



Heat Roadmap Europe

A low-carbon heating and cooling strategy

2050



Brian Vad Mathiesen

bvm@plan.aau.dk / [@brianvad](https://twitter.com/brianvad)

Sustainable Energy Planning Research Group
Aalborg University

Workshop with key H2020 projects on Heating & Cooling

Break out session:

Heat Roadmap Europe: H&C in energy systems modeling

11th September 2017, Bloxhub, Copenhagen, Denmark



www.heatroadmap.eu

[@HeatRoadmapEU](https://twitter.com/HeatRoadmapEU)



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 695989.

www.heatroadmap.eu
[@HeatRoadmapEU](https://twitter.com/HeatRoadmapEU)



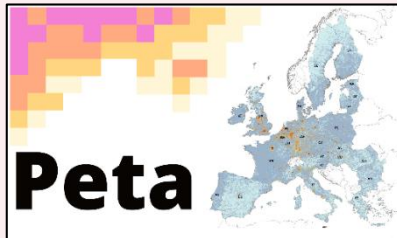
Combining the Strengths of Different Energy Models

Heating & Cooling
(Creating Data)

Energy System
(Creating Scenarios)



Location of Heating & Cooling
and Renewable Energy (WP2)



Profile of Heating & Cooling
(WP3/4)



Energy System Transition
(WP5/6)

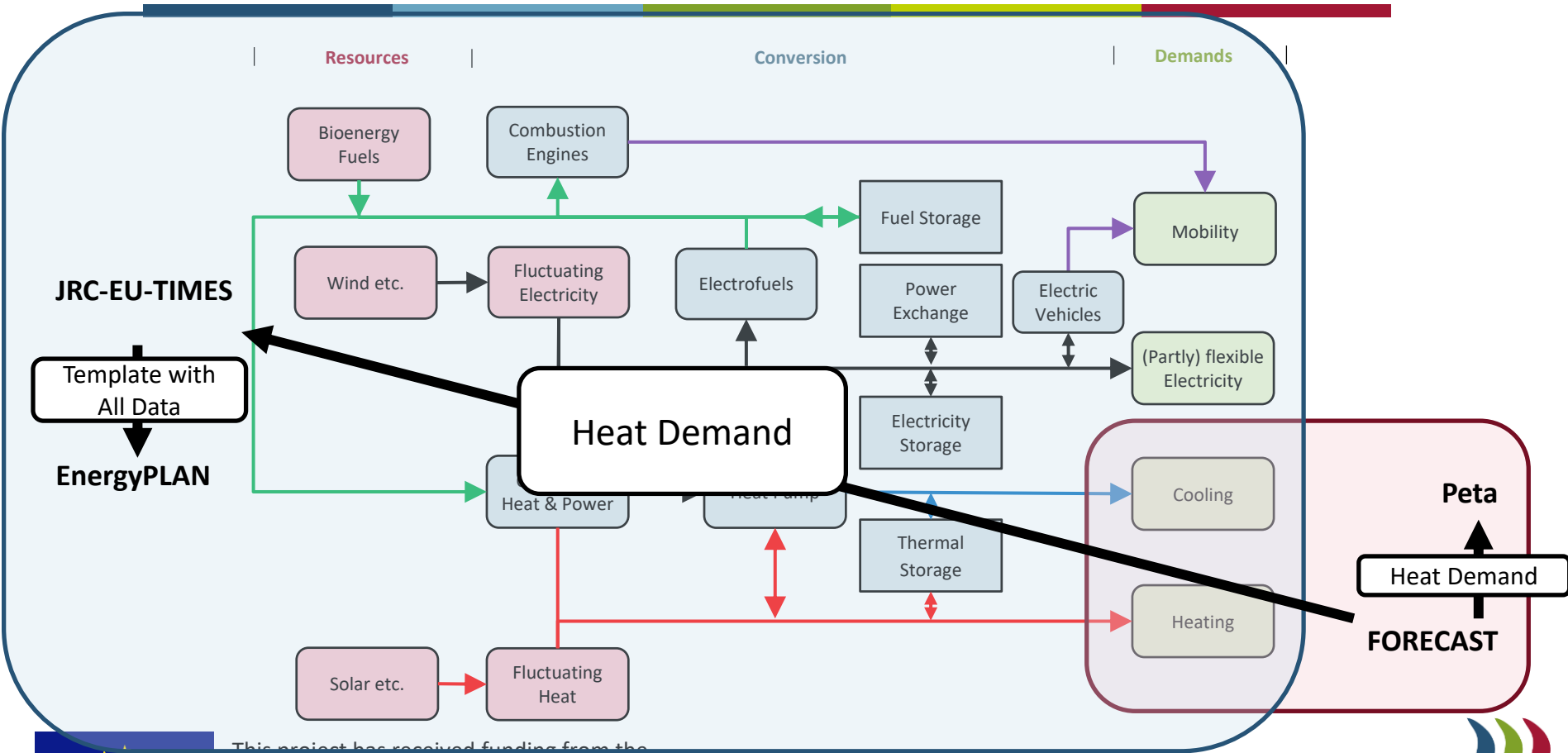


Energy System Operation
(WP5/6)

Energy PLAN

Advanced energy
system analysis
computer model

Model Connections in HRE4



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 695989.

