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EUROPEAN GRID SERVICE MARKETS symposium
Lucerne 05.07.2018

Demand side management potentials in the services sector – empirical study on four European countries

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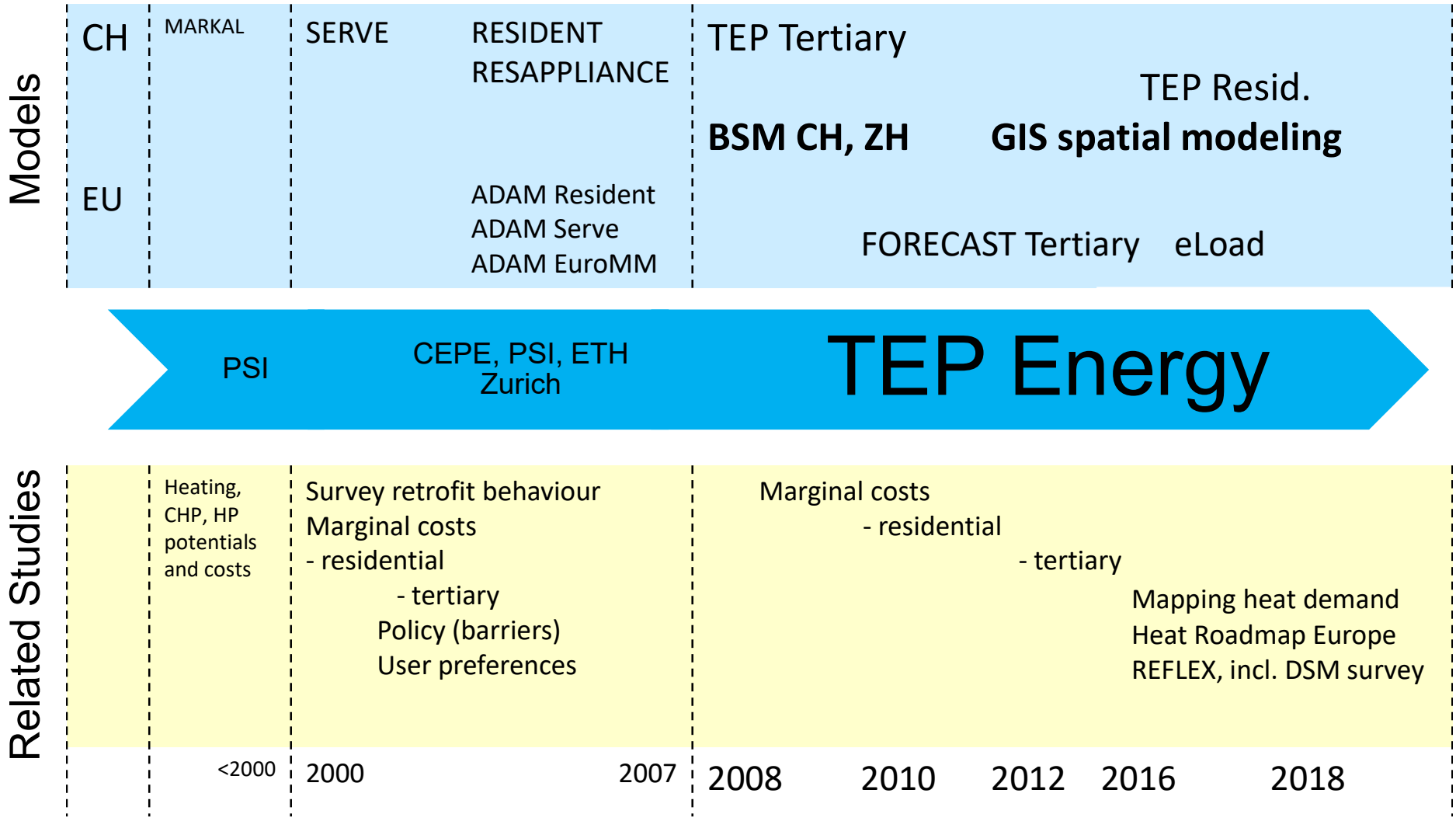
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 691685 and the Swiss Federal Office of Research and Innovation.

REflex Analysis of the European Energy System

TEP Energy

Long-term expercience in energy modelling & empirical studies



Overview

- Introduction to EU-project REFLEX and general background
- Setup of the empirical study on demand side management (DSM)
- Survey results and implementation
- Conclusions and outlook

Introduction I

- Demand side management (DSM) is seen as promising option to integrate rising shares of intermitting renewable electricity generation into the grid
  - Matching supply and demand
  - Reduce need for grid expansion
- Over Europe the DSM market is at its infancy in the services and residential sector
  - First market entrances
- Recent regulatory changes
  - Legislative support from European Commission within European Energy Efficiency directive
  - Country specific uptake of new favourable DSM conditions

Regulatory framework conditions

Explicit Demand Response in Europe
Mapping the Markets 2017 – SEDC

Figure 1: Map of Explicit Demand Response development in Europe today

Introduction II

- To better understand which improvements are needed to further support market uptake of DSM, empirical data on DSM potentials from service companies in Europe is needed
- Within the REFLEX project (www.reflex-project.eu), a survey was conducted to first time collect data on DSM perception and potentials
  - of services companies
  - from different countries with different regulatory environments
- Results of the empirical study will be presented in the following

Setup of the empirical study

- Empirical study was conducted in four countries
  - Switzerland, United Kingdom, Poland and Italy (Germany covered within other project)
  - Country selection based on diversity of market environments, geographical specifications and budget restrictions
- Four services sub-sectors are in focus with specific high energy demand
  - Wholesale and retail trade
  - Hotels and restaurants
  - Offices in the public domain
  - Offices in the private domain
- Sample size
  - 300 full data sets per country, 75 data sets per sub-sector

Setup of the empirical study

- Telephone interviews with standardized questions/answers, option to finish survey online
- Survey including questions on
  - General information on the building / site (number of employees, energy reference area, annual electricity consumption, building standard, etc.)
  - Relation of the company towards energy efficiency and demand side management (energy audits, expected investment or refurbishment measures to improve energy efficiency)
  - Acceptance of DSM and availability of technologies installed (company allows for DSM, is already participating, what are drivers and hurdles, economic expectance, technologies installed, etc.)
  - Decision processes (who is deciding on energy efficiency improvements, energy supply, partners, etc.)

