



Co-funded by the Intelligent Energy Europe
Programme of the European Union

ADVANCED BUILDINGS MODELLING AND DATA, EU

Lukas Kranzl,
Vienna University of Technology,
IEA Webinar 23 June 2014

CONTENT

- The model Invert/EE-Lab
- Data collected in the project ENTRANZE
- Selected results for a few EU countries

CONTENT

- The model Invert/EE-Lab
- Data collected in the project ENTRANZE
- Selected results for a few EU countries

THE MODEL INVERT/EE-LAB



- Bottom-up modelling tool of building stock and related heating, cooling and hot water systems
- Simulates substitution and/or renovation of technologies and building components
- Takes into account user behaviour
- Delivers scenarios for energy demand, energy carrier mix, investment activities, ...

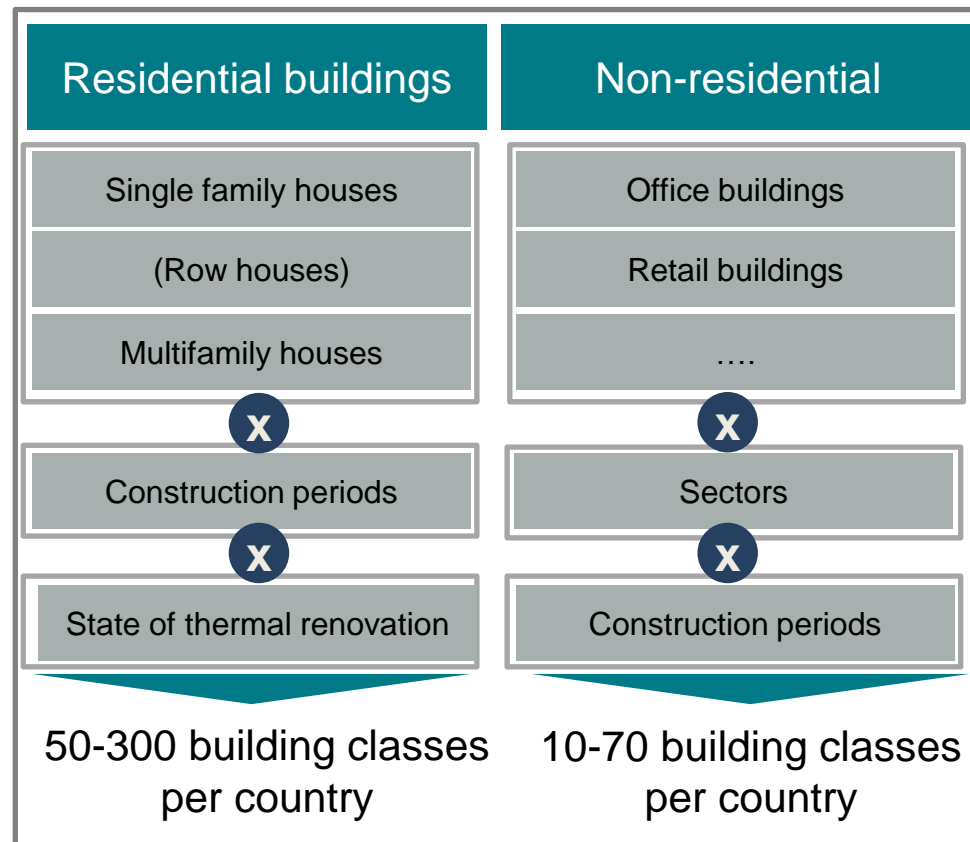
- Development has started in 2002
- Has been used in more than 30 projects in more than 15 countries and has been extended to EU-28 (+Serbia) in the IEE project ENTRANZE (www.entranze.eu).
- www.invert.at



