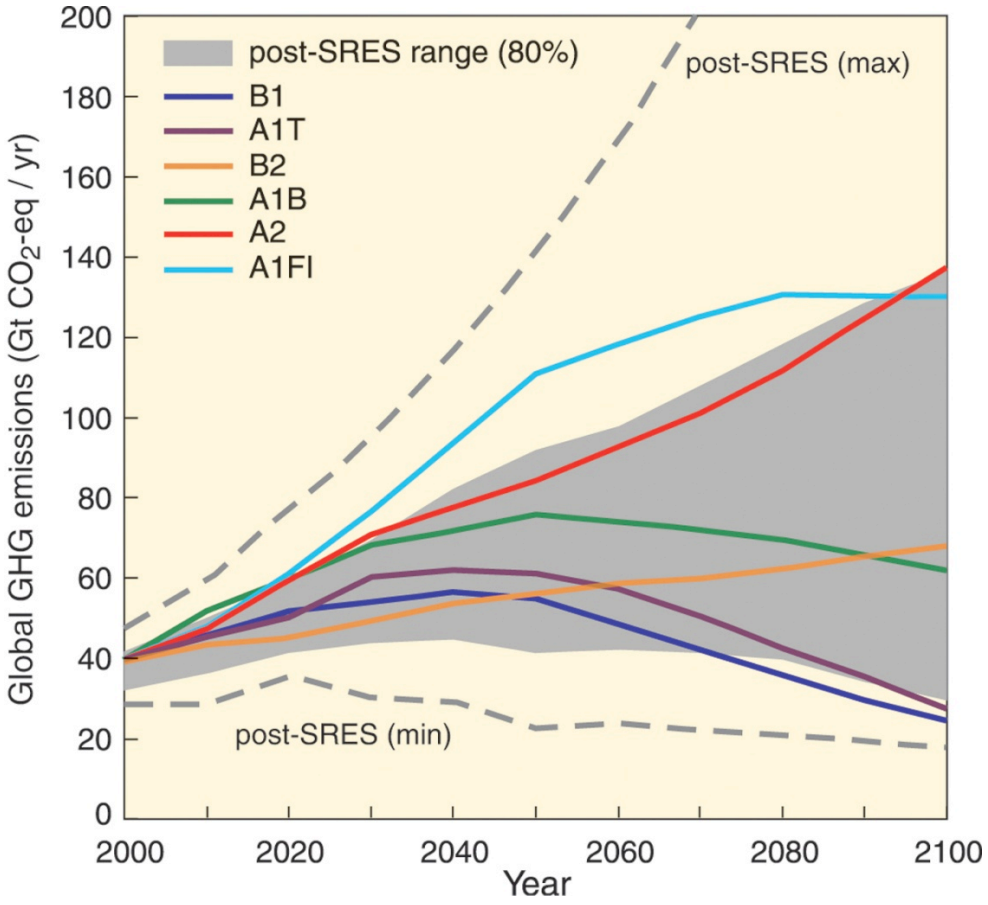
Background - Scenarios for future energy use and emissions



Source IPCC, 2007

Project objective

To analyse possible options to further enhance the realism of bottom-up energy modelling tools and their usefulness for policy design and evaluation in addressing the household sector

Objectives phase 1

1. To identify and explore determinants influencing households' (non-)adoption of energy-efficient technologies
2. To explore the extent to which the findings on empirically estimated behavioural economic parameters correlate with the ones used in energy modelling efforts

Research areas – Phase 1

- Choice determinants for energy-efficient buildings
- Choice determinants for energy-efficient lighting systems
- Choice determinants for energy-efficient consumer appliances
- Discount rates for technology choice in energy models
- Discount rates for technology choice from empirical studies

Main cross-case findings

Choice determinants for energy-efficient **buildings**

Choice determinants for energy-efficient lighting systems

Choice determinants for energy-efficient consumer appliances

Discount rates for technology choice in energy models

Discount rates for technology choice from empirical studies

- Important determinants of choice:
  - Comfort, reduction of noise
  - Capital costs
  - (Operating costs)
  - Aesthetic appearance
- Important aspects: age of the house, frequency of moving, 'principal agent-problem'→ ownership
- Barriers for up taking: space constraints, loss of storage space

Main cross-case findings

Choice determinants for energy-efficient buildings

Choice determinants for energy-efficient **lighting systems**

Choice determinants for energy-efficient consumer appliances

Discount rates for technology choice in energy models

Discount rates for technology choice from empirical studies

- Important determinants of choice:
  - Design, aesthetics, availability, compatibility, performance, safety, quality
  - Capital costs
  - Operating costs

- Contradictions regarding high income and education levels as determinants

Main cross-case findings

Choice determinants for energy-efficient buildings

Choice determinants for energy-efficient lighting systems

Choice determinants for energy-efficient **consumer appliances**

Discount rates for technology choice in energy models

Discount rates for technology choice from empirical studies

- Important determinants of choice:
  - Size, brand (seen as a guarantee for quality)
  - Capital costs
- Contradictions regarding importance of operating costs

Main cross-case findings

Choice determinants for energy-efficient buildings

Choice determinants for energy-efficient lighting systems

Choice determinants for energy-efficient consumer appliances

Discount rates for technology choice in <u>energy models</u>

Discount rates for technology choice from empirical studies

- Literature review indicates that real (or normal/private) discount rates applied in energy models for the household sector are in the range of 3-20%:
  - PRIMES: 17,5%
  - NIA: 3~7%

Main cross-case findings

Choice determinants for energy-efficient buildings

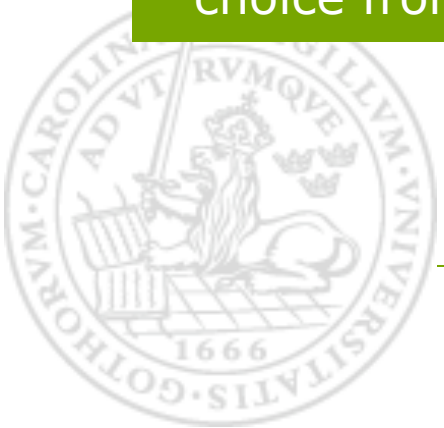
Choice determinants for energy-efficient lighting systems

Choice determinants for energy-efficient consumer appliances

Discount rates for technology choice in energy models

Discount rates for technology choice from **empirical studies**

- Compelling evidence shows high implicit discount rates that prevent adoption of efficient technologies
  - Building envelop: 10~30%
  - Appliances: 20~300%



Concluding remarks

- The results show that capital costs prove to have an important influence on technology choice, but…
- Results clearly suggests that a broader set of determinants need to be considered and that different determinants will influence households' technology choice
- Even if pure economic parameters are scrutinised, there is still a gap between ex-ante and ex-post studies
- Strong need to further enhance realism of bottom-up energy models and their usefulness for household policy evaluation

Next research steps – Phase 2

- In the second phase of the project we:
  - review numerous existing bottom-up energy models and examine their decision-making rules for technology-choice
  - analyse modelling approaches undertaken to evaluate energy efficiency policy instruments
  - identify key areas to further improve models for energy efficiency policy analysis targeting the household sector

Thanks for your attention!

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