Survey results and implementation

- Current situation
  - Supply contracts
  - Energy audits
  - Investments in energy efficiency
- Relation towards DSM
  - Participation in DSM as of today
  - Likelihood of DSM acceptance
  - Hurdles
- Future potential
  - Available equipment
  - Age distribution

Results

- Current situation
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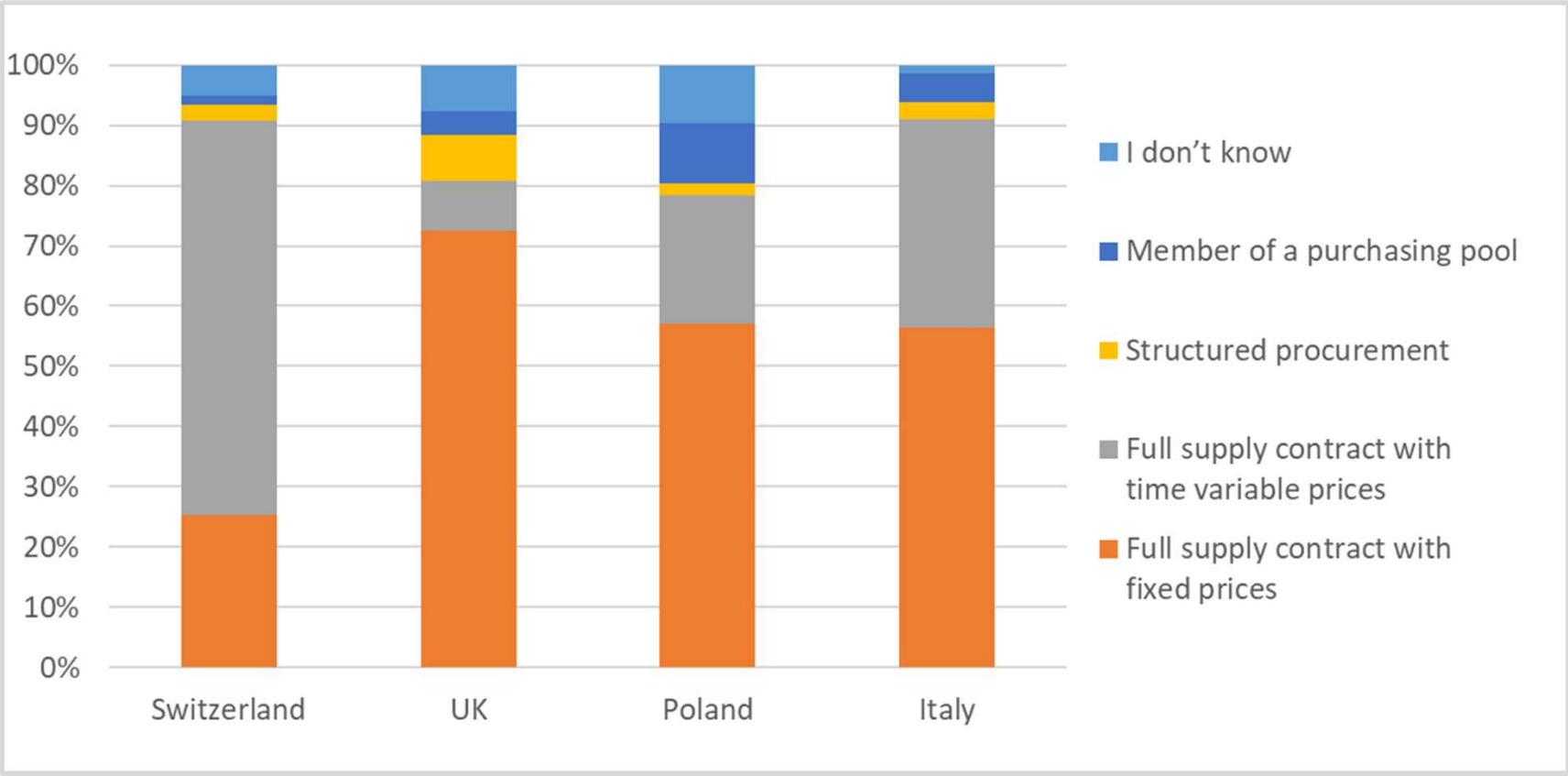
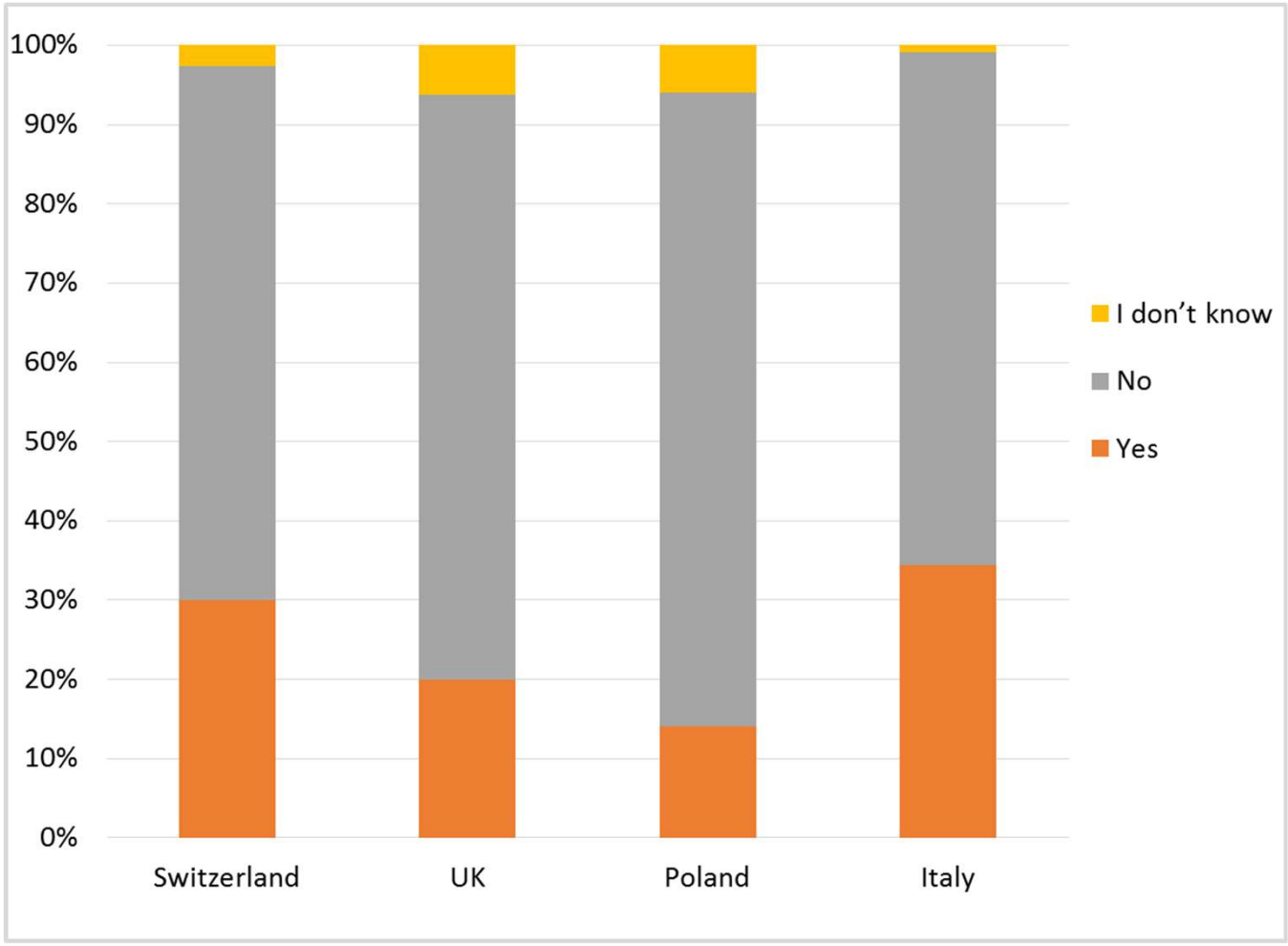
Type of electricity supply contract



