

Integrated planning of multi-energy systems: a comprehensive modelling framework

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Objectives



Partners

- Design of efficient transition paths for the energy systems of the future (2050), both at generation & infrastructure levels, in order to meet decarbonization targets
- Integrating the electricity, heat, gas and mobility sectors (exploiting synergies and flexibilities: sector coupling)
- Develop a decision support tool targeted at:
 - European and National System planners,
 - System Operators (TSOs & DSOs),
 - Multi-utilities

36 months total duration, started in November 2019



Another Tool?



Energy Modelling Platform for Europe (EMP-E V4) http://www.energymodellingplatform.eu/

Scope & Hybridization (Sectors) \rightarrow



Blue-EU, Green-national, Red-regional, Yellow-other © Reiner Lemoine Institut | CC BY-SA 4.0

3 general approaches:

- **Energy Network/Infrastructure ...** 1)lack of supply side/sector coupling
- 2) **Energy conversion units...**
- ... no optimization & network topology
- Scalability/Comprehensiveness design & operation.... 3)
- ... no network details & no user friendly



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Comprehensive solution that attempts to integrate all 3 approaches (focusing on strategic/investment view point) **User Friendly**







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Electric infrastructure,

Target area, e.g. Italy



Macro area, e.g. Tuscany

Transmission line



Transmission nodes, e.g. Large power plants Macro area clusters per technology

Distribution line

Distribution nodes, e.g. **Electric substations**

Gas infrastructure, e.g.

Power plants Power-to-gas Heat infrastructure, e.g. Boiler, Cogeneration **Commodity-X**, e.g. cooling Absorption chiller Compression chiller

PlaMES Tool Overview







The tool will have two main target uses:

Central Use (use case 1):

Plan the development of infrastructures at Transmission Levels + supply side mix that meets decarbonization targets Target Users:

- European and National Energy Agencies
- Transmission System Operators (TSOs)

Decentral Use (use case 2):

Energy Infrastructure Planning at Local Level + Synergies between different energy vectors at distribution level

Target Users:

- Local Authorities
- Distribution System Operators (DSOs)
- Multi-Utility Companies
- Original Equipment Manufacturer (OEMs) & Investors





Conclusions









Thank you for your attention

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