Co-funded by the Intelligent Energy Europe Programme of the European Union

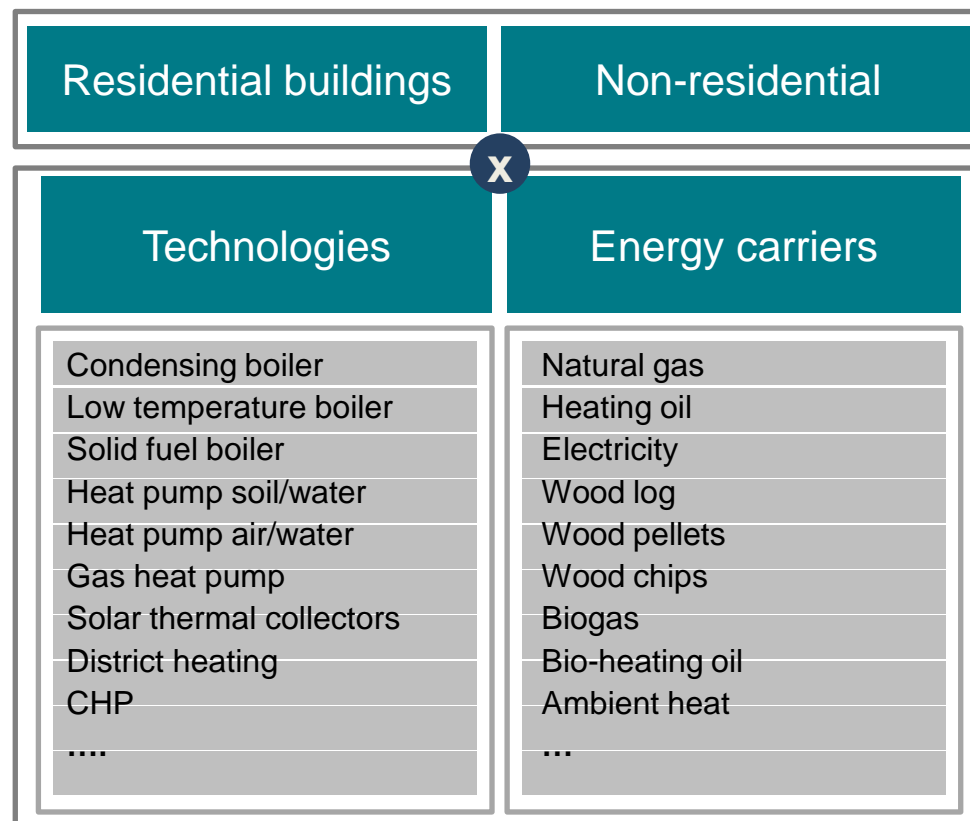
DISAGGREGATED MODELLING OF THE BUILDING STOCK

- Highly disaggregated representation of the building stock
- Demolition and construction of buildings



