Enabling flexibility from future-proof decarbonized buildings

Schneider Electric™ Sustainability Research Institute

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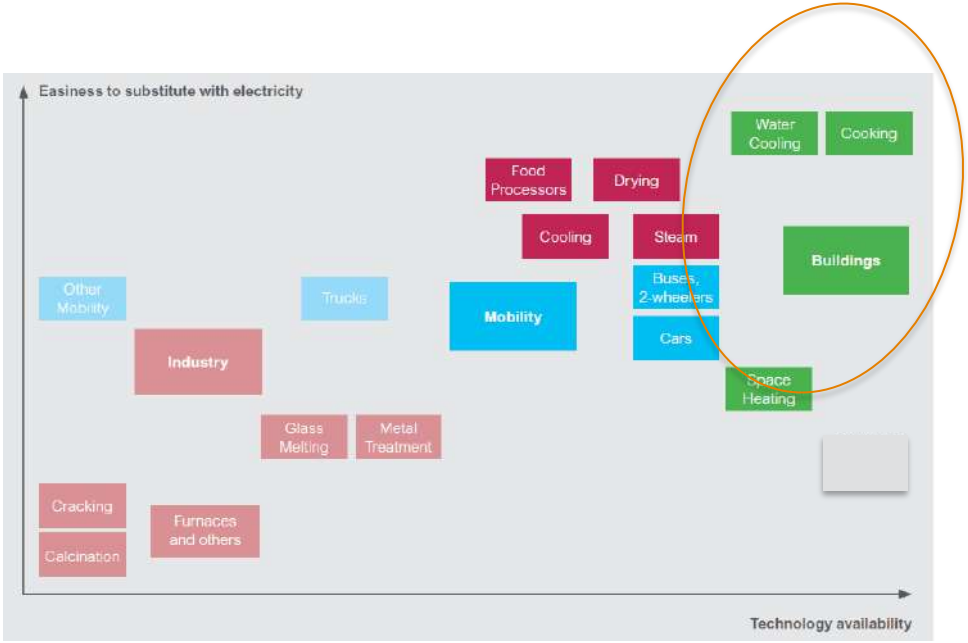
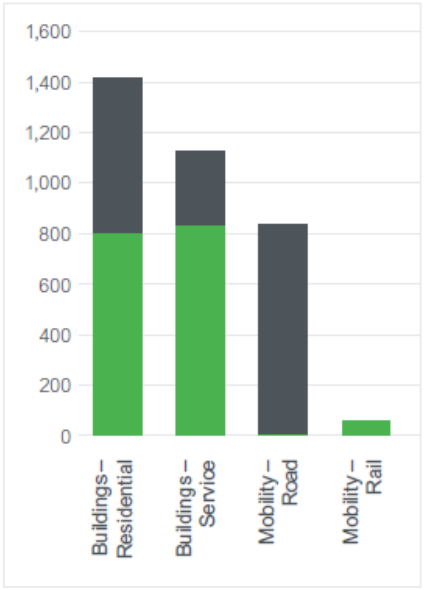
1/ Potential for demand-side electrification of Europe is underestimated …

Latest study shows the key role of buildings and clean mobility will play





Electricity demand increase in volume, by sector (TWh/y)

Based on EU JRC 2018 database (All countries of EU, 17 sectors, process steps)

- Assess process step by process step what can be electrified (e.g., steam generation, space heating, cooking stoves, etc.)
- Recompute corresponding energy system
- Evaluate impacts on electrification penetration, electricity demand, and fossil fuels displacement (by type)