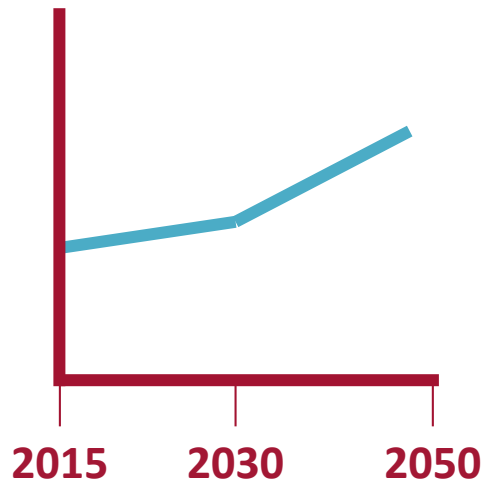
www.heatroadmap.eu
@HeatRoadmapEU



Connecting Energy Models Using the Strengths of Each One

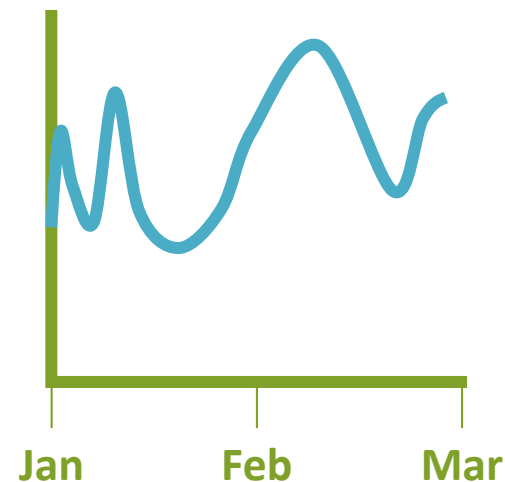
JRC-EU-TIMES

Tells us what happens
between now and 2050



EnergyPLAN

Explains what is going on in
each hour of the year



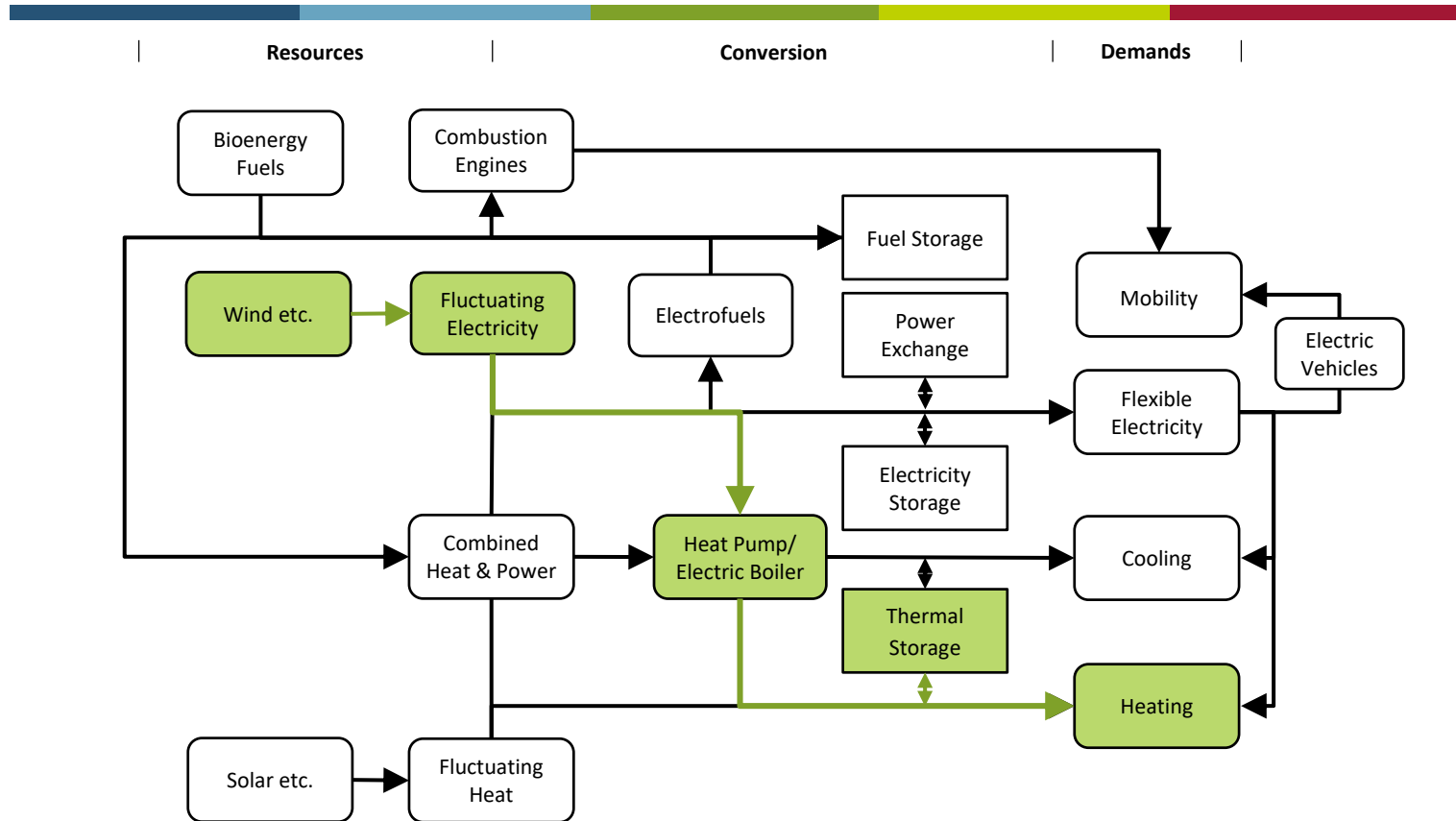
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 695989.