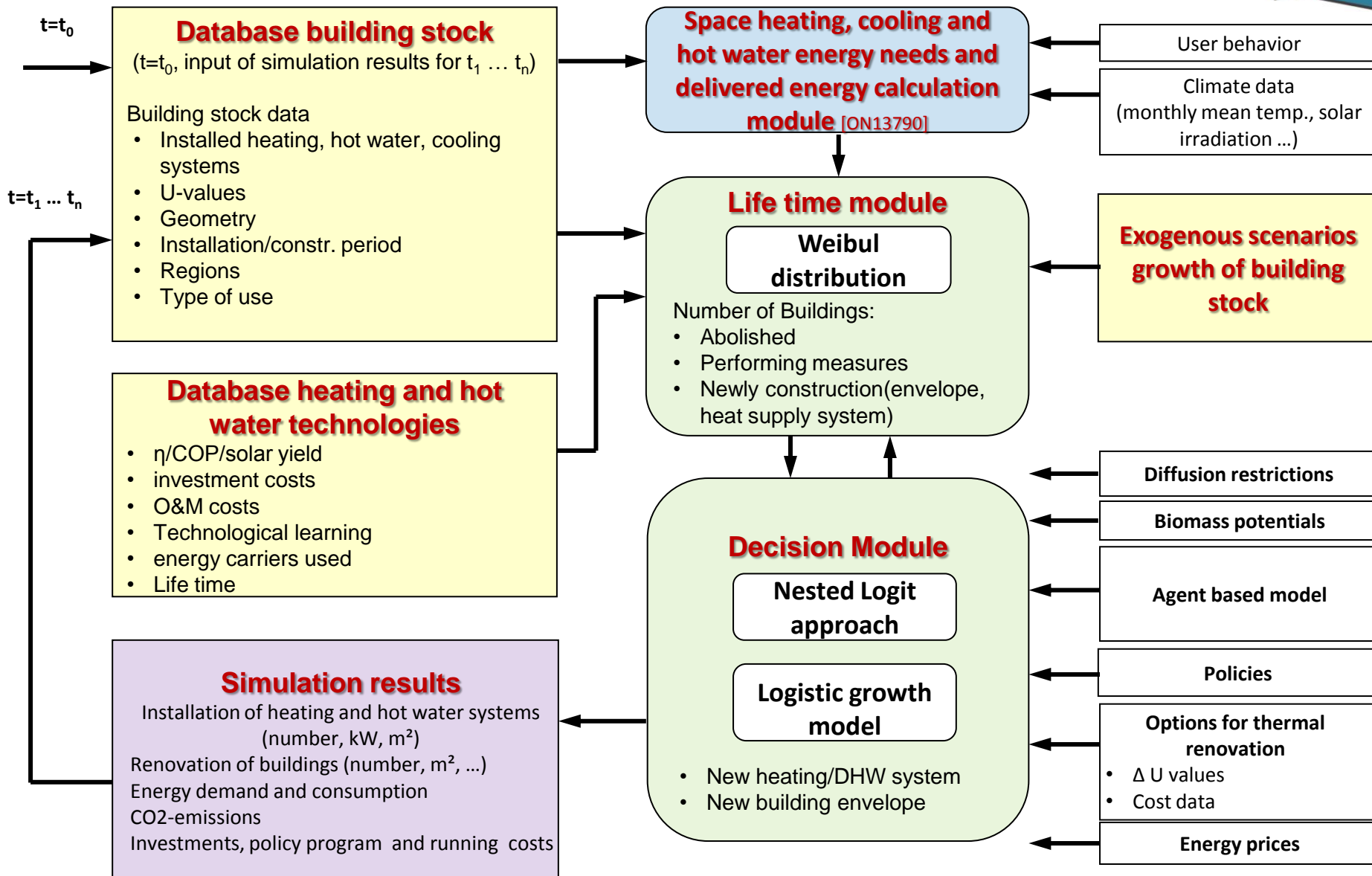
DISAGGREGATED MODELLING OF THE BUILDING STOCK

- Highly disaggregated representation of the building stock
- Demolition and construction of buildings
- Various heating and hot water systems



500 - 4500 reference building segments per country

STRUCTURE INVERT/EE-LAB

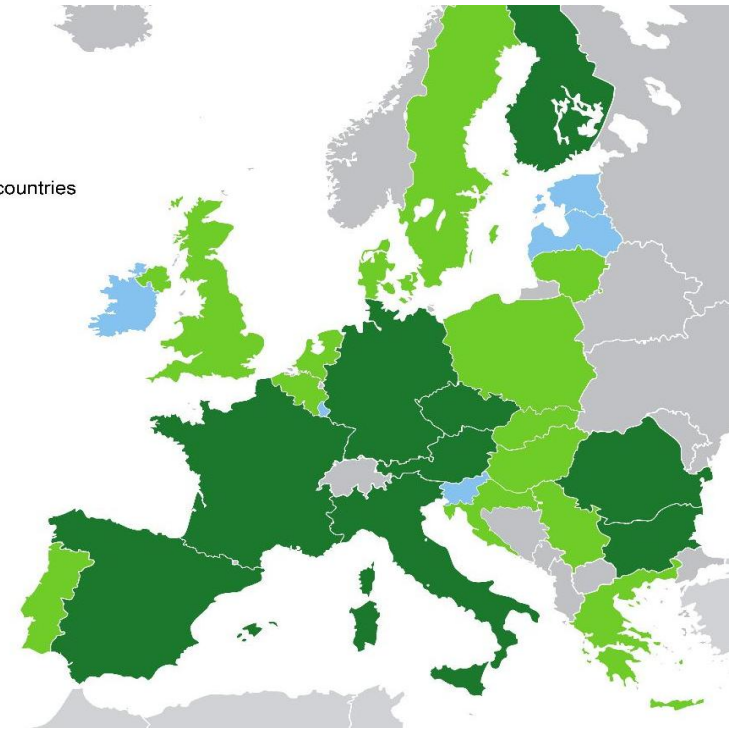


CONTENT

- The model Invert/EE-Lab
- Data for the EU building stock collected in the project ENTRANZE
- Selected results for a few EU countries

POLICIES TO ENFORCE THE TRANSITION TO NZEBs IN THE EU (ENTRANZE)

- IEE Project
- Support of policy makers in the implementation of effective and efficient policies for nZEBs
- Investigate the impact of policies in scenarios up to 2030 in target countries and EU-28 (+Serbia)
- Set up a comprehensive database of policies, costs, building stock, HVAC stock



ENTRANZE DATABASE COVERS:



- Residential and non-residential buildings (industrial buildings excluded)
- EU-28 (+Serbia)
- Split into climatic regions for selected EU countries
- Building stock data
 - Installed heating, hot water and cooling systems
 - U-values
 - Geometry
 - Installation/constr. period
 - Regions
 - Type of use
 - (Previous renovation activities: year, type, depth => relevance)
- Techno-economic data of heating, hot water, cooling systems

DATA SOURCES

- ENTRANZE database (www.entranze.eu), building on:
 - BPIE data hub (www.buildingsdata.eu)
 - Odyssee - Mure
 - Eurostat
 - National building statistics
 - National statistics on various economic sectors for non-residential building data
 - Tabula and similar projects regarding building typologies
- The level of detail the number of construction periods etc. depends on the data availability and structure of national statistics.

