



# OPTIMATE

## Platform overview

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Co-funded by the Intelligent Energy Europe  
Programme of the European Union



# Agenda

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- Context
- OPTIMATE Platform
- Focus on reference equilibrium
- Conclusion





## Context

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- EU sustainable development goals
- Heterogeneous national configurations
  - Market players and Market rules
  - Information transparency
  - Exchange barriers
- How to integrate variable renewable generation?
  - Assessing market designs...
  - ... And their impacts

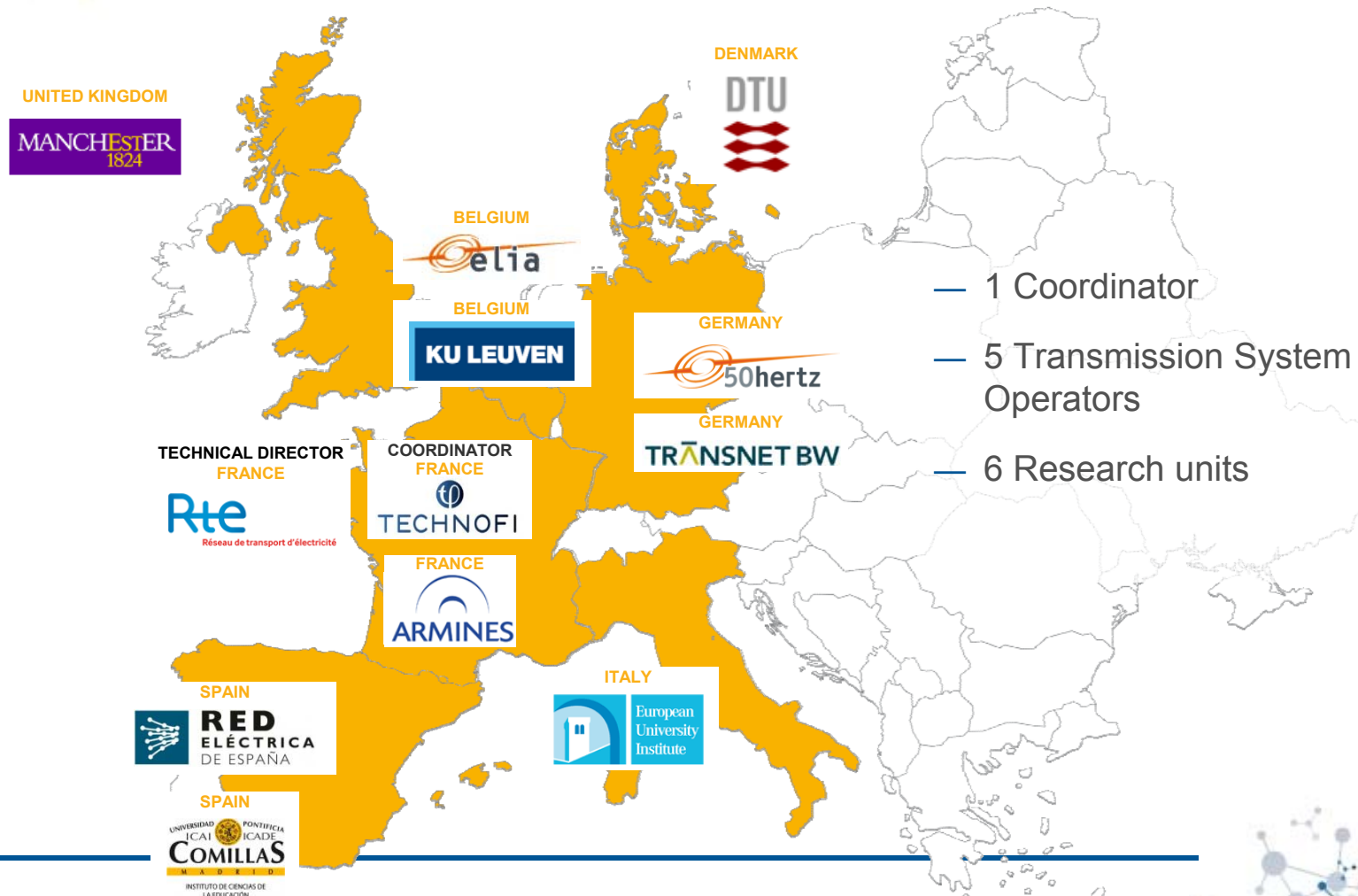


→ Development of the OPTIMATE prototype within a co-financed EC - FP7 project ...

... a tool to compare short-term electricity market designs



