

Innovation and Policy Measures to Solve the Heat Challenge

Global Clean Energy Action Forum

September 22, 2022

Pittsburgh, PA, USA



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Innovation and Policy measures to solve the Heat Challenge



www.heatpumpingtechnologies.org

Monica Axell – Technology Collaboration Programme on Heat Pumping Technologies by IEA (HPT TCP by IEA)



Piero de Bonis – Mission Innovation's Innovation Community on Affordable Heating and Cooling of Buildings (MI IC7)



David Smedick – Global Alliance for Building and Construction's (ABC's) Clean Heat Forum

Agenda

- **Welcome**, *Monica Axell* (HPT TCP by IEA), *Piero de Bonis* (MI IC7), *David Smedick* (The Global ABC's Clean Heat Forum)
- **Opening remarks – Transformation in the heating sector needed to reach the climate ambitions**, *Araceli P Fernandez*, Head of Technology and Innovation, Energy Technology Policy Division within the International Energy Agency (IEA)
- **Role out of heat pumps in Europe – Policy enablers and barriers**, *Martin Forsén*, President of European Heat Pump Association (EHPA)
- **Role out of heat pumps in US – Policy enablers and barriers**, *Ramachandran Narayanamurthy*, Manager of the Emerging Technologies Programme, US Department of Energy (DOE)
- **Clean Heat Forum and policy ambitions**, *David Smedick*, The Global ABC's Clean Heat Forum
- **Comfort and Climate Box – Road map for scaling and replication**, *Caroline Haglund Stignor*, Technology Collaboration Programme on Heat Pumping Technologies by IEA (HPT TCP by IEA)
- **Panel discussion**, *Jon Saltmarsh*, (MI IC7)
- **Q&A**
- **Closing remarks**, *Monica Axell* (HPT TCP by IEA), *Piero de Bonis* (MI IC7), *David Smedick* (The Global ABC's Clean Heat Forum)



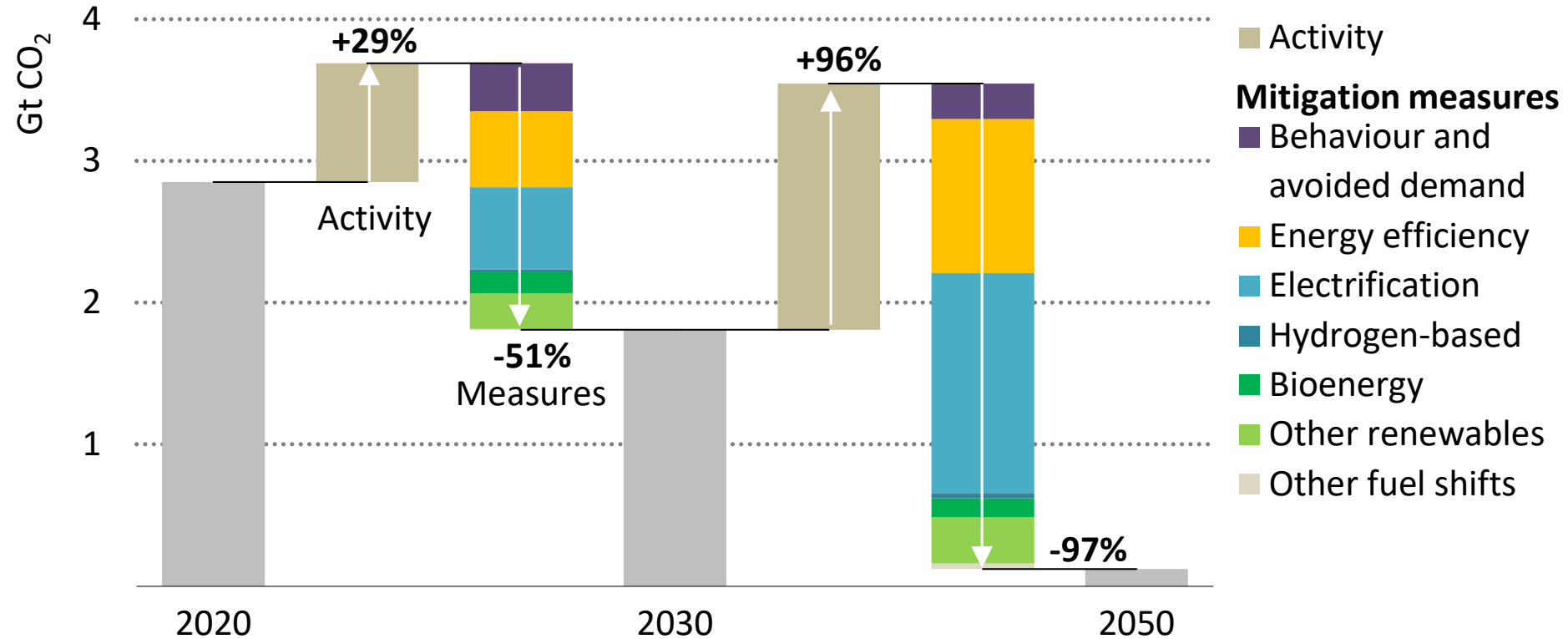
Transformation in the heating sector needed to reach the climate ambitions

Global Clean Energy Action Forum, 22nd September 2022

Araceli Fernández Pales, Head of Technology Innovation Unit

Quick policy action is needed to put buildings on track towards net zero

Global direct CO2 emissions reductions by mitigation measure in buildings in the NZE