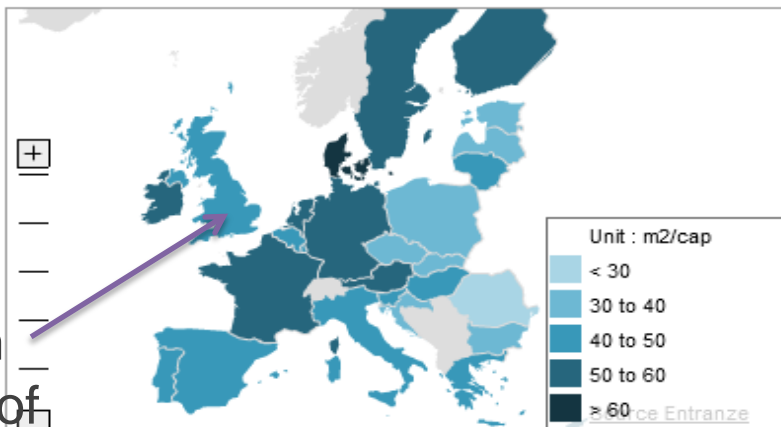
ONLINE DATA TOOL

www.entranze.eu

ONLINE DATA TOOL

- ▶ All buildings
- ▶ Residential buildings
- ▶ Non residential buildings
- ▶ Heating/AC systems
- ▶ Energy use
- ▶ How to use this interface
- ▶ Database scope
- ▶ Sources

Average floor area per capita



Year : 2008

[Highest ten](#) | [Lowest ten](#)

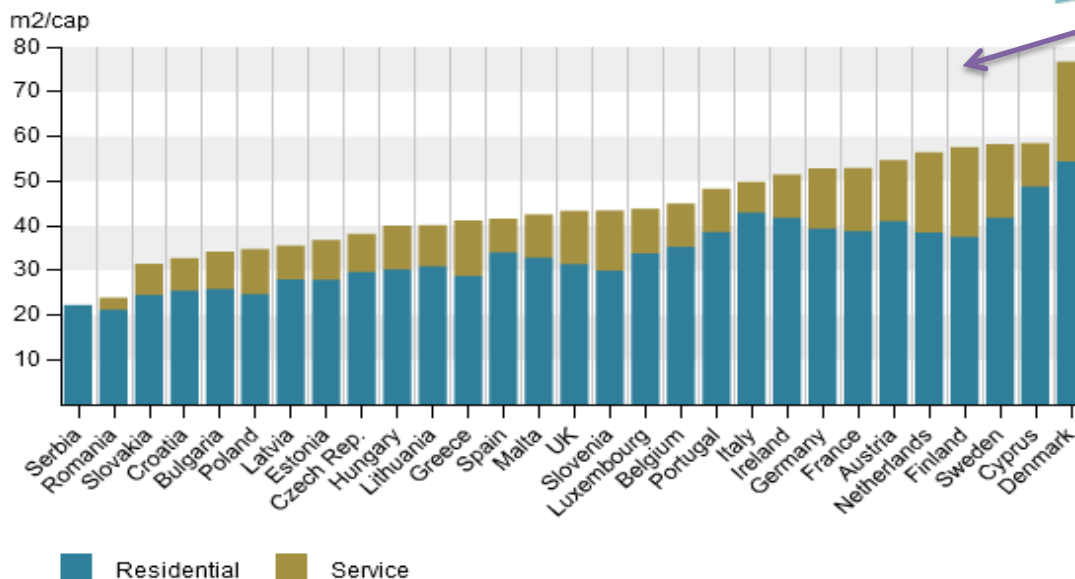
Country ranking	Value
Denmark	77
Cyprus	59
Sweden	58
Finland	58
Netherlands	56
Austria	55
France	53
Germany	53
Ireland	52
Italy	50

Excel | Map

A table showing the country ranking

A map with the values of indicators by country

Average floor area per capita



A bar chart providing additional detail for the indicator

CONTENT

- The model Invert/EE-Lab
- Data for the EU building stock collected in the project ENTRANZE
- Exemplary, selected results for a few EU countries

User chooses country, scenarios and indicators

ONLINE SCENARIO TOOL



ENTRANZE scenario tool

ANALYSIS ALL-BUILDINGS RESIDENTIAL NON-RESIDENTIAL INFORMATION
METHODOLOGY, OBJECTIVES

Items: 3 Countries: 1 Scenarios: 3

Gas market share in space and water heating building demand
 Electricity market share in space and water heating building demand
 Oil market share in space and water heating building demand

France

BAU
 CO2 tax
 Proactive

High prices

Search...