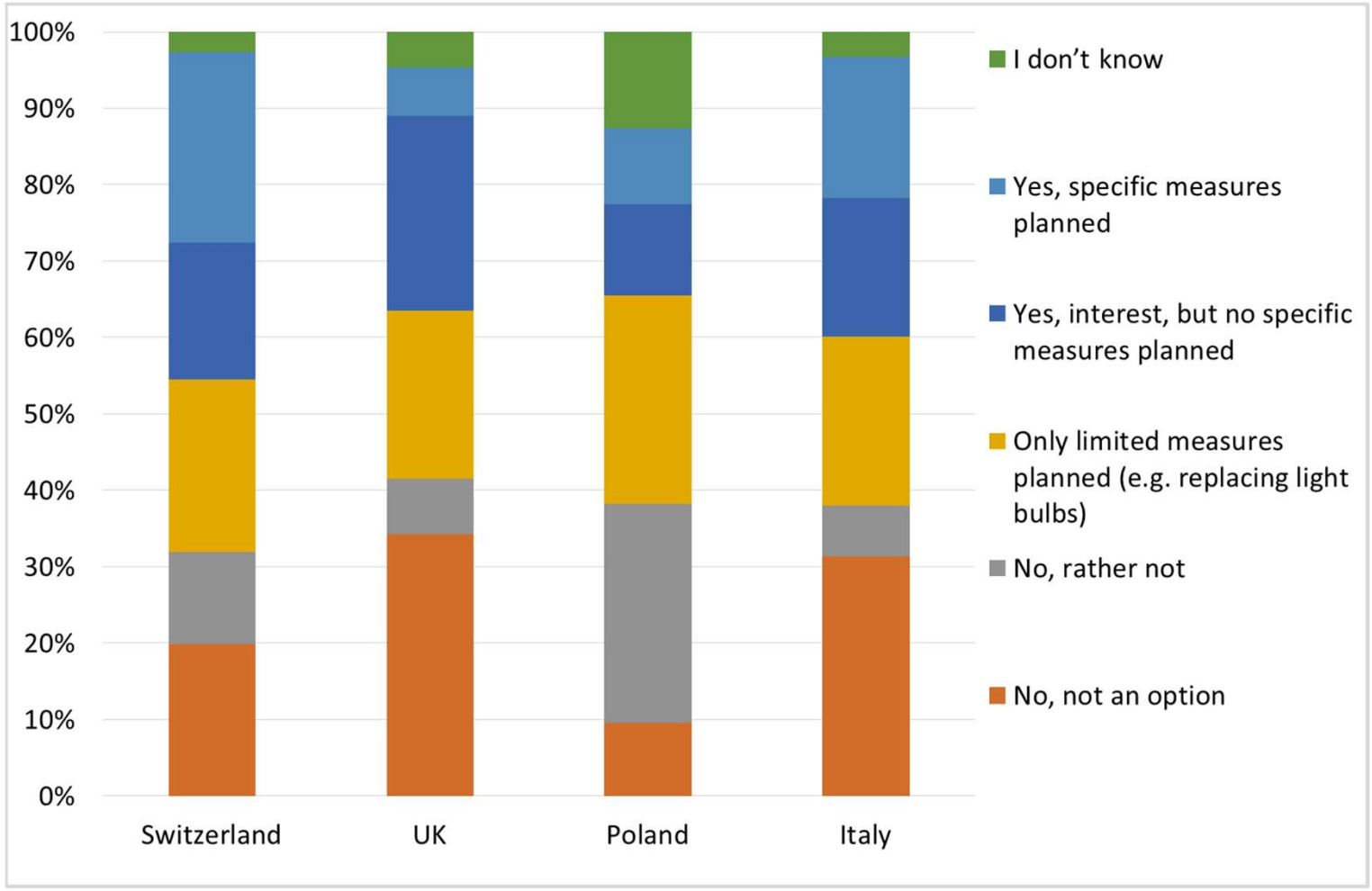
Type of electricity supply contract

- Familiarity with flexible tariffs and market prices is limited
  - 80-90% of the companies have full supply contracts without short term price signals
  - Limited incentives to adjust demand to supply
- No adequate metering infrastructure available
  - Only in UK more than 50% meter consumption on sub-hourly levels, all other countries below 25%
  - Even if smart metering is available (IT), limited use of data and information