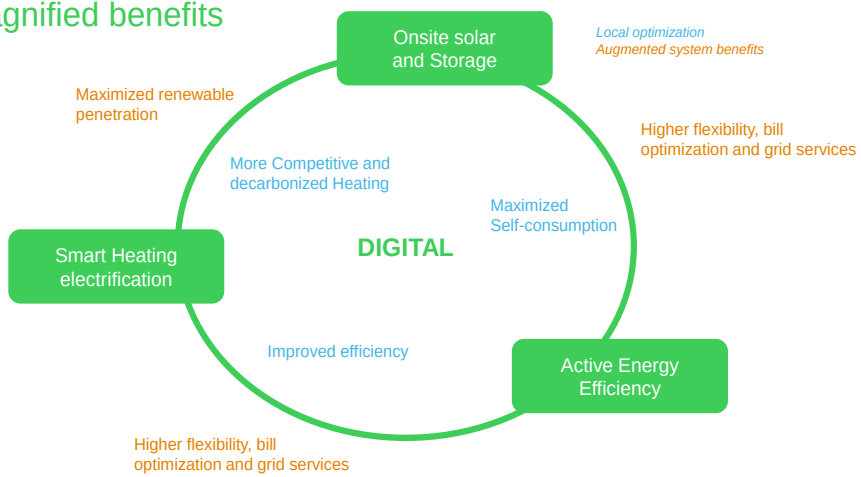
https://www.se.com/ww/en/insights/sustainability/sustainability-research-institute/road-to-a-rapid-transition-to-sustainable-energy-security-in-europe.jsp?stream=sustainability-research-institute

2/ Arising of hyper-efficient, decarbonized, grid-enabled buildings

From Buildings of Today to Buildings of the Future

Centralized and Decentralized electricity

Magnified benefits



Impact ÷2 to 3 Carbon Emissions ($kgCO_2$/ m²/ y) ÷2 to 3 Total Energy spend (USD/m²/y) -30 to -50% Total energy demand (kWh/m²/y)

https://www.se.com/ww/en/insights/sustainability/sustainability-research-institute/towards-net-zero-buildings-a-quantitative-study.jsp?stream=sustainability-research-institute

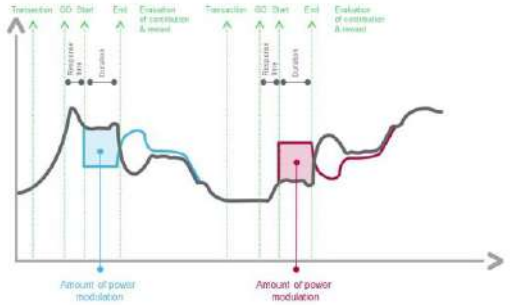
“RE Power EU + Fit for 55” policy framework fostering a new business environment

Policy support

Priority
Electrify heating in buildings with connected heat pumps and smart controls
Deploy electric vehicles and smart charging
Drive energy efficiency in buildings with digital monitoring and control
Deploy renewables with rooftop solar and self-consumption
Invest in demand-side flexibility sources
Develop microgrids

Available Demand Side Flexibility in Buildings today

Available flexibilities



Downward adjustment: Curtailment

Upward adjustment: Triggered demand

- Load shedding (notably HVAC via BMS)
- Smart (Reversible) Heat Pumps
- Smart EV Charging
- Stationary or Thermal storage

Hive SE HQ Building (Paris)

- Load shedding (Freezing 3 main electricity usages on April 3rd and 4th, 2022

- Peak shaving with Smart EV Charging for Grid congestion services

EV charging infrastructure

Clean Energy Package opens new rights for prosumers ...

… but there is room for progress

- EU framework adopted in 2018 allow entities to set up micro-grids through renewable and citizens energy communities
- As part of the Renewable Directive and the Electricity Directive, definition of communities were set up.
- Renewable energy communities can be seen as the gold standard for a Citizen Energy Community

Still numbers of barriers for collective self-consumption, renewable and citizens energy communities:

- The possibility for citizens energy communities to have a right to set up, own and operate local power networks is optional (no obligation for Member States to grand this right)
- Energy communities are embedded in overarching targets such as broad consumer empowerment → needs accompanying measures
- Barriers to flexibility also preventing further microgrids roll-out → integration in dynamic flexibility markets could provide even stronger incentivizes to provide specific system benefits
- Need to reward provider of demand-side flexibility to foster investments
  - eg in the UK:
  - https://www.express.co.uk/news/science/1726060/octopus-energy-ovo-edf-national-grid-demand-flexibility-service-power-654000-homes

Q & A

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Some of our recent research on buildings

Some of our key research partners

A key focus of our effort is to engage with and develop a large research ecosystem to bring credible and meaningful contribution to the debate at hand

https://www.se.com/ww/en/insights/tl/schneider-electric-sustainability-research-institute