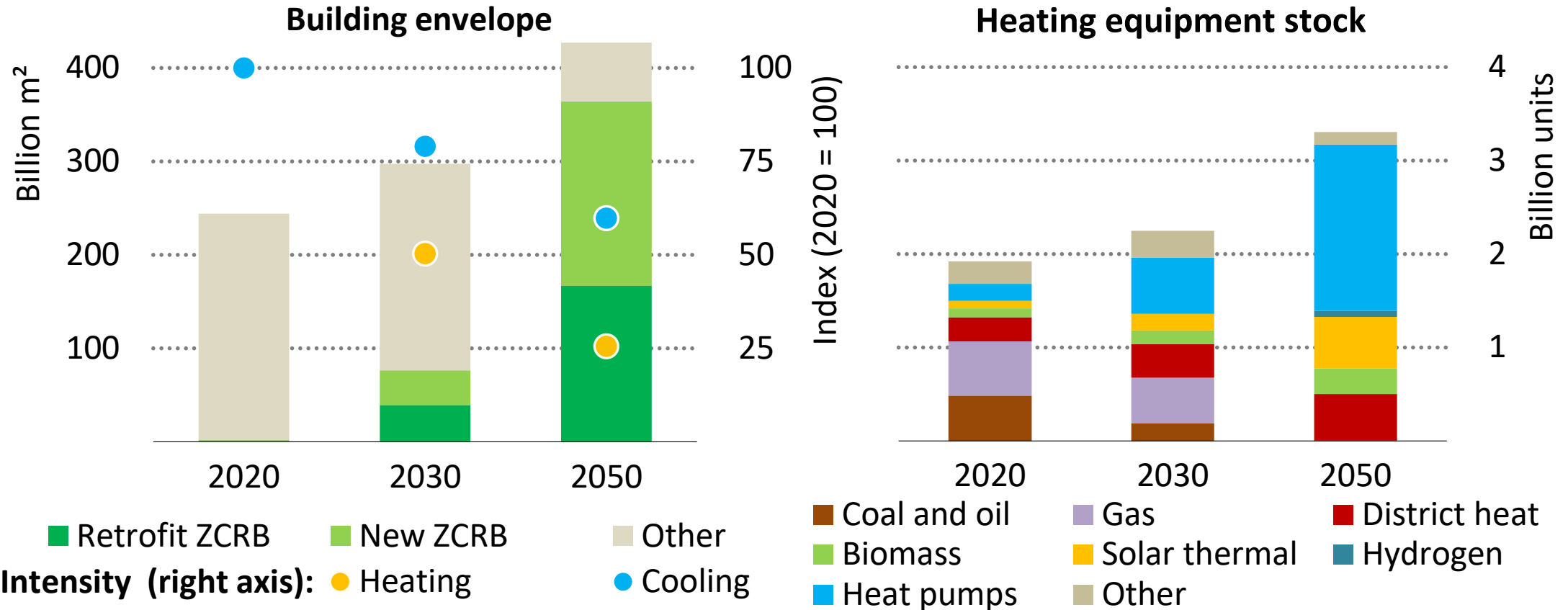


Electrification, energy efficiency and renewables integration are the key levers to decarbonise buildings in the NZE, but behavioural changes are also important, especially in the short term

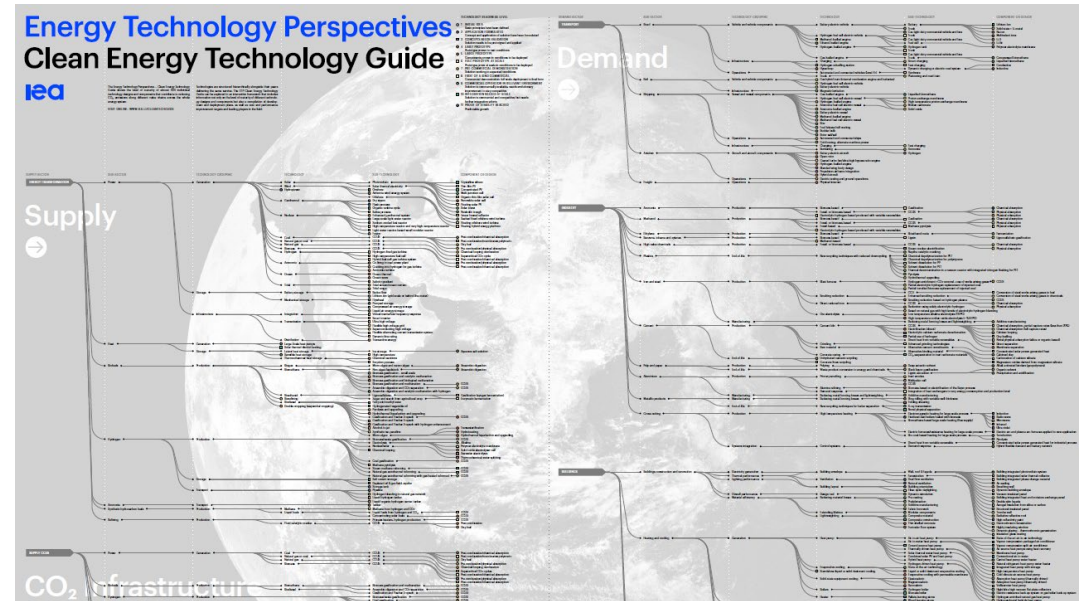
Building retrofits and fuel shift for heating in buildings should be in the spotlight



