



Planbureau voor de Leefomgeving



Expert workshop on INNOVATION IN RELATION TO BUILDING ENERGY DEMAND IN IAMS,

Utrecht, Jan. 21-22



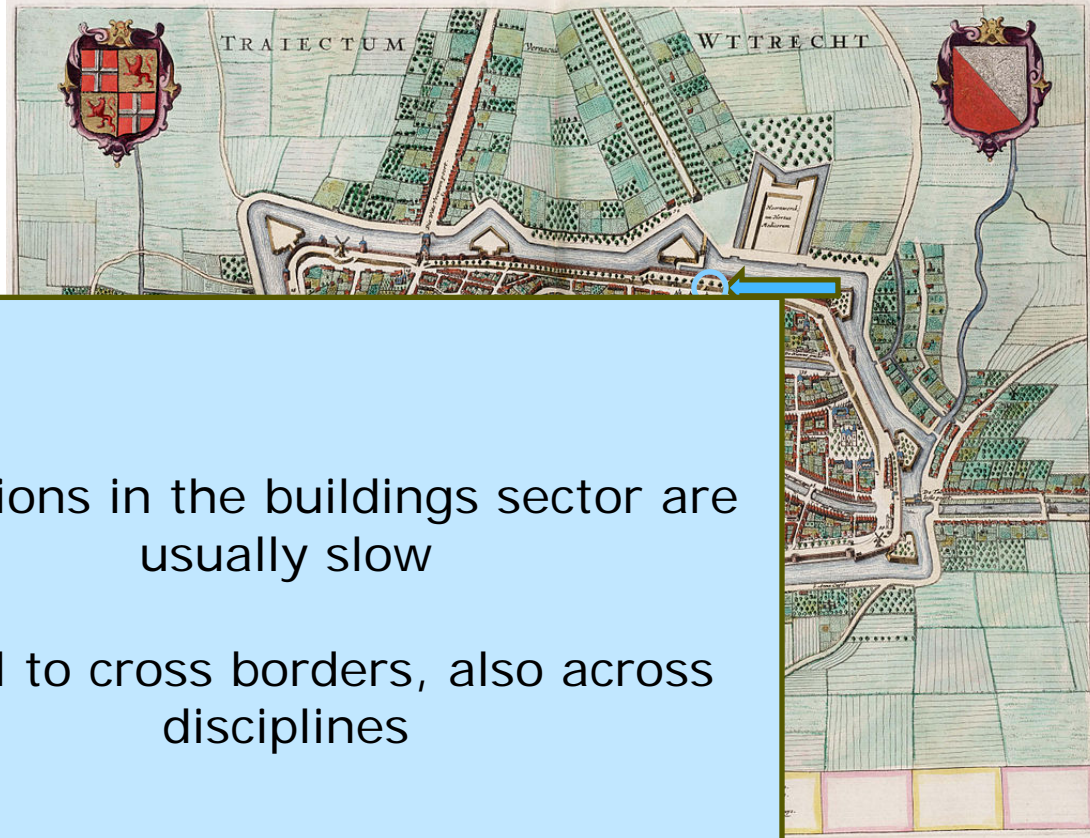
This presentation was held within the ADVANCE project that received funding from the European Union's Seventh Programme under grant agreement No. 308329



Where are we?

Leeuwenbergkerk

- 1567-1845: Plague house/ (military) hospital (burnt down in 1678 but rebuilt)
- 1845-1929: University Laboratory
- 1930-2004: Church
- Recent: Music hall (during reconstruction of concert hall)