Countries

- Austria
- Bulgaria
- Czech Rep.
- Finland
- France
- Germany
- Italy
- Romania
- Spain
- Belgium
- Croatia
- Cyprus
- Denmark
- Estonia
- Greece
- Hungary
- Ireland
- Latvia
- Lithuania
- Luxembourg
- Malta
- Netherlands
- Poland
- Portugal
- Slovakia
- Slovenia

France - High prices

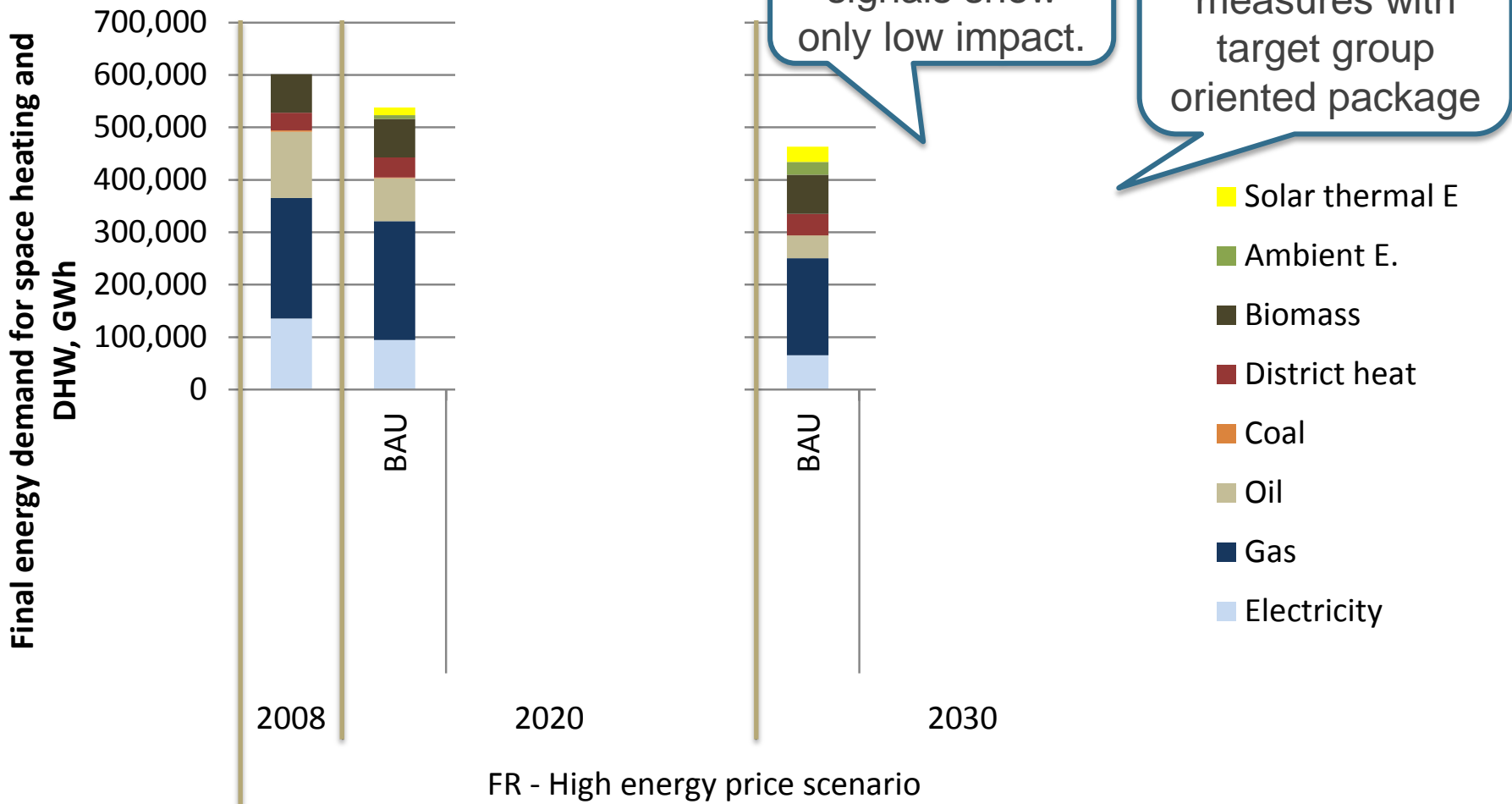
	Scenario	Price	Unit	2008	2015	2020	2025	2030
	Gas market share in space and water heating	BAU	H %	43.1	44.8	45.9	45.3	42.6
	Gas market share in space and water heating	CO2 tax	H %	43.1	44.1	44.6	43.5	40.8
	Gas market share in space and water heating	Proactive	H %	43.1	44.3	44.9	43.3	39.4
	Electricity market share in space and water	BAU	H %	12.7	11.1	9.95	9.01	8.15
	Electricity market share in space and water	CO2 tax	H %	12.7	11.1	9.97	9.13	8.26
	Electricity market share in space and water	Proactive	H %	12.7	11.2	10.3	9.55	8.86
	Oil market share in space and water heating	BAU	H %	23.7	20.0	16.7	13.2	9.97
	Oil market share in space and water heating	CO2 tax	H %	23.7	20.2	17.0	13.8	10.4
	Oil market share in space and water heating building demand	Proactive	H %	23.7	20.1	16.9	13.7	10.6

