Synergistic approach of Multi-Energy Models for a European Optimal Energy System Management Tool

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773897

plan4res Consortium

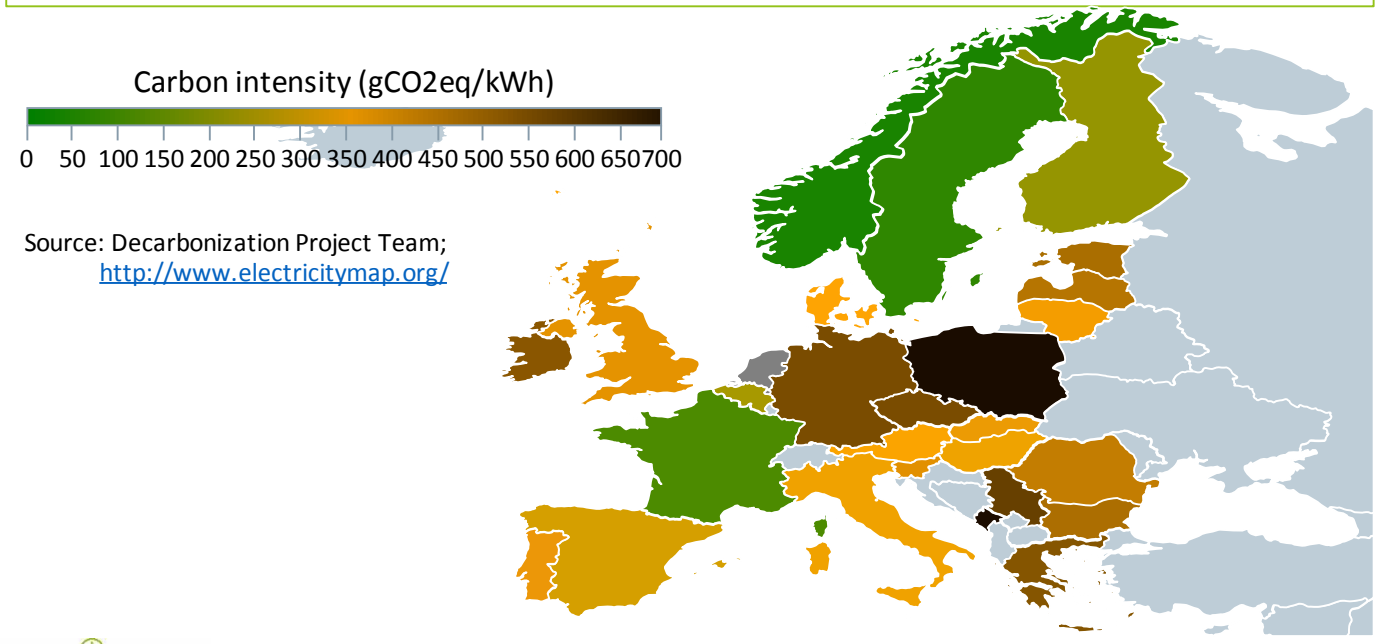
- ÉLECTRICITÉ DE FRANCE SA (EDF)
- IMPERIAL COLLEGE LONDON (IMPERIAL)
- SIEMENS AG, CORPORATE TECHNOLOGY (SIEMENS)
- CRAY COMPUTER GMBH (CRAY)
- ZUSE INSTITUTE BERLIN (ZIB)
- RWTH AACHEN UNIVERSITY (RWTH)
- CONSORZIO INTERUNIVERSITARIO PER L'OPTTIMIZZAZIONE E LA RICERCA OPERATIVA (ICOOR)

Context of the project : European objectives

2050 EU's carbon reduction targets ⇒ High share of Renewable Energy

Criteria for the European Energy System in 2050:

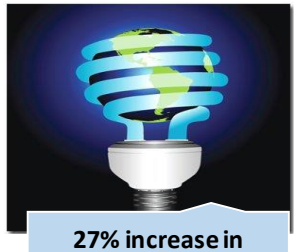
- ✓**Sustainability**
- ✓**Security of supply**
- ✓**Competitiveness**



Source: Decarbonization Project Team; http://www.electricitymap.org/

At least 27% RES-E

40% Reduction in GHG emission



27% increase in energy efficiency

PARIS2015 COP21·CMP11

What did the H2020 Call required?

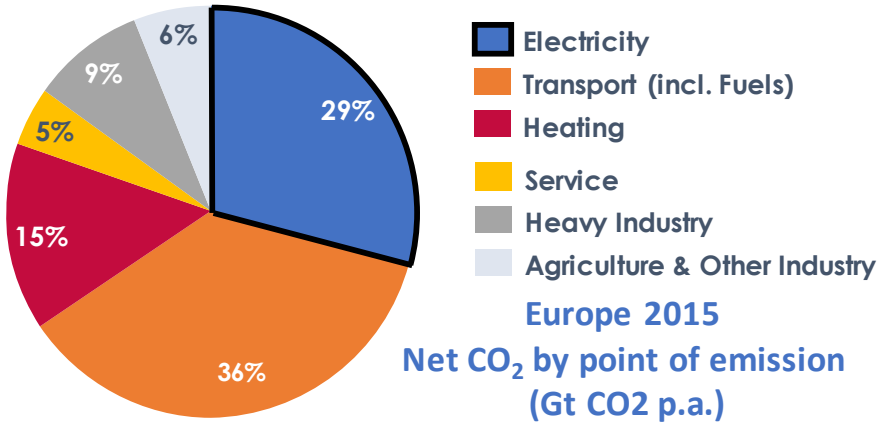
- ***The Challenge :*** ***contribute to targets for the reduction of emissions by creating tools that will help enhancing the flexibility of the energy system***
- ***"A Novel European grid and end-to-end energy system planning tools, including foreseeable features such as storage, aggregation, demand-response and integrating cost aspects"***
  - ***End-to-end : from generation to consumption, via transport and distribution***
  - ***Focused on the electricity system…. and coupling with other energies (gas, heat)***
  - ***Tools for planning, integration and operation***

plan4res storyline

Facing European targets for reduction of greenhouse gas emissions while maintaining high quality of supply and low cost