www.heatroadmap.eu
@HeatRoadmapEU



EnergyPLAN (www.EnergyPLAN.eu)

Example of Hourly Operations in Smart Energy System (www.SmartEnergySystem.eu)



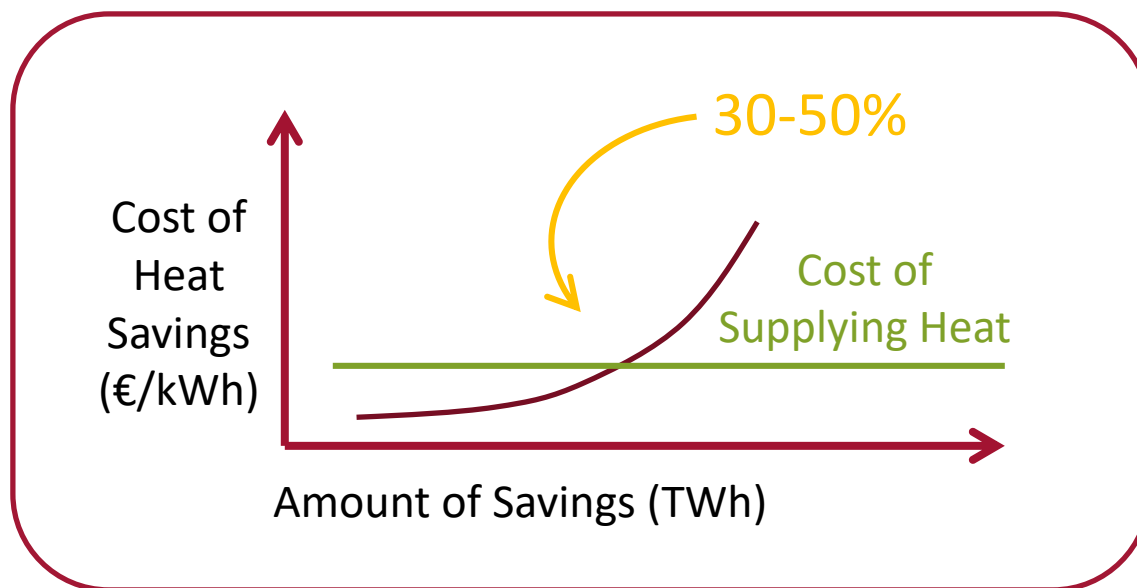
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 695989.

www.heatroadmap.eu
@HeatRoadmapEU



Example: Energy efficiency is required on both the demand and supply side of the heat sector – but how do we find the balance

www.energyplan.eu/buildings/



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 695989.

www.heatroadmap.eu
@HeatRoadmapEU



Simulation versus optimization and recommendations going forward

- a simulation model can be defined as representation of a system used to predict the behaviour of the system under a given set of conditions
- while an optimization model is typically used synonymously with mathematical programming to refer to a mathematical formulation in which a formal algorithm is used to compute a set of decision-variable values that minimize or maximize an objective function subject to constraints

- **What data do we need in Europe to better model and understand the heating and cooling sector?**
- **What tools do we need to assess future energy systems?**
- **How can we combine strengths of different data, tools and methods in the future?**
- **How can we combine optimisation methods and simulation methods?**



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 695989.