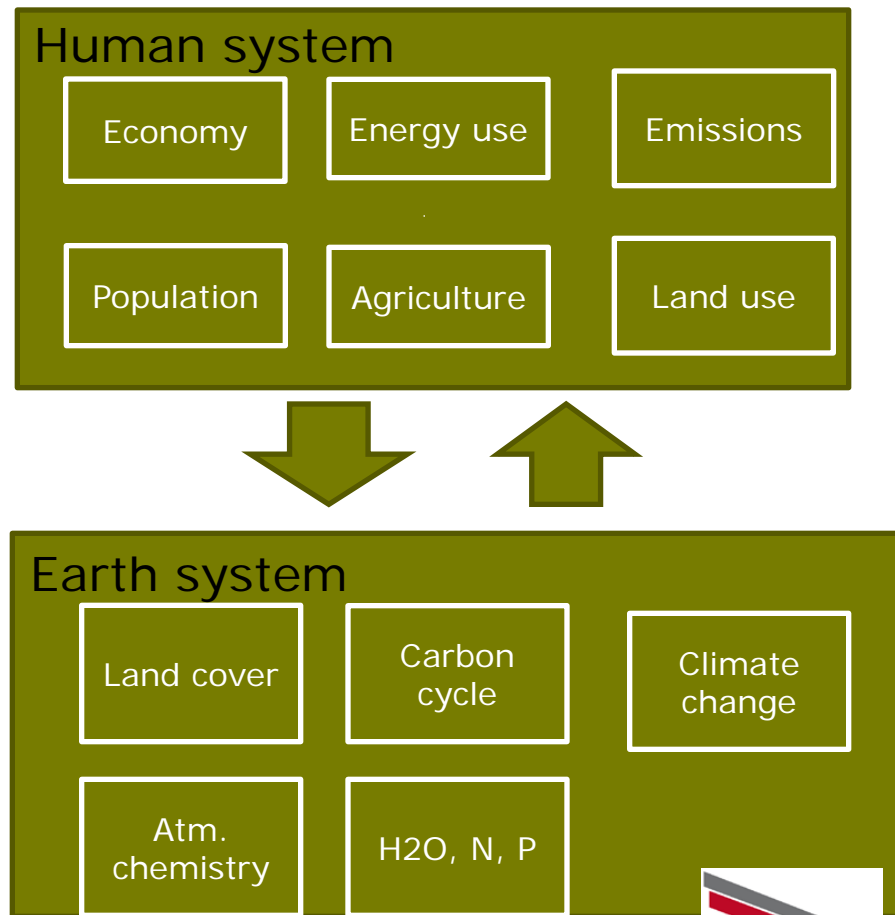
Transitions in the buildings sector are usually slow

Useful to cross borders, also across disciplines

Integrated Assessment Models (IAMs)

Focus on how do **earth system** and **environmental system** interact.

- This type of models focus on long-term scenarios of climate change and its drivers (energy sector)
- They play a major role in advising mitigation strategies of different governments, directly and indirectly (via IPCC)
- Most of the models include a reasonably detailed, long-term energy model.





The ADVANCE project

- Integrated assessment and energy-economy models have become central tools for informing long-term global and regional climate mitigation strategies.
- There is a large demand for **improved representations** of complex system interactions and thorough validation of model behaviour in order to increase user confidence in climate policy assessments.
- ADVANCE aims to **facilitate the development** of a **new generation of integrated assessment models**.
- This will be achieved by substantial progress in key areas where model improvements are greatly needed: **end use and energy service demand**; representation of heterogeneity, behaviour, innovation and consumer choices; technical change and uncertainty; system integration, path dependencies and resource constraints; and economic impacts of mitigation policies.
- The ADVANCE project will make a large and coordinated effort to generate relevant **datasets**.





One tool: Expert workshops

- Allow dialogue between modellers and real experts in specific areas of interest.
- Three earlier workshops:
 - Transport
 - Renewable energy
 - Uncertainty
- The fourth and final on innovation and residential energy use.





Important to pay attention to energy demand

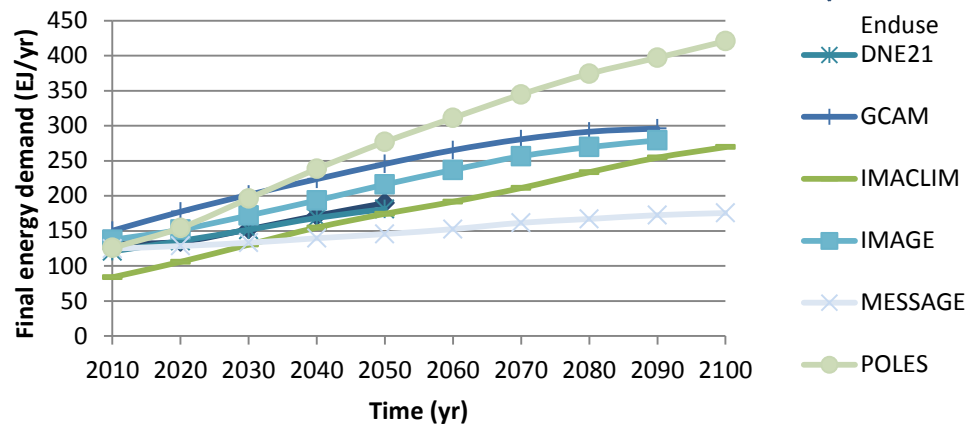
- Most models have relatively **little detail in energy demand**, compared to great detail in energy supply.
- Many models achieve the largest reductions through energy supply changes, but still energy demand significant.
- GEA and EMF27 **emphasize the importance of efficiency** for achieving 2°C.
- **Quite some uncertainty in energy consumption** scenarios