Results can be uploaded in excel, and displayed in several formats (table or graphs)

A clear methodology is proposed

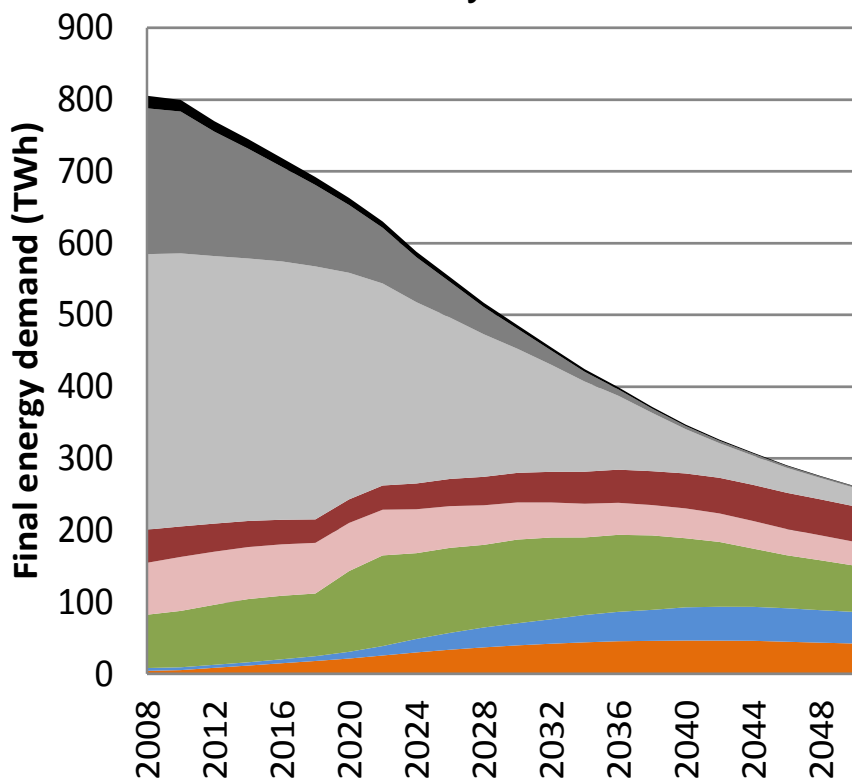
Price sensitivity

E.G. FRANCE: CO2/ENERGY-TAX VS. PROACTIVE, TARGET GROUP ORIENTED POLICY SETS