Global building and heating equipment stock and useful space heating and cooling demand intensity changes in the NZE



By 2030, retrofit rates need to increase to about 2.5% per year in advanced economies, while heat pump deployment should reach around 1.8 billion units by 2050



Technology and innovation pathways for zero-carbon-ready buildings by 2030:

- Strategic vision of experts from the IEA Technology Collaboration Programmes (TCPs) on how to help achieve some of the most impactful short-term milestones for the buildings sector

ETP Clean Energy Technology Guide:

- Breakdown of around 120 building technologies that can contribute to achieve the goal of net-zero emissions

iea

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Role out of heat pumps in Europe Policy enablers and barriers

Martin Forsén
President – EHPA
Manager International Affairs - NIBE



Overarching EU-2030 targets

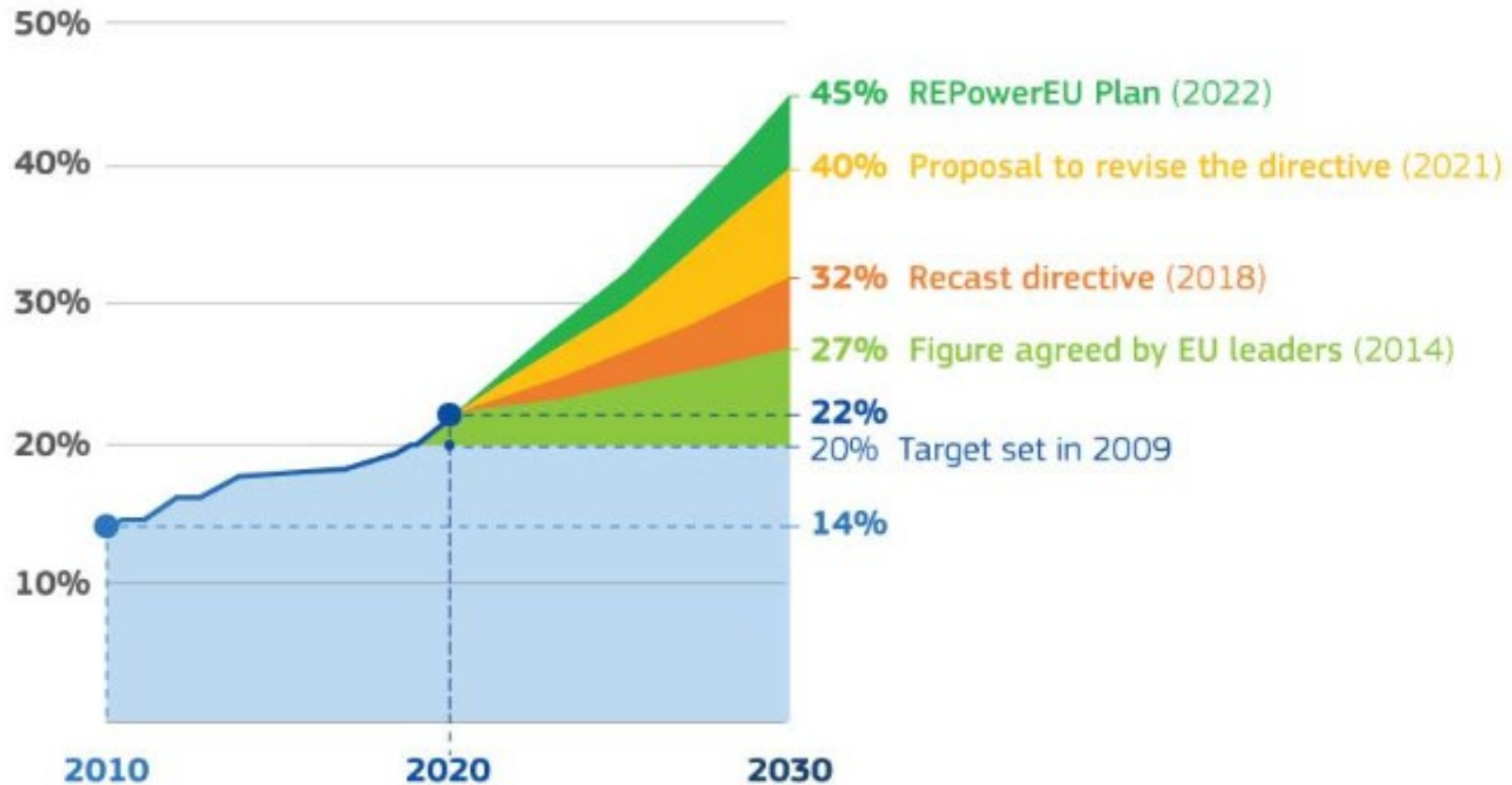


55 % GHG-emission reduction

36 % Improved energy efficiency

45 % Renewable energy

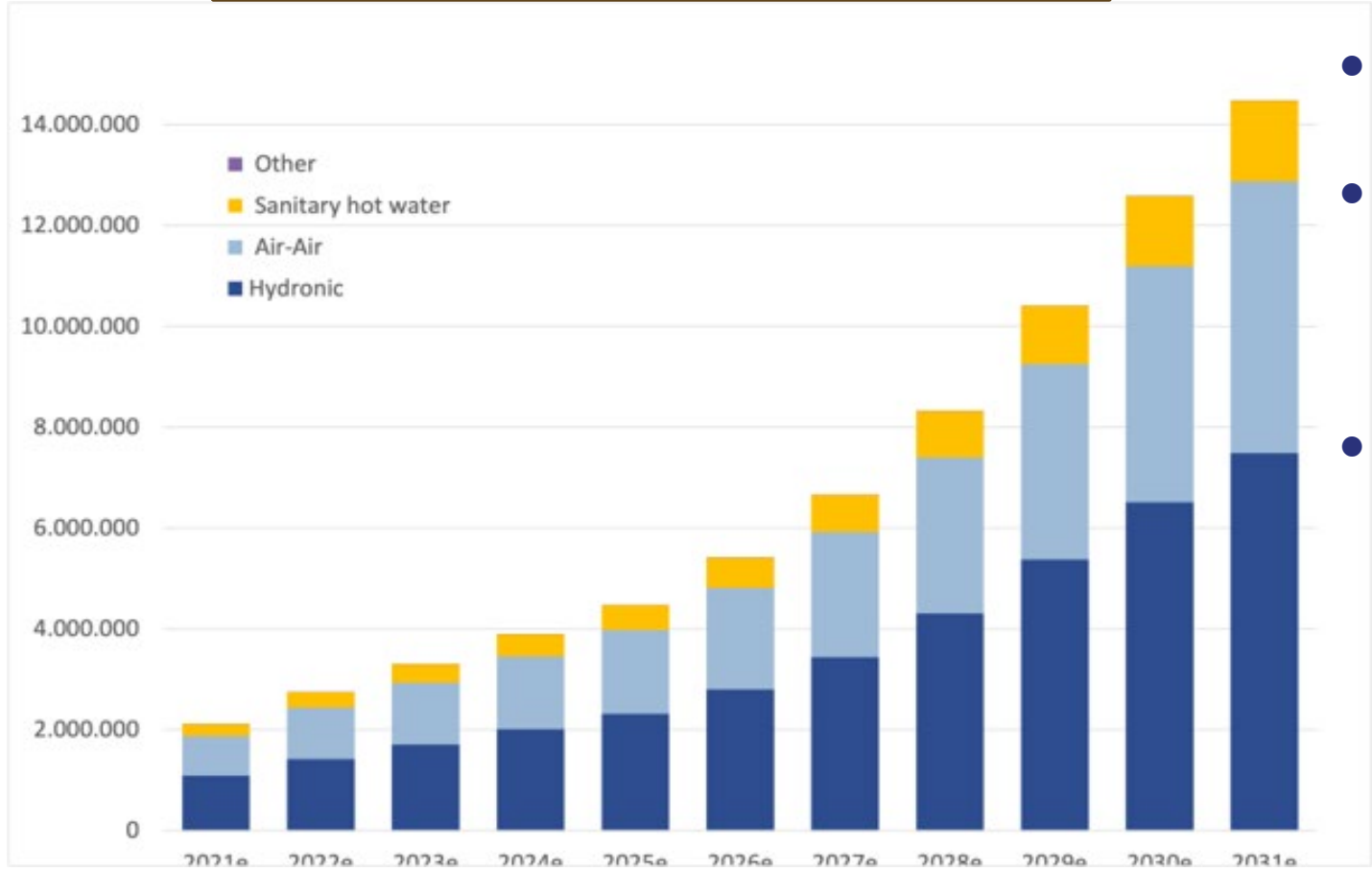
Evolution of renewable energy targets



The ambition: Double the deployment rate

EU ambitions in numbers

Insights



- Constant double-digit growth
- All technologies growing – no major shift in demand
- No disruption: HP is proven technology