## Context – FP7 consortium





## Context – FP7 project outputs

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- Outputs of the FP7 project (2009-2012)
  - A Prototype (under almost perfect competition assumptions) with partial functional scope
  - Validation studies
- RTE is mandated by the FP7 consortium and the EC to exploit the project's results
  - Functional development of the prototype
  - Prototype exploitation (grant access to external users)
  - Industrialization of the tool





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## OPTIMATE Platform – Input

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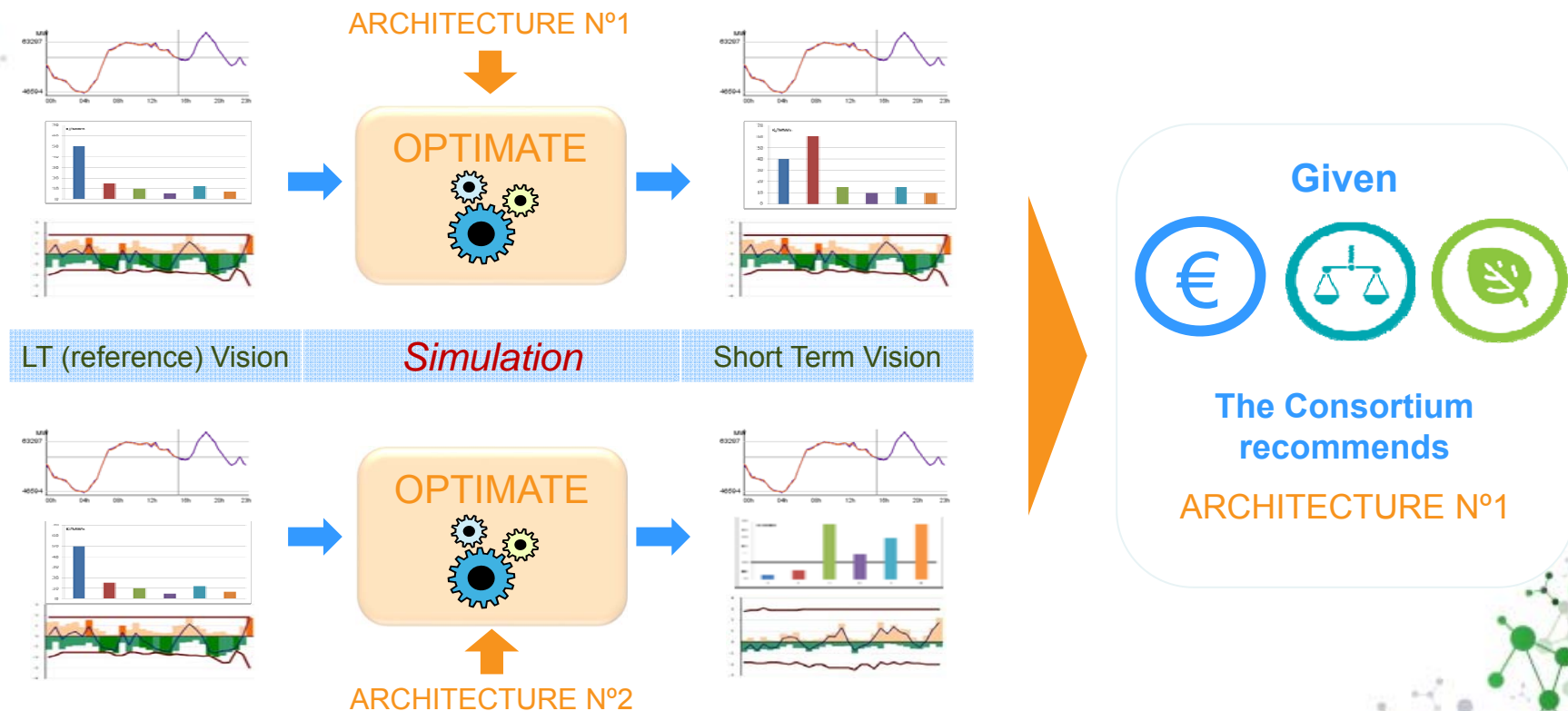
- Market players and assets
  - Generation fleet
  - load and RES capacities (forecast and realized time series)
- Aggregate network
  - Clusters
  - Critical branches, NTCs