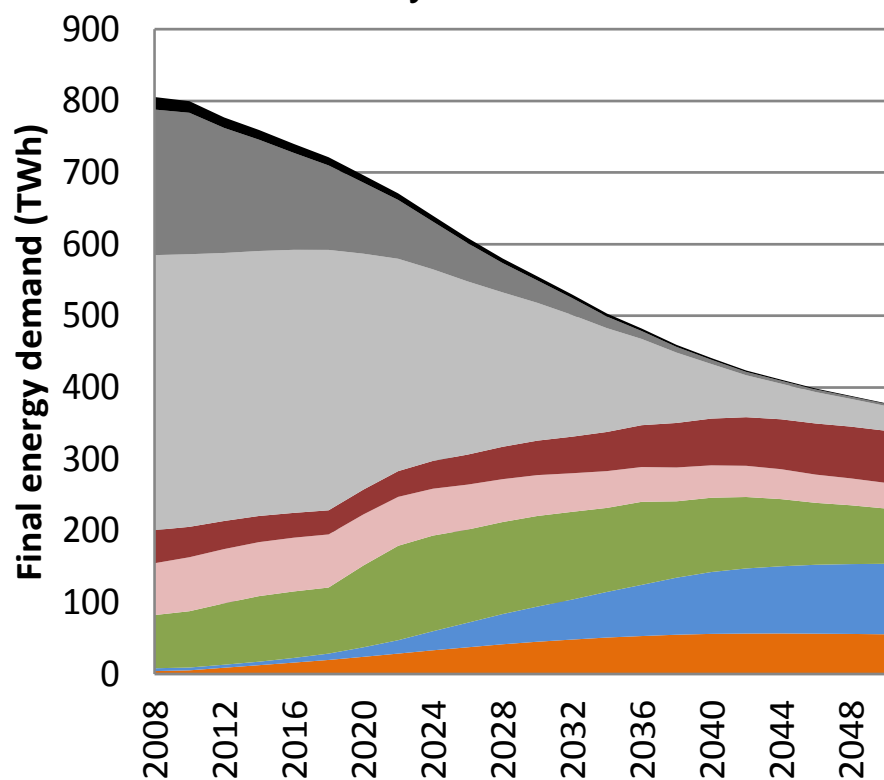


E.G. GERMANY: LONG-TERM SCENARIOS

Focus efficiency

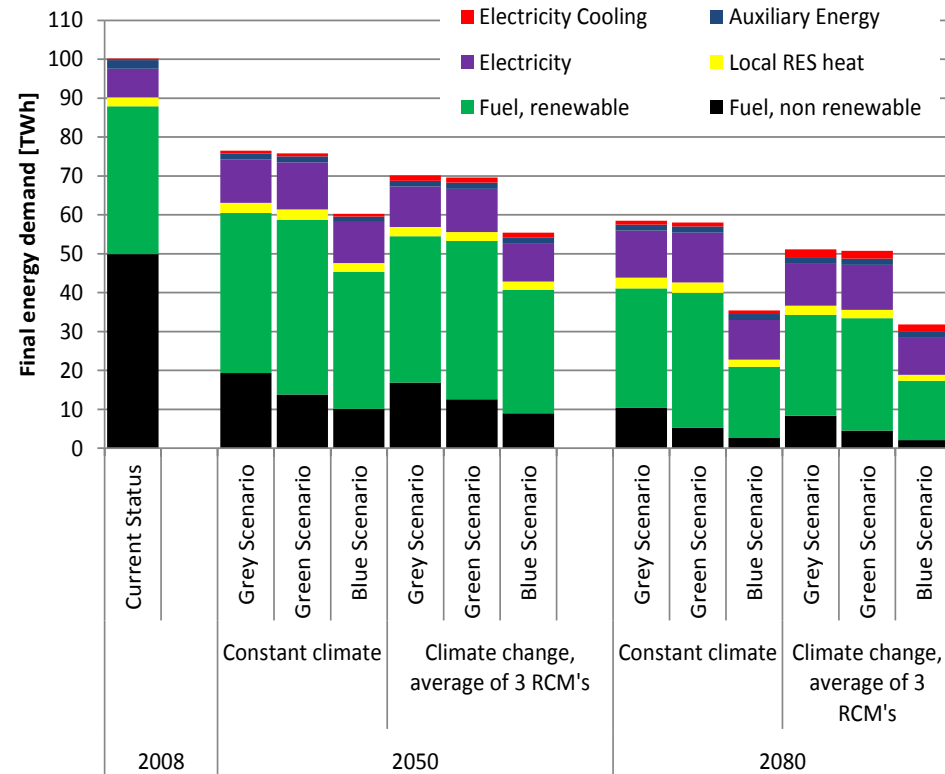
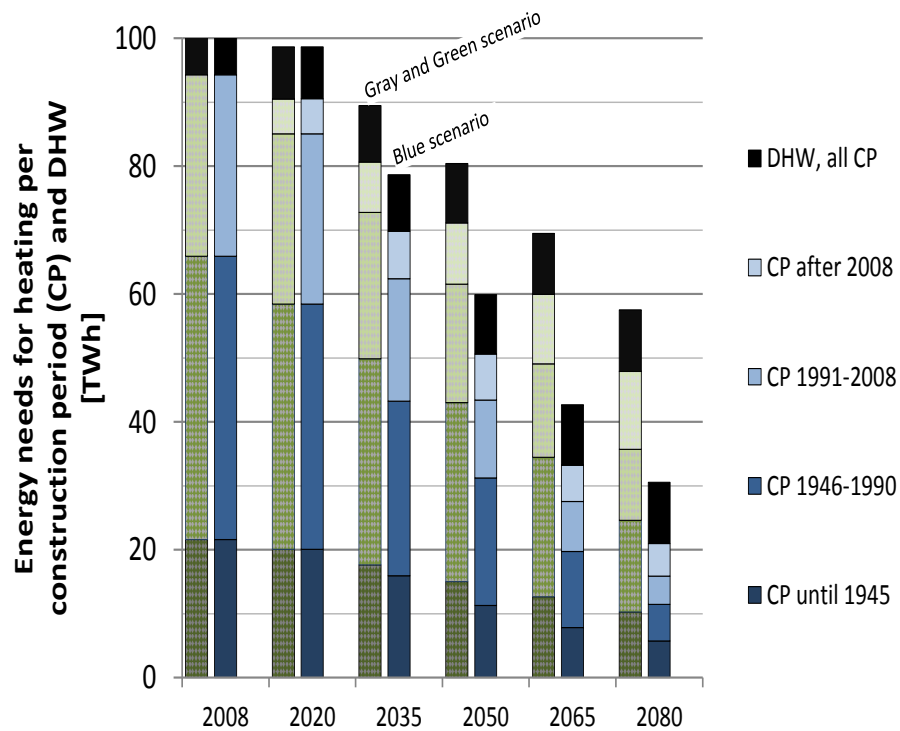


Focus electricity and RES, moderate eff.