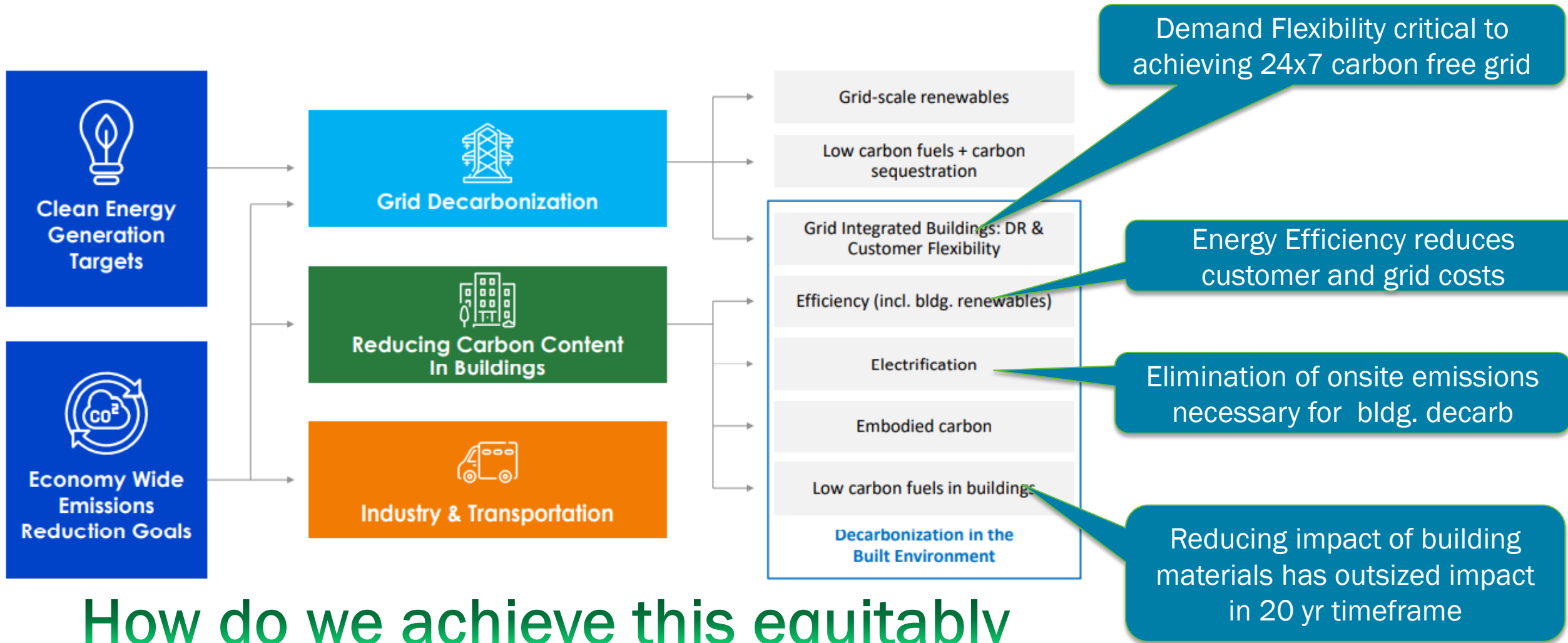
Decarbonization of Heat

Ram Narayanamurthy, Dept. of Energy

Ram.Narayanamurthy@ee.doe.gov

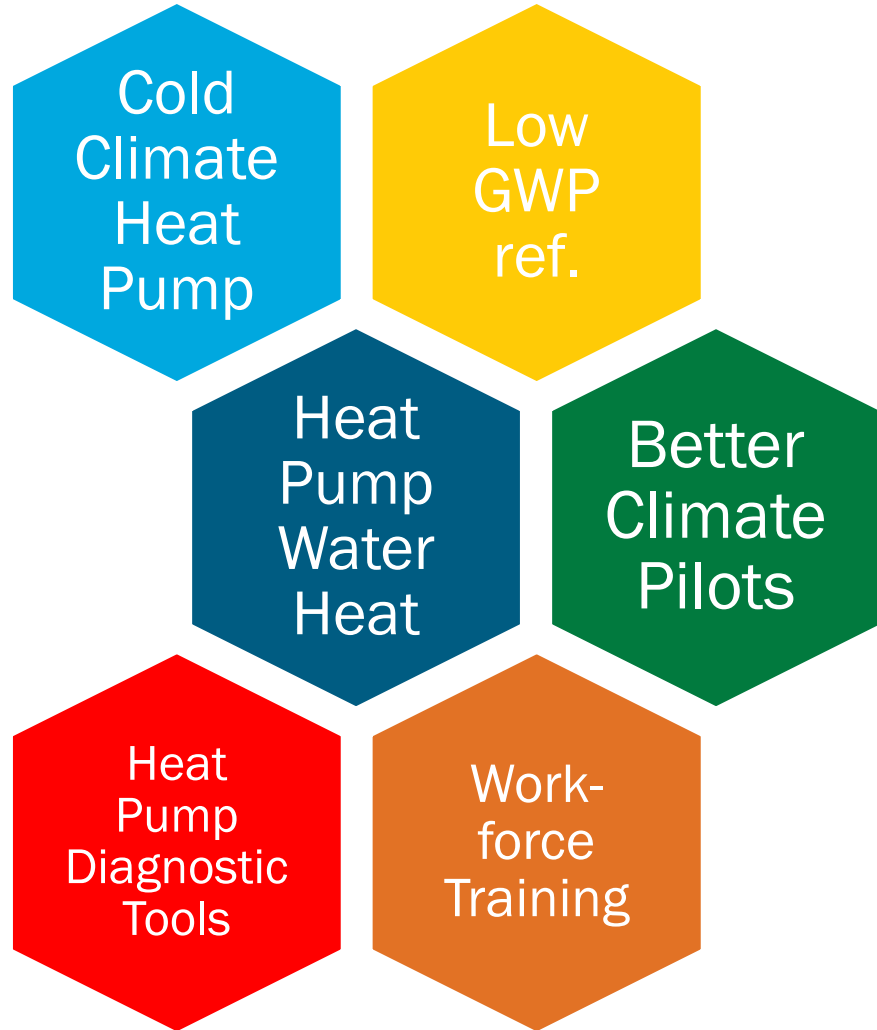
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Pillars of Building Decarbonization



How do we achieve this equitably and affordably?