# OPTIMATE Platform – in a nutshell

A short-term market architectures simulator







## OPTIMATE Platform – Indicators

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For a given scenario and a given architecture,



Day-Ahead market clearing prices, surplus breakdown by market player / portfolio...



Real time imbalance and imbalance prices, amount of tertiary reserve power, load curtailment duration...

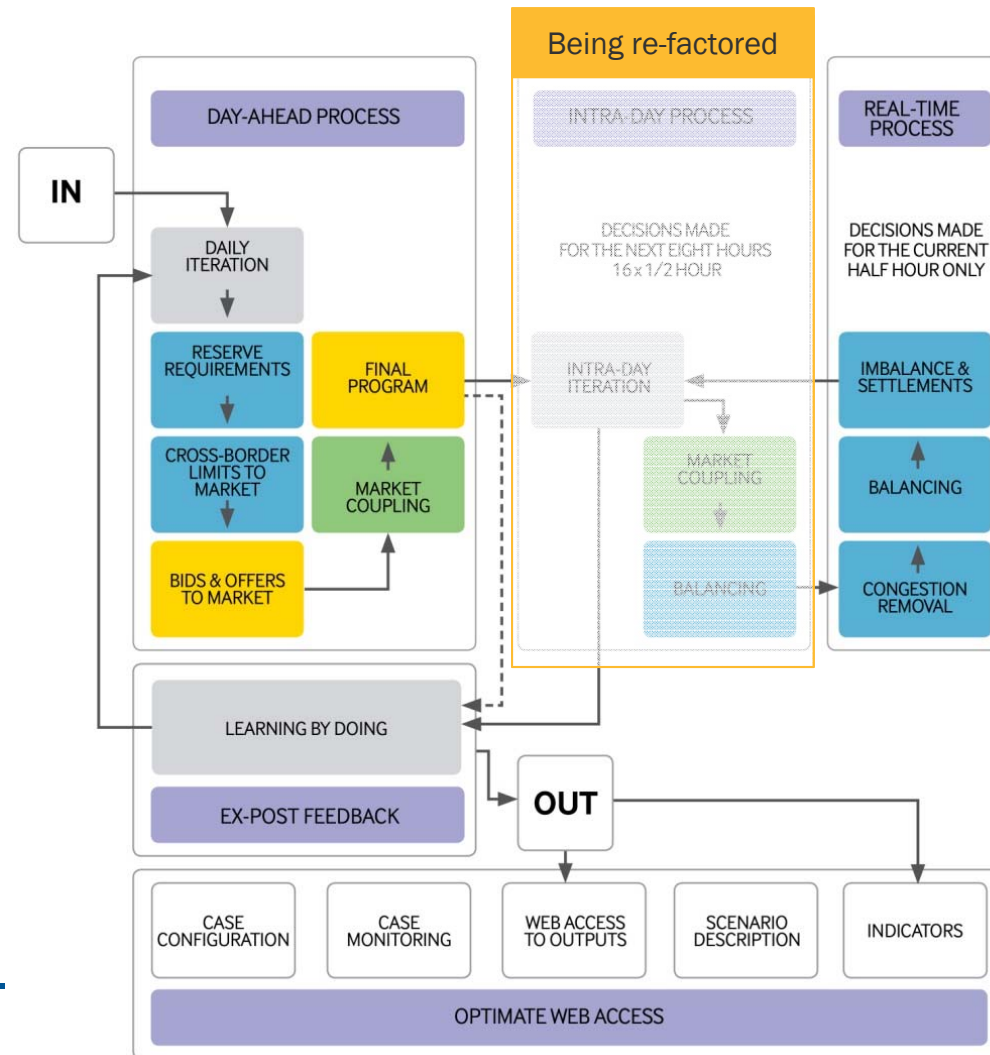
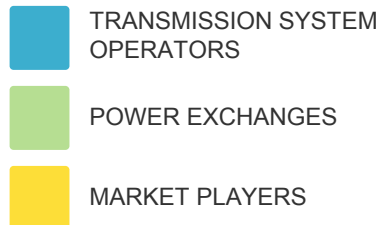