- Coal
- Heating oil
- Natural gas
- Electricity
- District heating
- Biomass
- Ambient energy
- Solar thermal

E.G. AUSTRIA: CLIMATE SENSITIVE SCENARIOS



Thank you for your attention!

Further information: www.entranze.eu

Lukas Kranzl

Vienna University of Technology

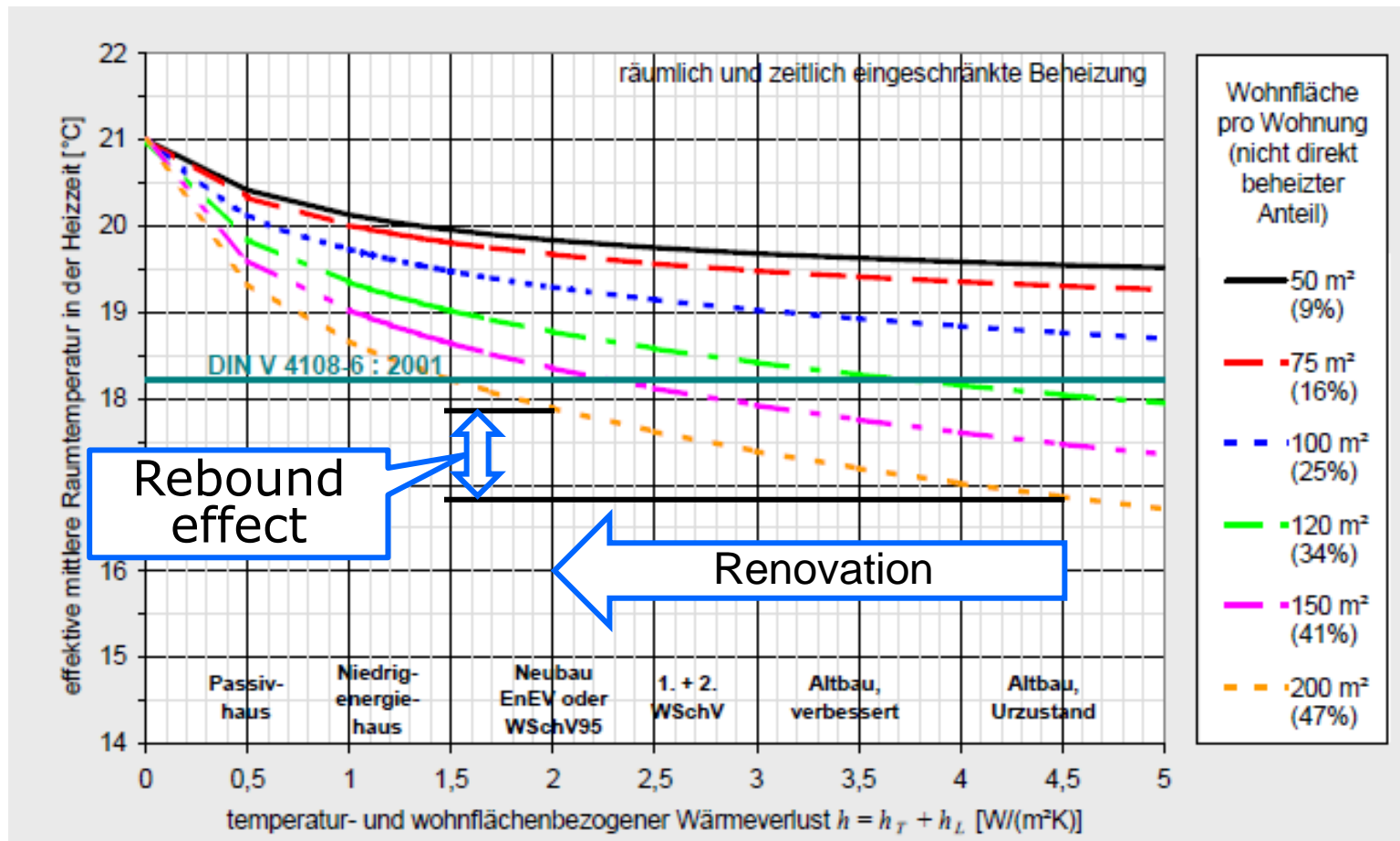
Energy Economics Group

Tel: + 43 1 58801 370351

Email: lukas.kranzl@tuwien.ac.at

SERVICE FACTOR AND REBOUND EFFECT

Impact of dwelling size and building quality on average indoor temperature



Source: IWU, 2004