

Redesigning residential sector MARKAL-WEU

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Introduction

- History
 - Dutch model
 - Studies on energy efficiency of technologies
 - Western European model
- Why remodelling
 - Over detailed
 - Fake accuracy
 - Unnecessary complex
 - Balance the model with respect to other sectors

Boundary conditions on redesign:

- Future question to be answered
- Keep model as simple as possible

Look for balanced description of the residential sector!

Current 18 energy demand categories

- Space heating
 - North (SFD, MFD)
 - Middle (SFD, MFD, NEW)
 - South (SFD, MFD)
- Water heating
 - North
 - Middle
 - South
- Food preparation
- Lighting
- Refrigeration
- Dish washing
- Clothes washing
- Clothes drying
- Other electric appliances Existing
- Other electric appliances New

SFD: single family dwelling, MFD: multi family dwelling, NEW: new dwellings

New energy demand categories (11)

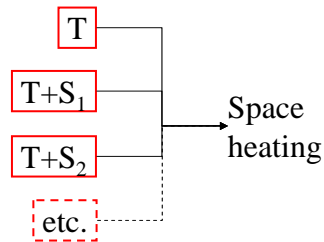
- Space heating
 - Regions
 - Types of dwellings (new and existing)
- Water heating
 - Regions
- Cooking (?)
- Aggregated electric demand

- Hence considerable reduction of categories

Current modelling technologies for space and water heating

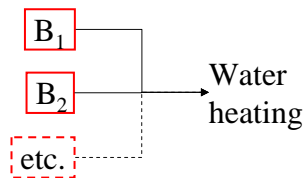
Space heating:

- Demand technologies (T)
- 112 technologies
- Saving package (S_i) on technology modelled with saving as input (CSV).
- Saving does not decrease the capacity of boilers



Water heating:

- 29 technologies
- No saving

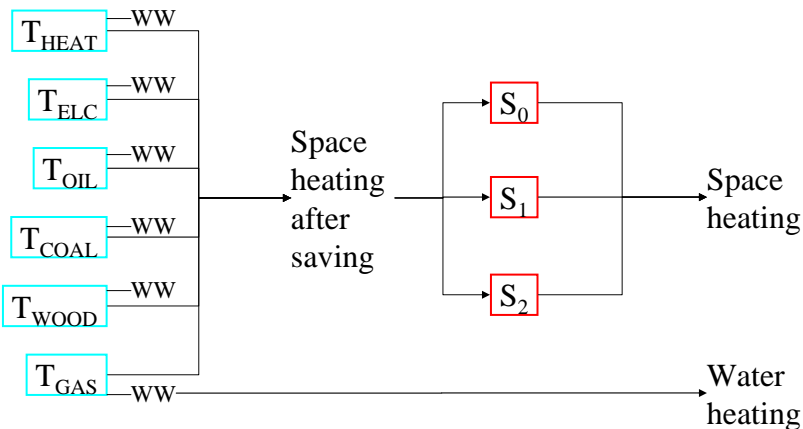


Disadvantages:

- Too much detail, especially for the future. E.g. based on actual technologies.
- Saving packages on technologies
- No “combi” of combi boilers

Desired modelling:

- 1 technology for each energy carrier
- Saving packages model as black boxes and separate from technology
 - Long lifetime savings (insulation)
 - Short lifetime savings (coated windows / advanced technologies)
- Combi boilers



Problem

Relative dimensioning of capacity for space heating and water heating.

- Fixed output share [PJ/PJ]
 - throw away space heat
 - use other water heating technology

- Using LIMIT
 - Optimising water heating
 - ...

Possible solutions

1. Old situation
 - no link space heating water heating
 - Extra technologies

2. Aggregate space and water heating
 - Different seasonal demand curves
 - Loose detailed distinction
 - Technological restrictions

3.?