Energy audits



Investments in energy efficiency



Summary current situation

- Almost 70% of the companies did not conduct any energy audit in the past three years
  - Relevant shares of the surveyed companies have an electricity demand higher than 100MWh/yr
  - High theoretical potential for efficiency improvements
  - Minority of respondents states that energy audits are based on mandatory requirements

- 50% up to 70% of the companies plan to invest in energy efficiency in the coming 3-5 years

Results

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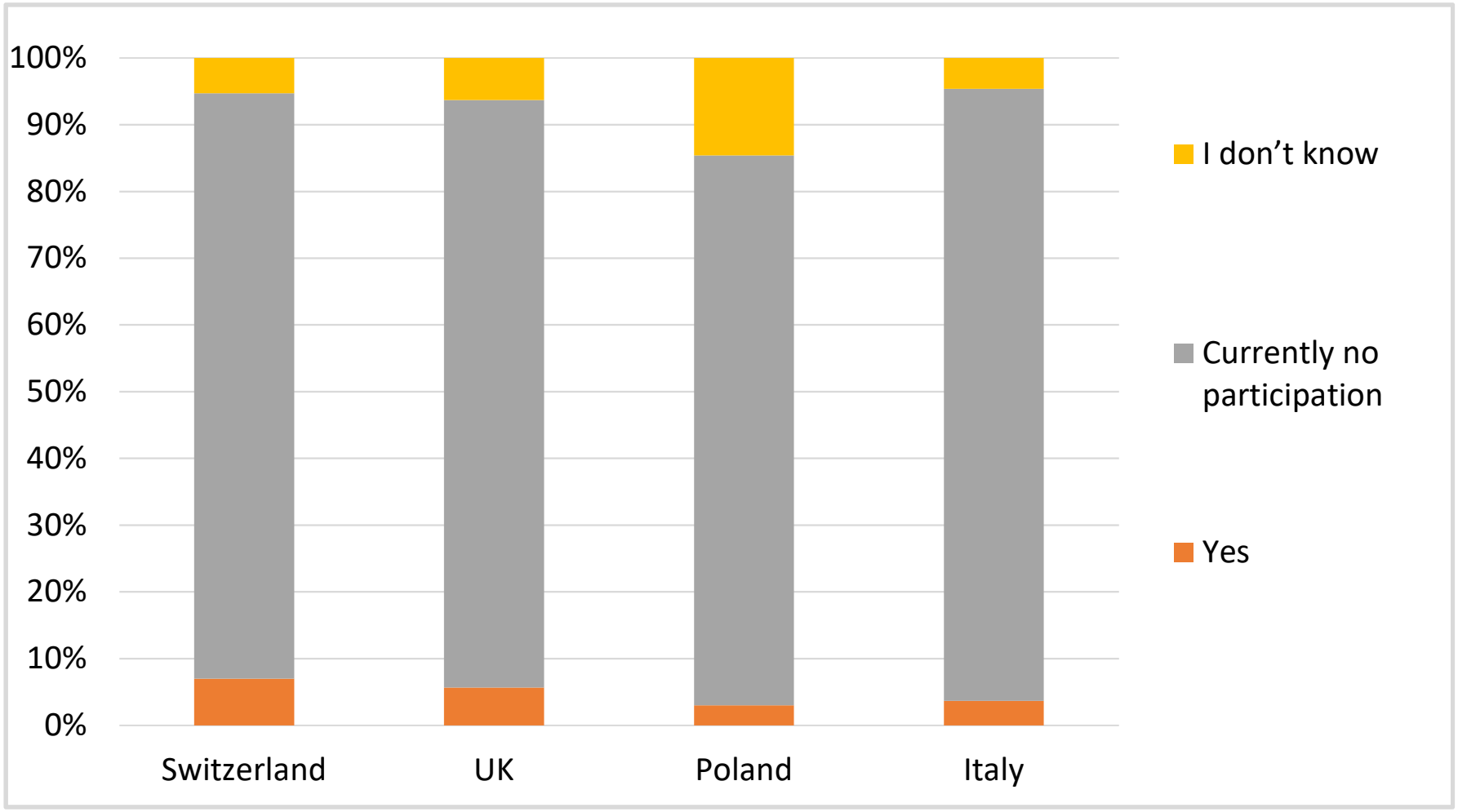
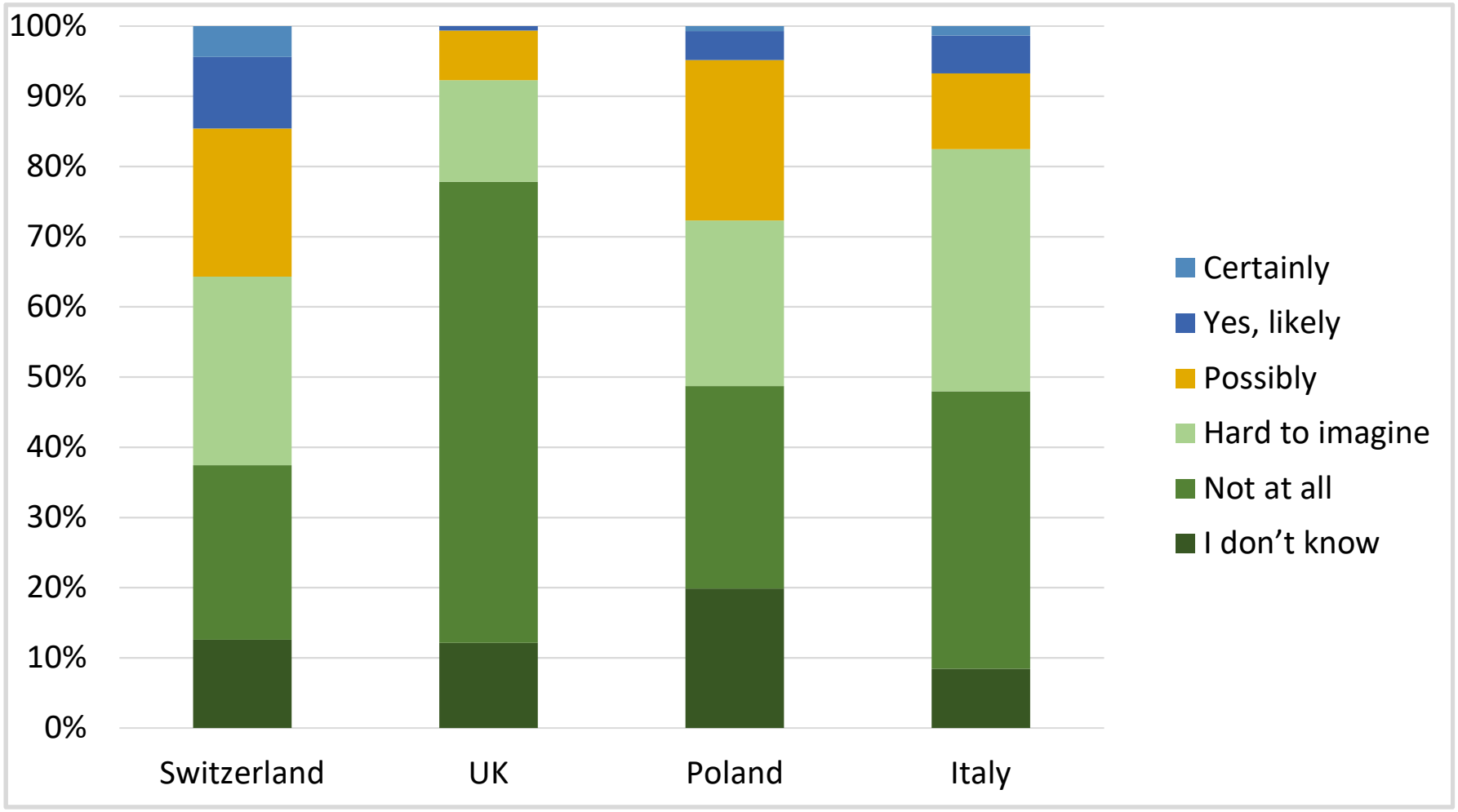
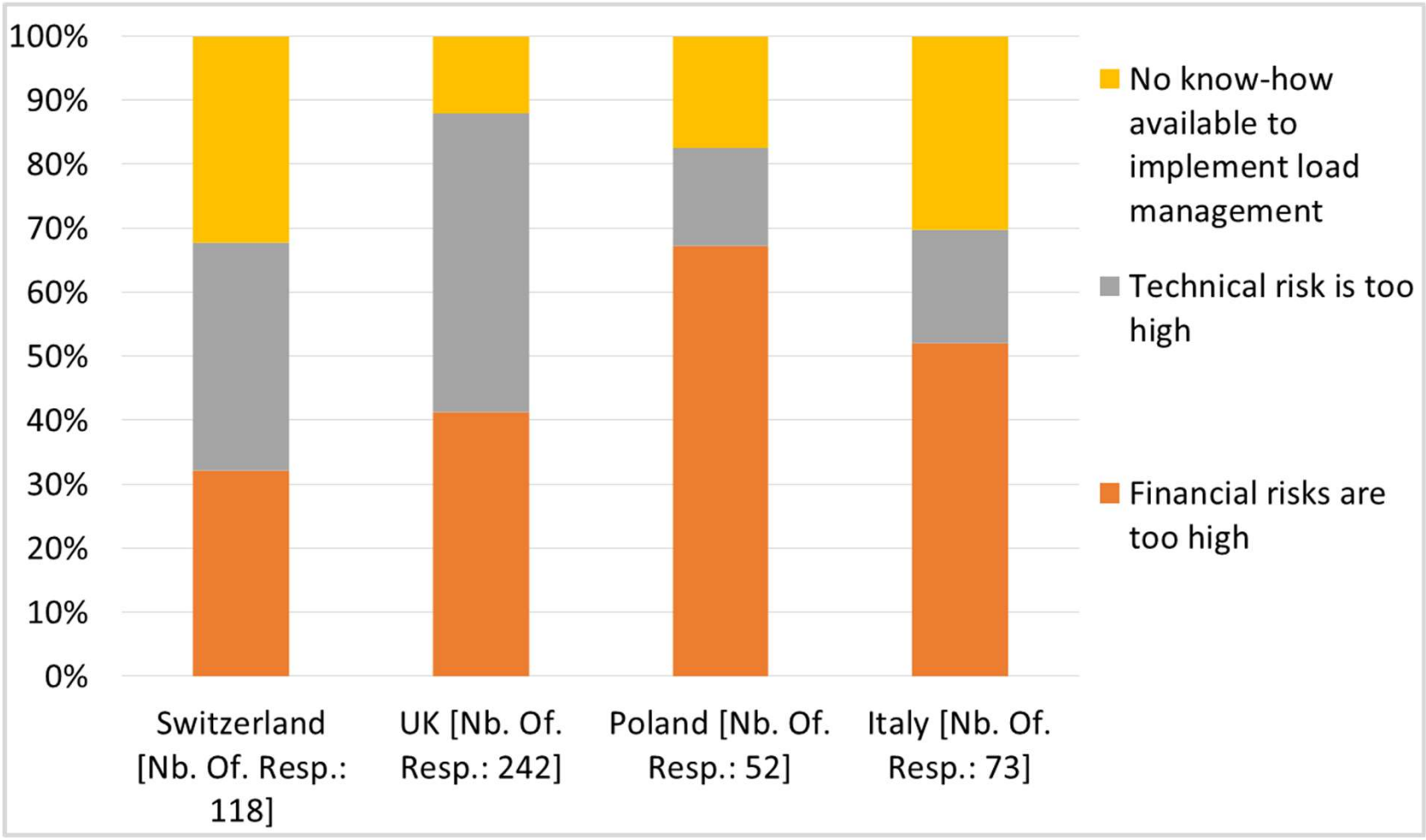
Participation in load management