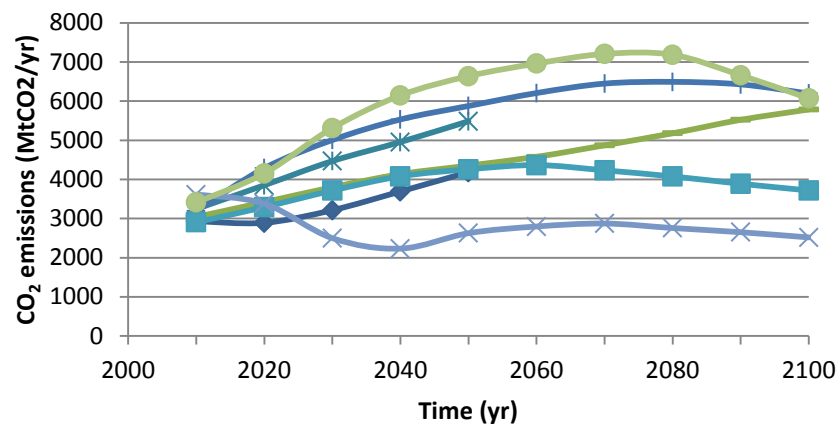


Residential –EMF results

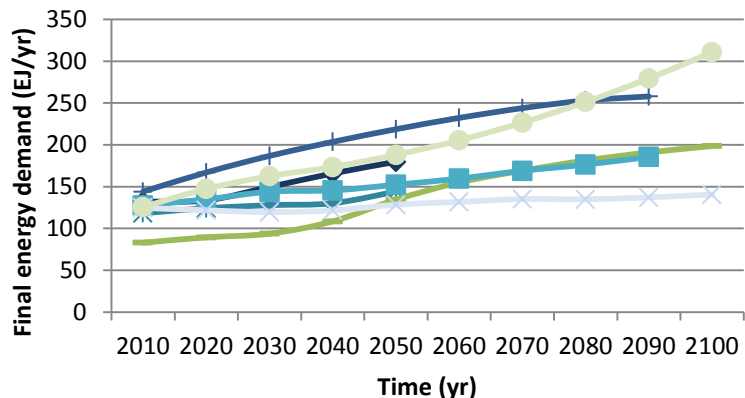
Final energy Residential -Baseline



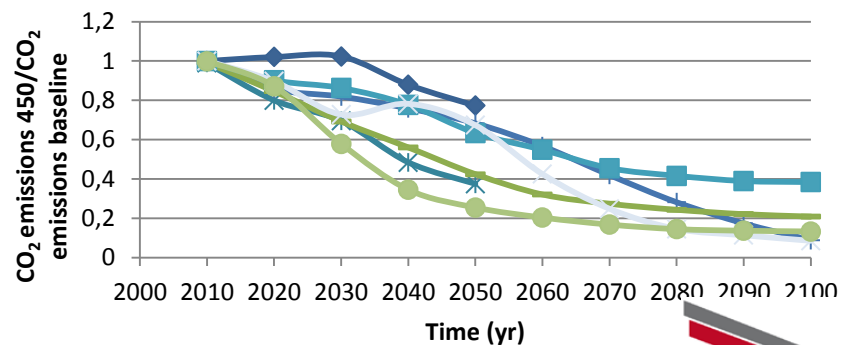
CO2 emissions - Baseline



Final Energy Residential - Mitigation

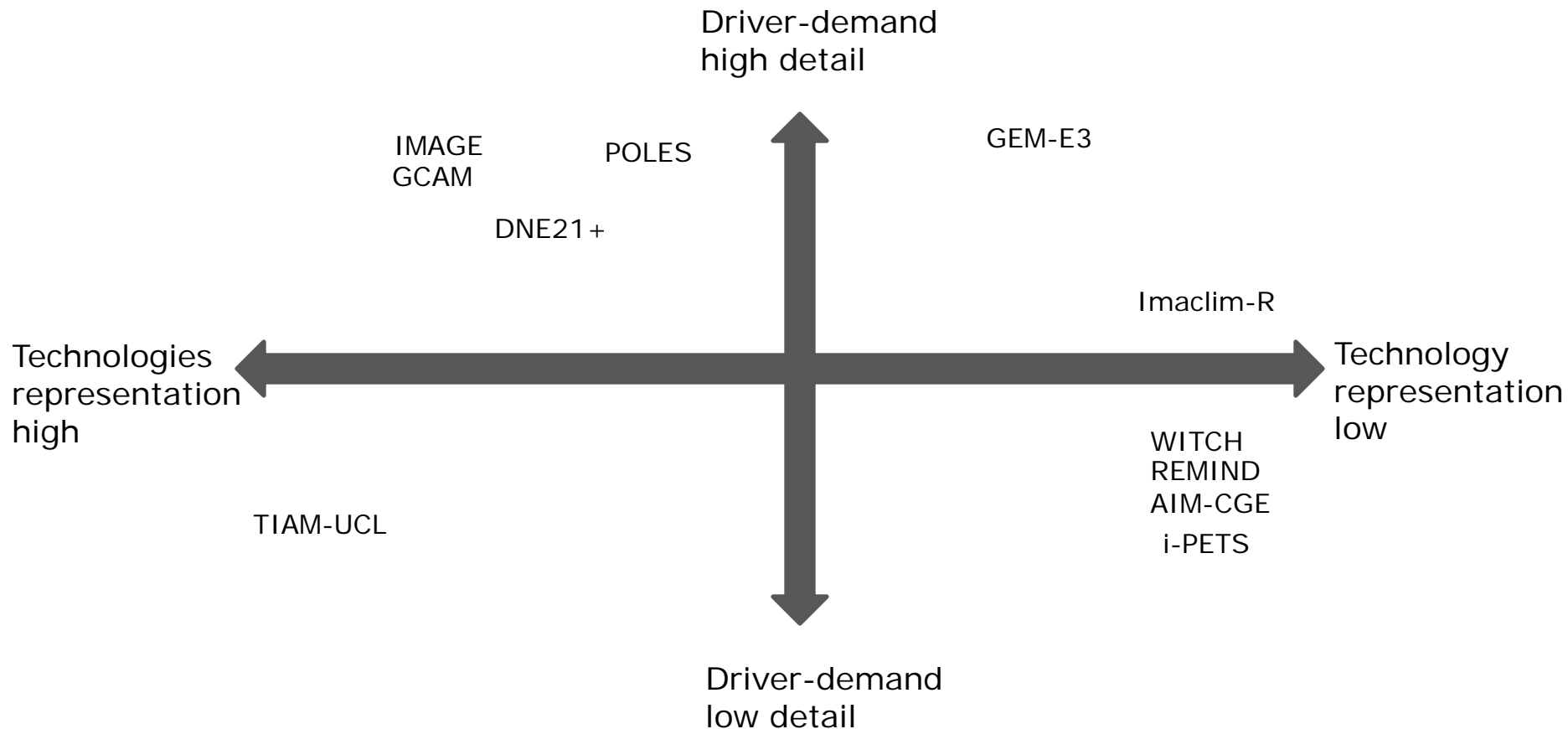


Relative CO2 emissions





Residential matrix





2013/2014 inquiry on intended model improvements

- Add residential energy use to model (separate from industry)
- Disaggregate energy services such as space heating, cooking and water heating
- Better representation of energy efficiency decisions (possibly adding even multiple-agent models)
- Heterogenous representation of the building stock: urban/rural, single, multi-family
- Include behavioral aspects
- Separation of industrial and residential energy demand
- Develop a hybrid energy model –more top down elements
- Looking into fuel poverty





Intention of the workshop

- Look into key issues of future residential energy demand – in particular in relation to innovation
- Expert view on important topics
- Discuss implications for integrated assessment models

- Three key issues identified:
 - Mitigation potential and relationship with innovation
 - The impact of behaviour
 - Relationship between integration of renewable and residential energy demand





IAMs

- IAMs - models to advise policy-makers on overall mitigation strategies in the next decades
- Obviously no need to get all details in – but they need to be consistent with the information of detailed studies
- This workshop very useful as dialogue – but still challenge how to bring detailed information from case study level to information on integrated systems and, finally, aggregated, LT models.
- How much need to endogenous in the models – and how much can be exogenous assumptions
- Data needs – also outside OECD countries to represent energy demand functions.





Mitigation potential

- Innovation can play an important role future efficiency options – there many ways to influence these (labelling, pricing) – integrated approach through policy, business plan and leadership
- Very high potential for energy savings (e.g. zero energy houses), on the basis of EE models and bottom-up studies – not well captured in IAM models
- Case studies suggest that deep demand reductions do not have to be much more expensive than conventional housing over lifetime (case study)?
- Part of this potential via “deep insulation/integrated systems” (game changer).
 - how to capture in IAMs to would evaluate individual options of by MAC curve?
- Barriers to innovations (Harmsen).
- “Adaptive behaviour” may lead to rebound effects/loss of original intentional.
- Behaviour as a way to reduce energy use – 20% potential?
- Role of policies (Sticks and carrots)





VRE integration

- Several presentations showed potential for using residential energy (many examples: water heaters, air conditioning, heat pumps, vehicle batteries) allowing higher intermittent use (much more attractive than central storage)
- How to integrate that in models: seems to be too specific for IAMs, possible to create a more generic option to peak shift or battery (but depends on location, climate/culture etc).
- Trade-offs between efficiency and load-demand management