The Energy, Emissions and Equity (E3) initiative



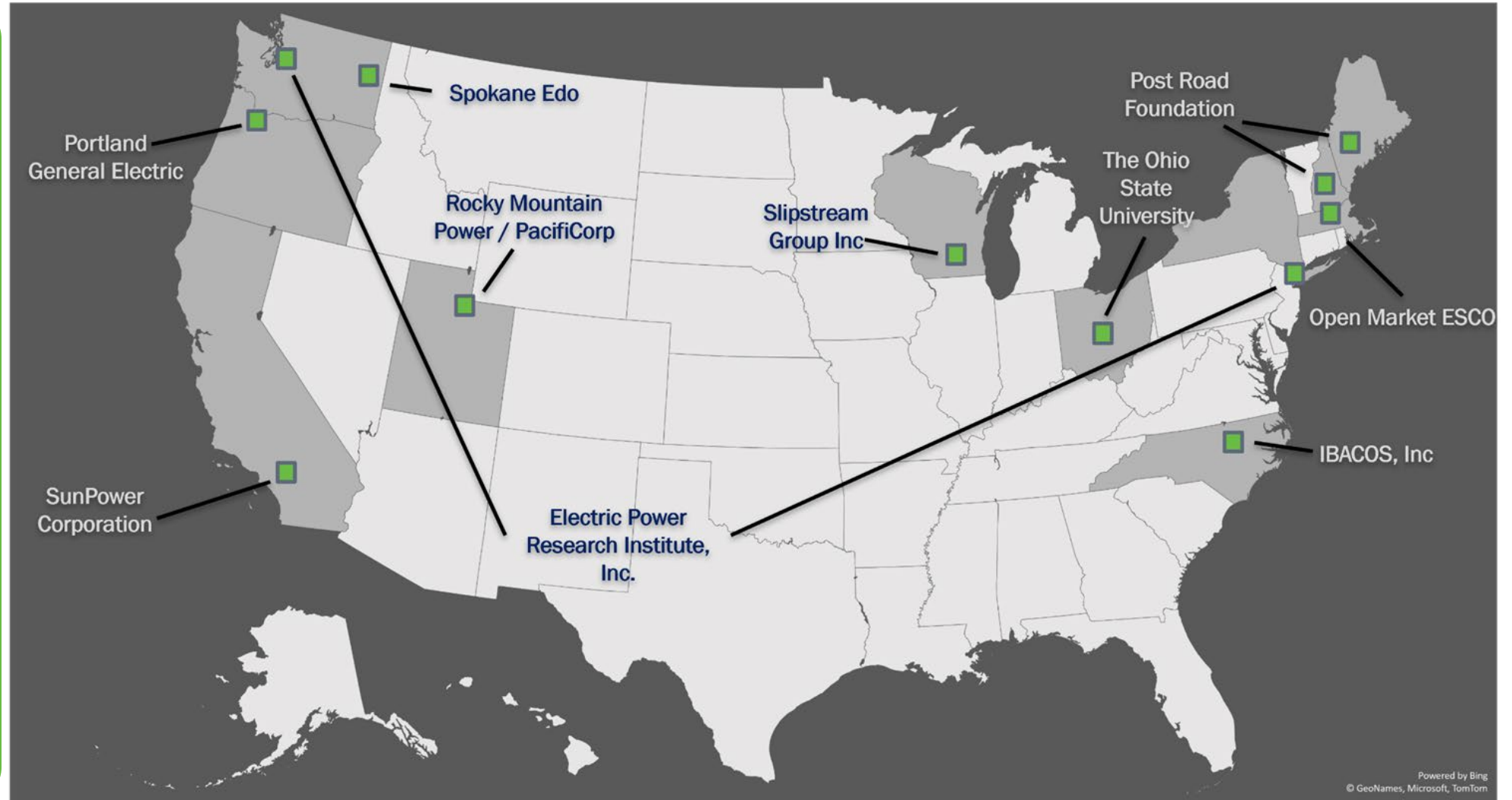
The E3 initiative is focused on developing, demonstrating and deploying heat pumps at scale

Connected Communities Project Awards



10 Selected Projects

- \$61 Million Total funding
- Final Awards expected May 2022.



www.energy.gov/eere/buildings/articles/meet-does-newest-connected-communities-grid-interactive-efficient-buildings

Technologies that can potentially reduce cost of electrification



High Efficiency 120V heat pumps
(140 units deployed)



Smart panels for demand control



Low power HPWH (120V
potential) with storage

Example technologies within a portfolio to help in reducing the demand for electric infrastructure upgrades



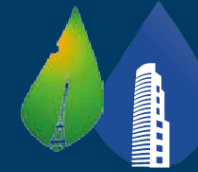
Innovation and Policy Measures to Solve the Heat Challenge

Clean Heat Forum

**Global Clean Energy Action
Forum 2022**



Clean Heat Forum



Global Alliance
for Buildings and
Construction

Marrakech Partnership for Global Climate Action

- By 2030 the built environment should halve its emissions
- New buildings must be net zero in operation
- By 2050 all buildings must be net zero across the whole life cycle

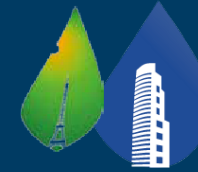
Clean Heat Forum Objectives

- Shape and exchange best practices
- Co-creation of standards and regulations
- Making the case of action by other parties to accelerate heat decarbonisation