Likelihood to allow for external load control



Why it is not an option



DSM perception and potentials

- Independent of the recent changes in the regulatory framework, DSM has not been widely accepted in services sector
- In the short future, between 8% (UK) up to 35% (CH) of the companies are potential adopters of DSM
- For companies which are currently not willing to adopt DSM measures, financial and technical risks are perceived as too high

Results

- Current situation
  - Supply contracts
  - Energy audits
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- Relation towards DSM
  - Participation in DSM as of today
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  - Available appliances
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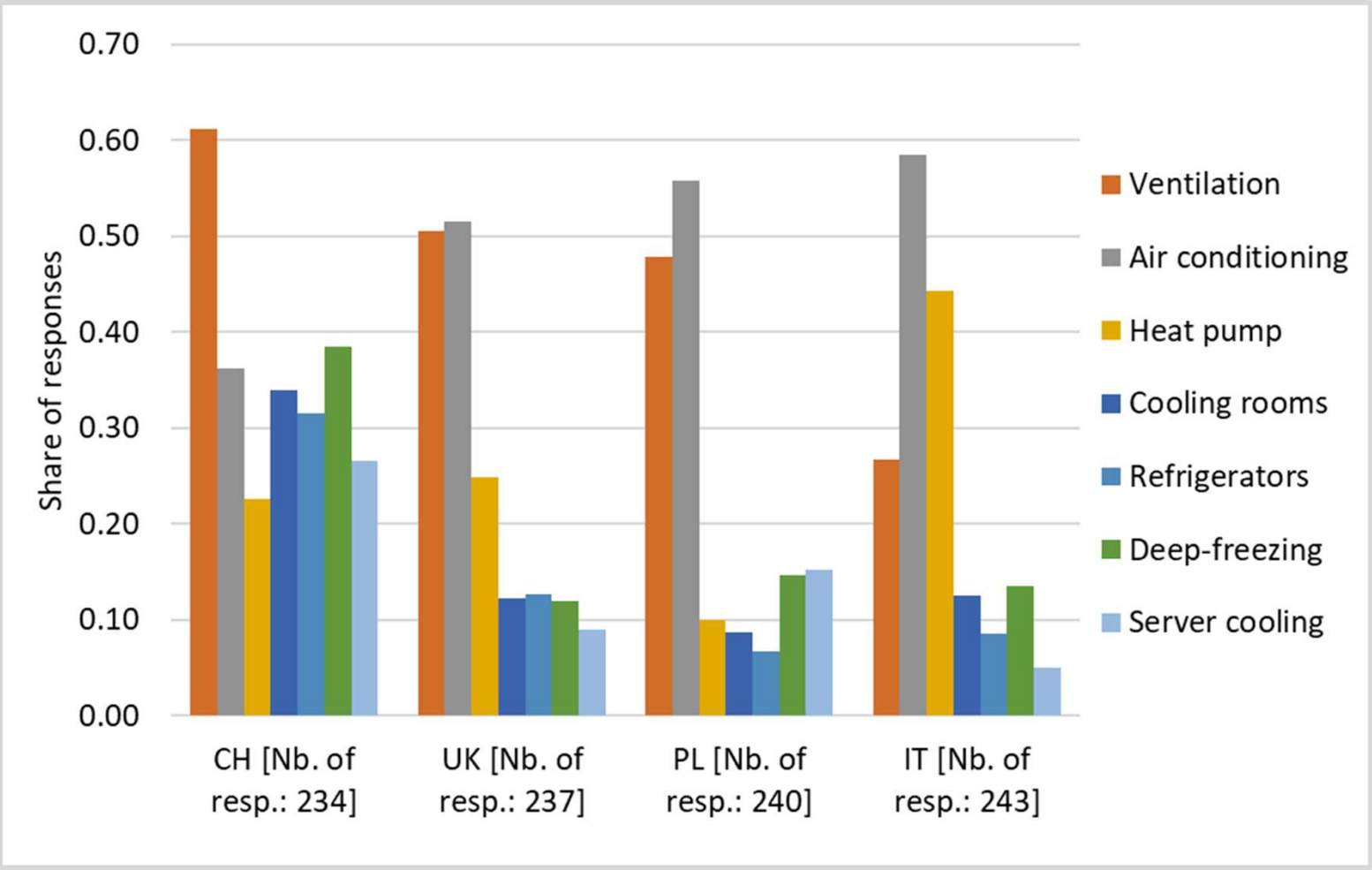
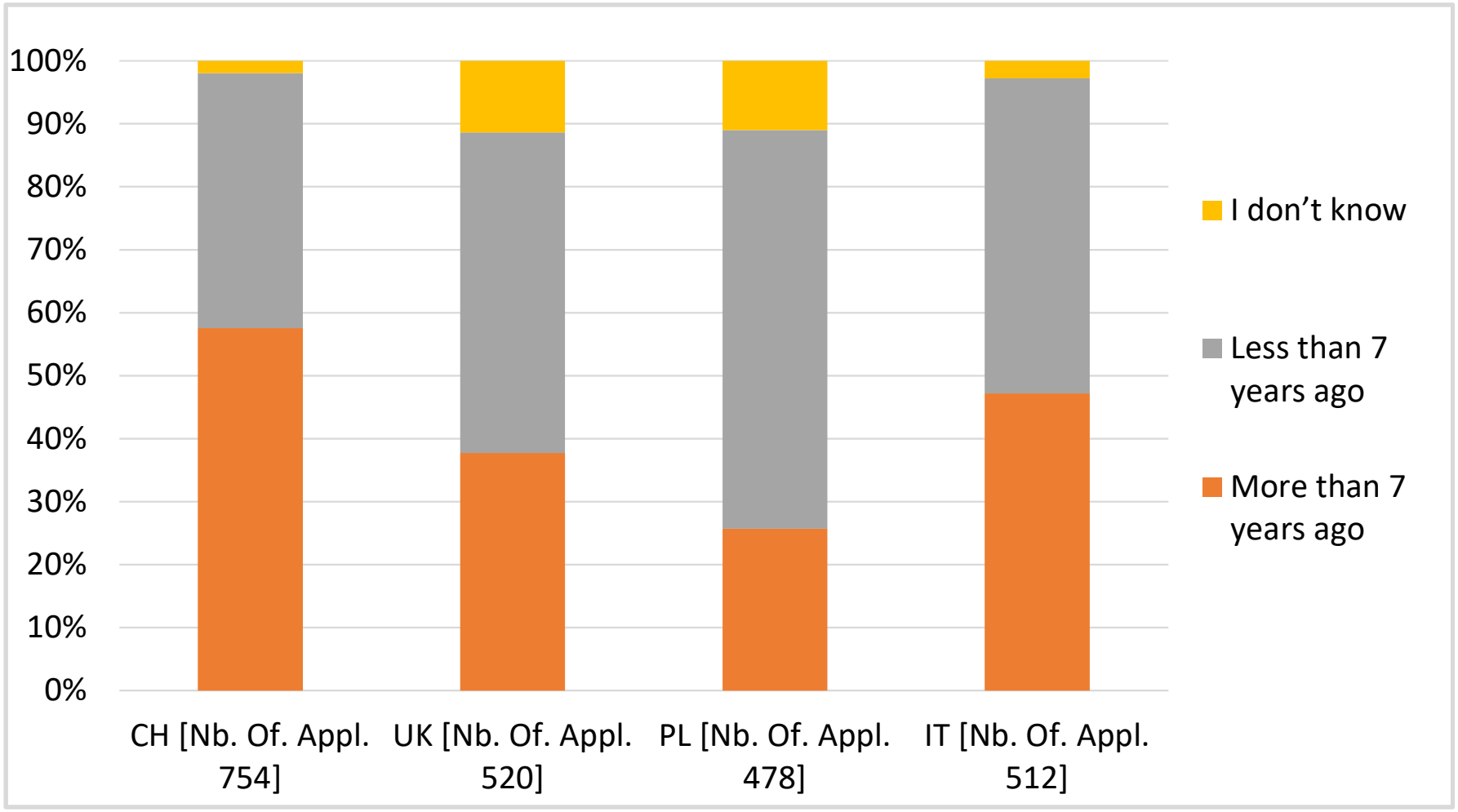
Available appliances