⇒Electricity : Increase Share of renewable

⇒Other Energies : move uses to low emission energy sources



⇒ **Maximise the grid capacity to host renewable by optimising the best balance between infrastructure investments and optimum use of all assets**

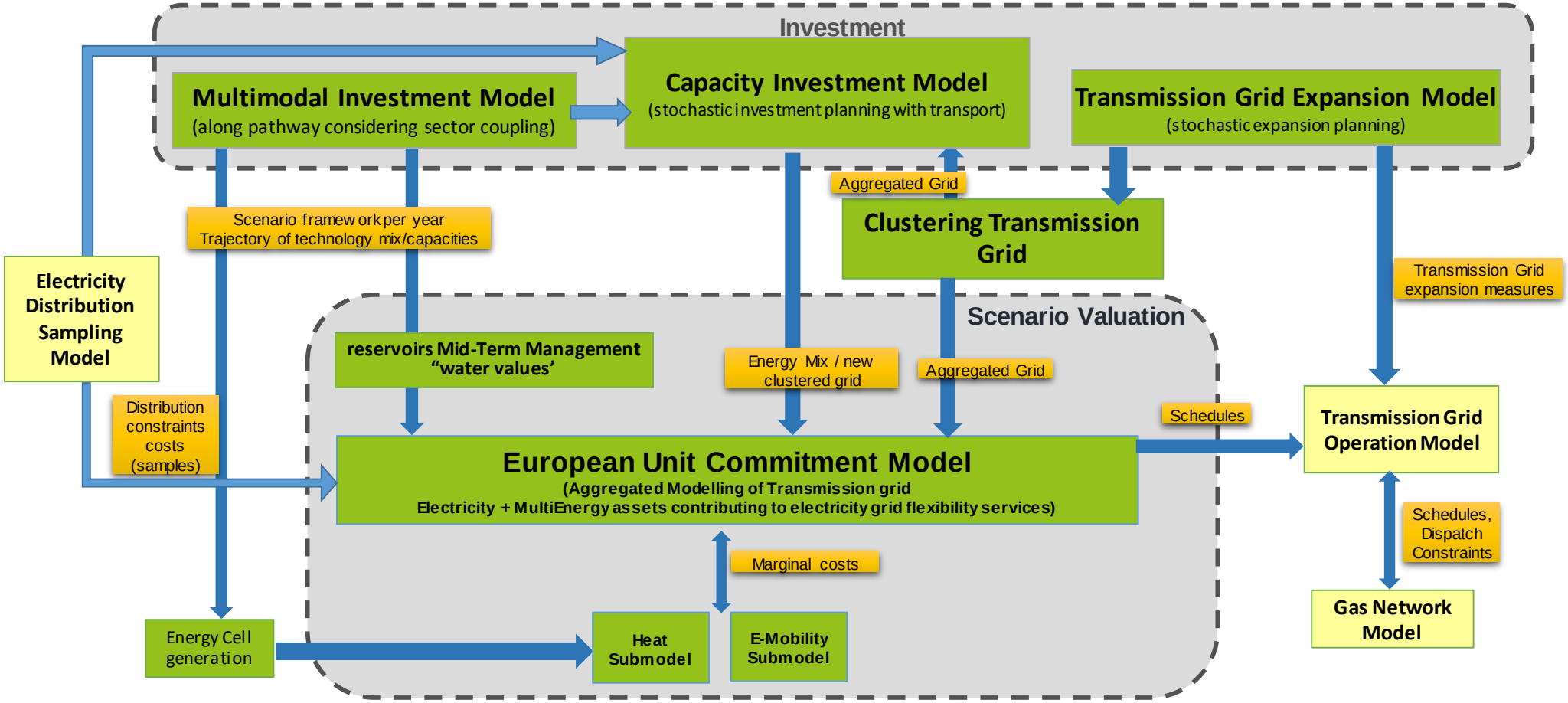
⇒ **Maximise the use of all available flexibilities including traditional (generation plants….) and emerging (distributed assets, multi energy synergies…)**

plan4res assumption : an **integrated representation of the system** is necessary in order to achieve the objectives with the lowest cost

What plan4res will deliver:

- An **end-to-end planning and operation tool**, composed of a set of optimization models based on an integrated modelling of the pan-European Energy System;
- An **IT platform** for providing seamless access to data and high performance computing resources, catering for flexible models (easily replacing submodels and the corresponding **efficient solution algorithms**) and workflows;
- A database of **public data**
- **3 case studies** highlighting the tool's adequacy and relevance.

plan4res interacting model



plan4res Case Studies

- **Strategic development of pan-European network without perfect foresight** and considering long-term uncertainties
- **Cost of RES integration and impact of climate change for the European Electricity System** in a future world with high shares of renewable energy sources
- **Multi-modal European energy concept for achieving COP 21 goal** with perfect foresight, considering sector coupling of electricity, gas, heat and transport demand

To know more

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Thank you