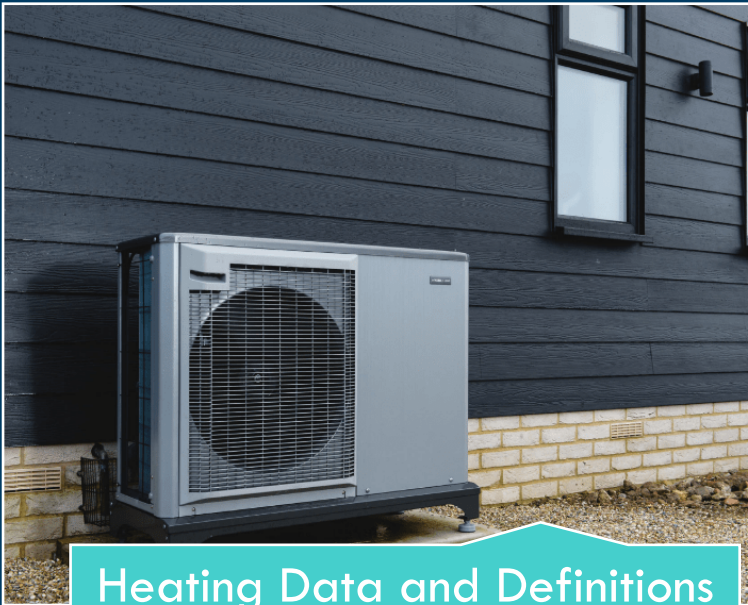
Accelerating Heat Decarbonisation in Year 1

- Governments, Civil Society, Industry, and more
- Public policy and public engagement best practices and ambition
- Advancing research, data, and definitions

Clean Heat Forum



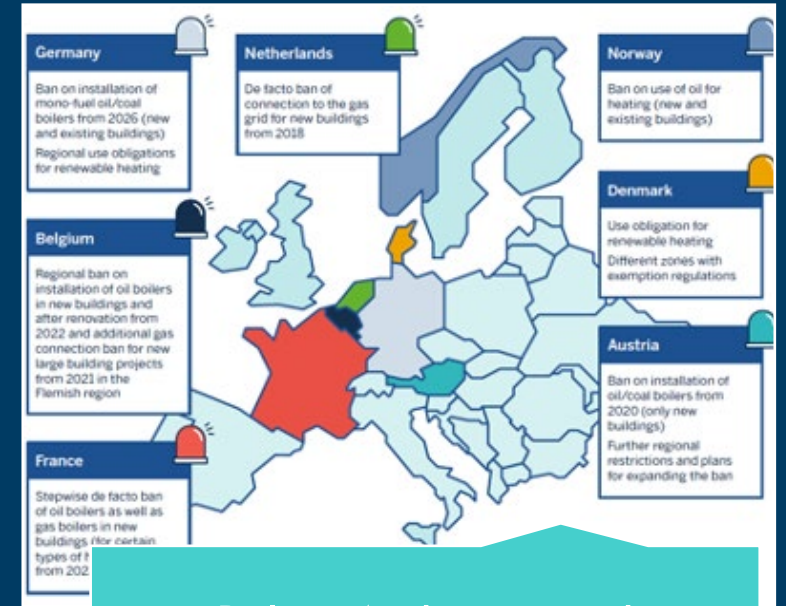
Global Alliance
for Buildings and
Construction



Heating Data and Definitions
Consumer Incentives &
Financing



Systemic Infrastructure and
Workforce Challenges



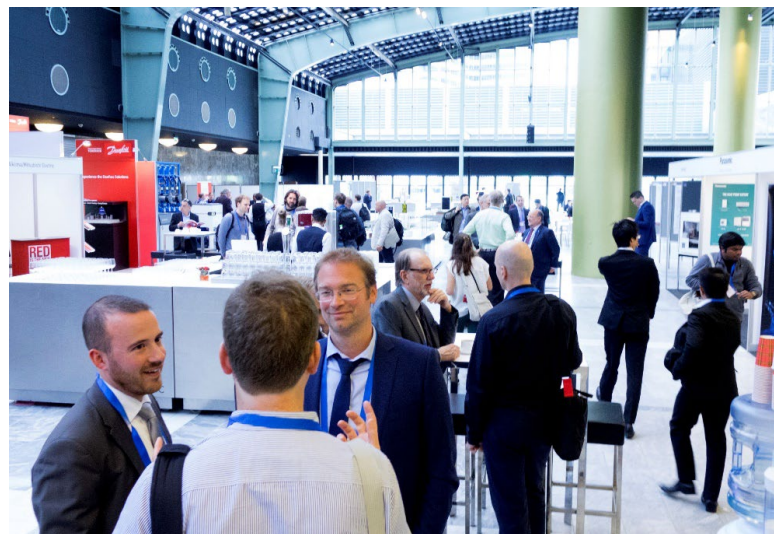
Policy Ambition and
Consistency

<https://globalabc.org/members/join-us>

IEA HPT TCP

Comfort and Climate Box

– Roadmap for scaling and replication



Research, Development, Demonstration, and Deployment of Heat Pumping Technology

Caroline Haglund Stignor, Heat Pump Centre, HPT TCP, c/o RISE Research Institutes of Sweden

Heat Challenge – the Needs

End-user

- A comfortable home
- Hot showers
- Reasonable energy bills
- A compact plug & play solution
- Environmental awareness

Policymakers

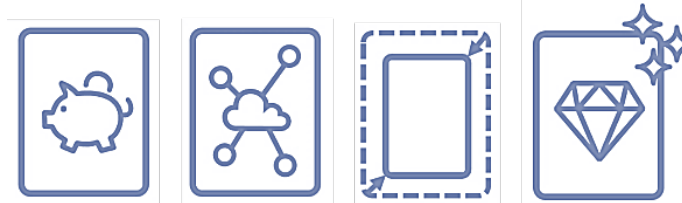
- Reach climatic targets
- Ensure security of supply
- Reasonable energy bills for the population