Installation year of appliances



Appliances

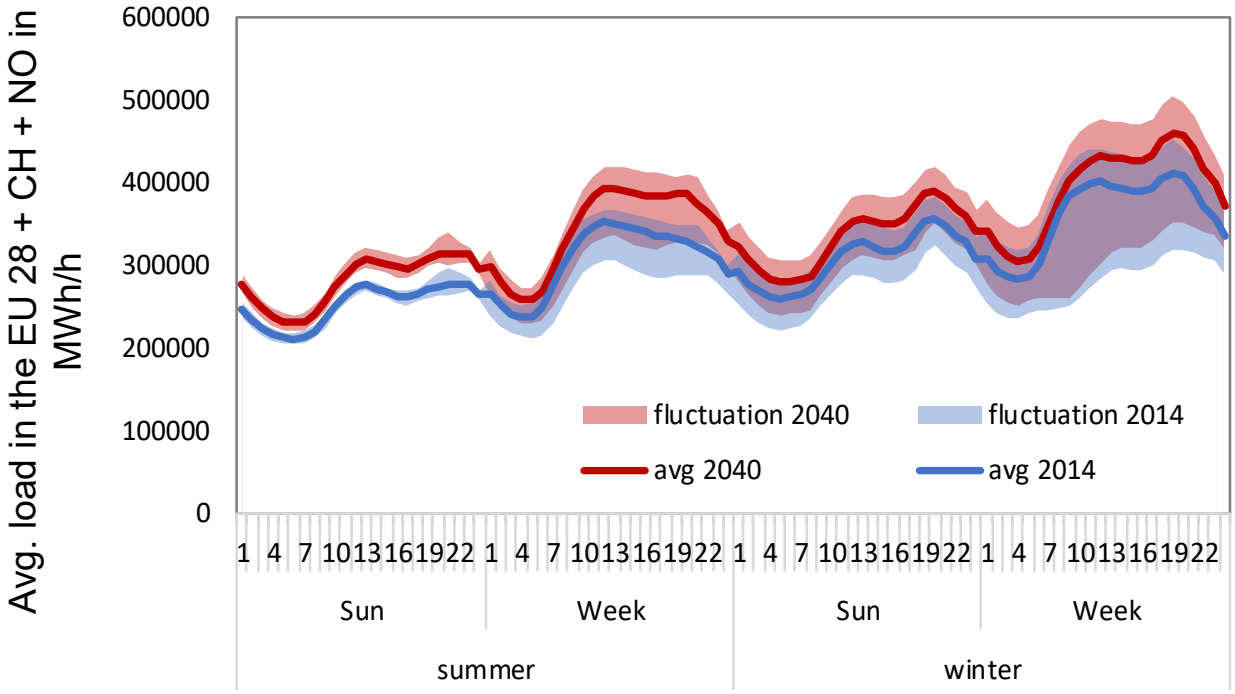
- Seasonal available appliances are dominating
  - Ventilation and air conditioning appliances with low demand shifting potential mainly in summers
  - heat pumps with reasonable potentials in winters

- 25% (PL) up to 50% (CH) of the equipment is older than 7 years and therefore is likely to be replaced in the next years
  - Combine installation of control units with exchange of equipment
  - Address relevant companies

Implementation I (REFLEX)

Impact on load curve

- Yearly electricity demand increases by 10%, while peak load increases by 12% ➔ **marginally increasing fluctuations**
- Higher changes in fluctuations for the individual countries: eg. in PT: avg. +17%, max. +65% (air-conditioning)



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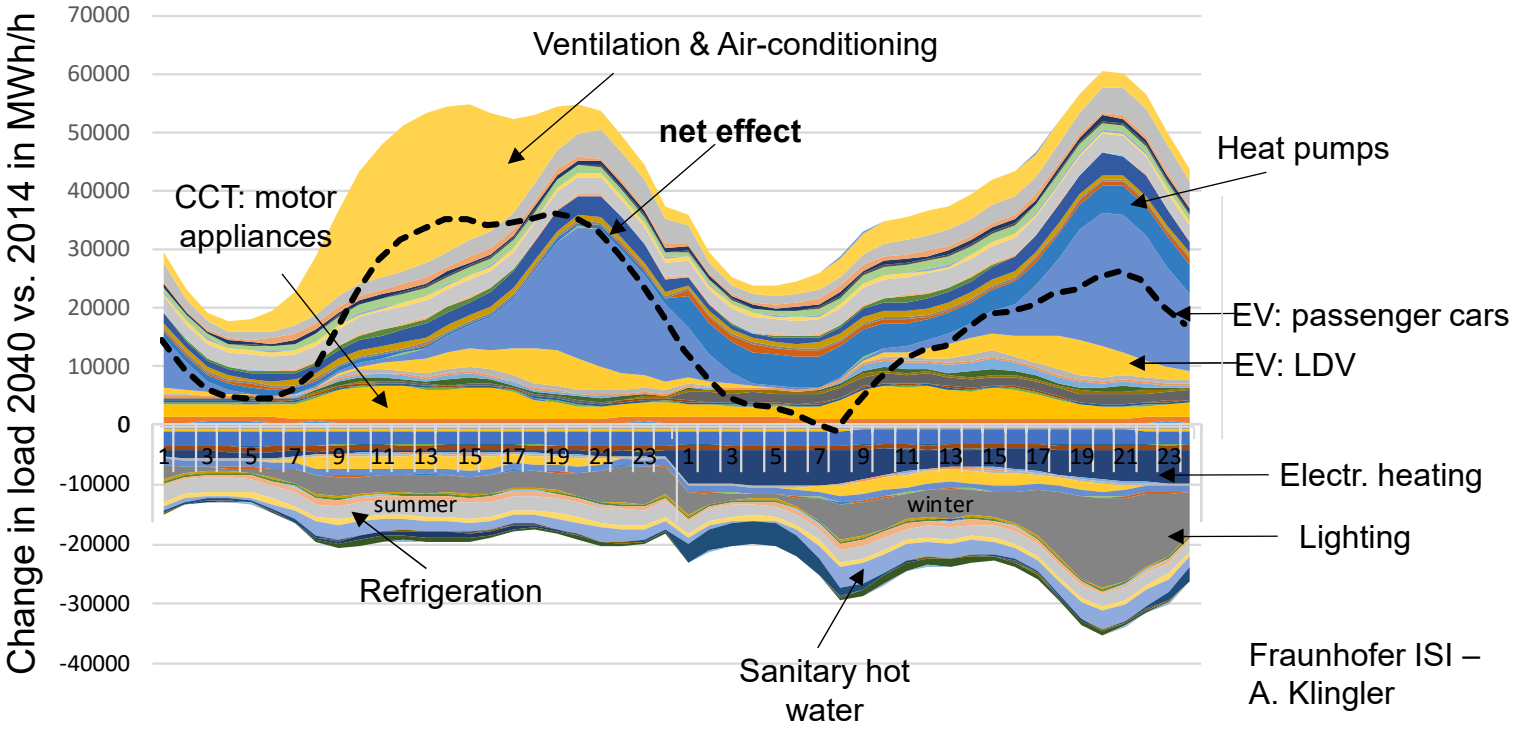
Implementation II (REFLEX)

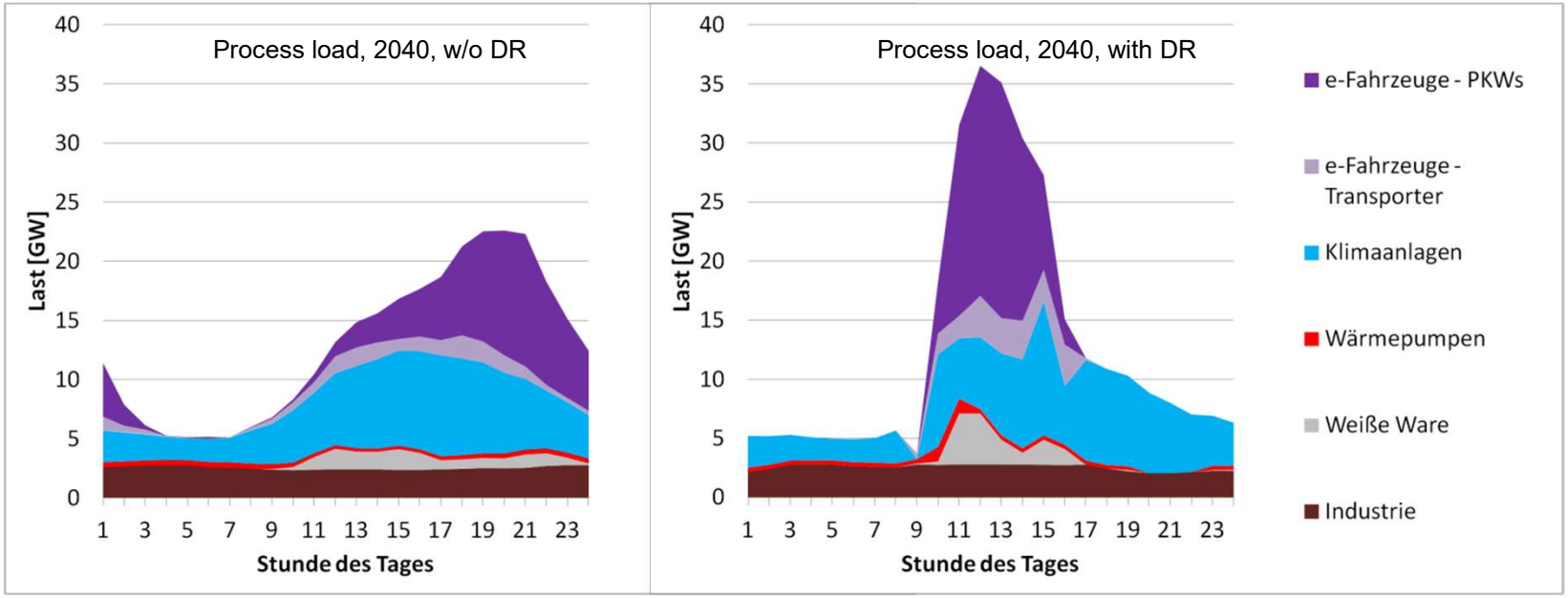
Impact on load curve

- Over average load **increase in midday hours** in summer due to increasing demand for ventilation and **air-conditioning**
  and in **evening hours** due to **electric mobility**
- Efficiency gains particularly in lighting diminish evening peak



Implementation III (REFLEX)
Impact on load curve – exemplary results

- DSM modelling



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Overall summary and conclusions

- Medium term increasing potential for DSM
  - Considerable share of companies interested in DSM participation
  - High equipment rates of companies with DSM suitable appliances
  - Sample cases available for DSM integration of ventilation, air conditioning, heat pumps, cooling devices, batteries, etc.
- Further regulatory changes and removal of barriers are needed to support market uptake
  - Tariff structures and metering equipment need to be adapted to allow for DSM
  - Financial and technical risk perceptions have to be addressed and mitigated
  - Regulatory boundary conditions: aggregators, smaller bid-sizes, etc.
- High potential for energy audits and energy efficiency measures

Thank you for your attention

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