Utilities and grid owners

- Acceptable return on investments
- Reaching emission targets
- Flexibility providers to ensure the security of supply and optimize investments

Implementation strategies

- Differ between markets



Affordability Flexibility Compactness Efficiency



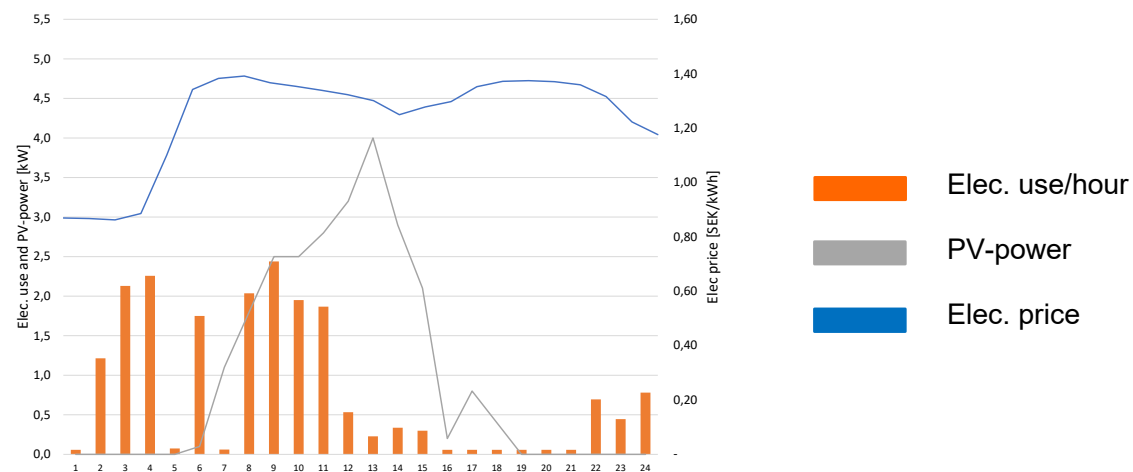
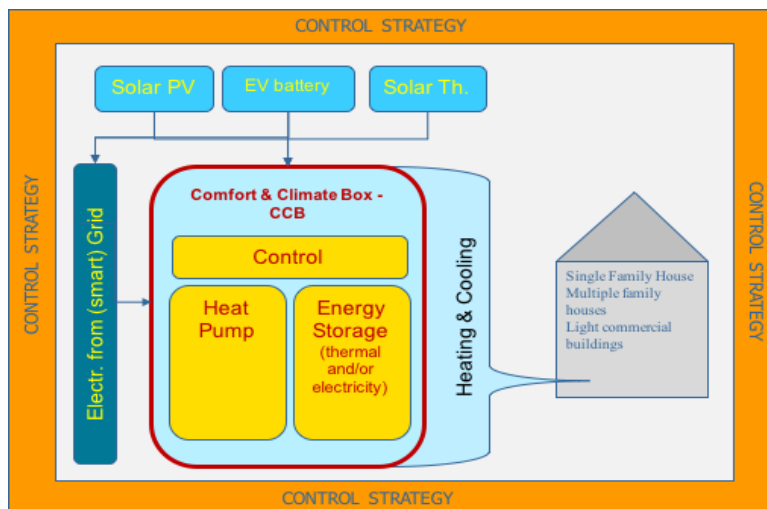
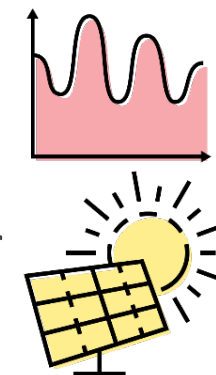
A solution – Comfort and Climate Box (CCB)

Integrated solutions of heat pump, energy storage and control – in a virtual box

A prototype developed within HPT Annex 55/ ES Task 34 in collaboration with MI IC7

Two “Smart control functions”

- Price: Minimize the electricity cost
- Sun: Maximizing self-consumption of PV-power
- **Combination of above**



Recommendations for accelerated deployment of CCB

Policy	Utilities and aggregators	Manufacturers
<ul style="list-style-type: none"> • Promote and prioritize heat pumps and energy storage in policies – a comprehensive approach needed • Promote standards and communication protocols for smart, flexible combinations of heat pump and energy storage – CCBs • Develop and revise labeling schemes that promote clean heating solutions which could balance the electricity grid • Ensure capacity building, to educate installers as well as others in the value chain of CCBs. • Invest in electric infrastructure – both grid and production facilities of renewable electricity 	<ul style="list-style-type: none"> • Offer alternative business models (leasing, rental, heat as a service, etc) for using a heat pump or a CCB as main heating equipment • Implement tariffs that stimulate off-peak-hour operation of the heating system • Inform the end users how they can influence their energy bill by being a part of the electricity capacity market and incentivize flexibility • Be stable in time and use harmonized price structures (over regions and countries) 	<ul style="list-style-type: none"> • Make the products “sufficient efficient”, avoid additional features and focus on mass production of a limited number of models. • Make control strategies for CCB for combinations with solar PV, EV, and energy storage • Make your communication protocol standardized and open • Make the products “plug-and-play” to minimize installation and maintenance costs. • Design the CCB as compact as possible and “boxify” the products • Keep the volume of the energy storage limited and utilize the possibility of using the building construction as heat storage

Continued research and innovation needed

THANK YOU FOR YOUR ATTENTION!

Monica Axell

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