CO2 emissions, share of RES...



# OPTIMATE Platform – Architecture

## OPERATIONS





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## Reference equilibrium

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- Using ANTARES computation core
- ANTARES is a Monte-Carlo software for power systems analysis:
  - Sequential
  - With a time span of one year
  - With a time resolution of one hour
- ANTARES is designed for
  - Generation / Load balance studies (Adequacy)
  - Economic assessment of Generation projects
  - Economic assessment of Transmission projects





## Reference equilibrium

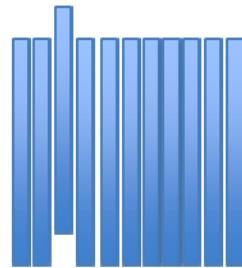
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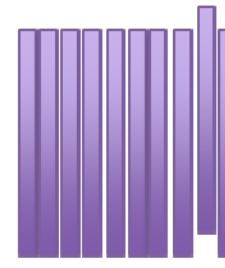
Wind time-series



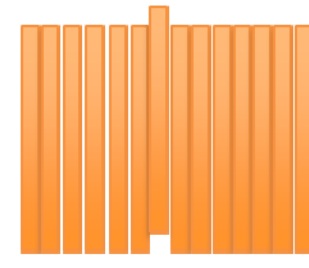
Solar time-series



Hydro time-series



Load time-series



Thermal disponibilitles  
time-series



ANTARES chooses a time-series for each variable (at random or user-determined)

→ An annual scenario for demand and generation (Monte-Carlo year)

→ Up to thousands years are computed

Focus on both:

- Statistical distributions (electricity not supplied...)
- Specific values (marginal cost...)





## Reference equilibrium

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- Objective : cost minimization of the generation-demand equilibrium at each hour for each MC year
- Constraints include
  - Generation constraints
  - More or less detailed network constraints, from Net transfers Capacities to DC approximation of Kirchhoff laws





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## Conclusion

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OPTIMATE is an **expert** tool, used for/by:

- TSOs and National Regulating Authorities
- Academics
- ACER, CE and energy ministries
- And within European projects such as **Market4RES**

A **prototype** built upon the FP7 consortium work

→ **Industrialization** is currently ongoing (by RTE)

→ Intra-Day processes being re-factored and performances are being enhanced (algorithms review, multi-threading...)

More info at [www.optimate-platform.eu](http://www.optimate-platform.eu)





Co-funded by the Intelligent Energy Europe  
Programme of the European Union

Thank you very much  
for your attention





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#### COORDINATOR



#### PARTNERS

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#### CONTACT

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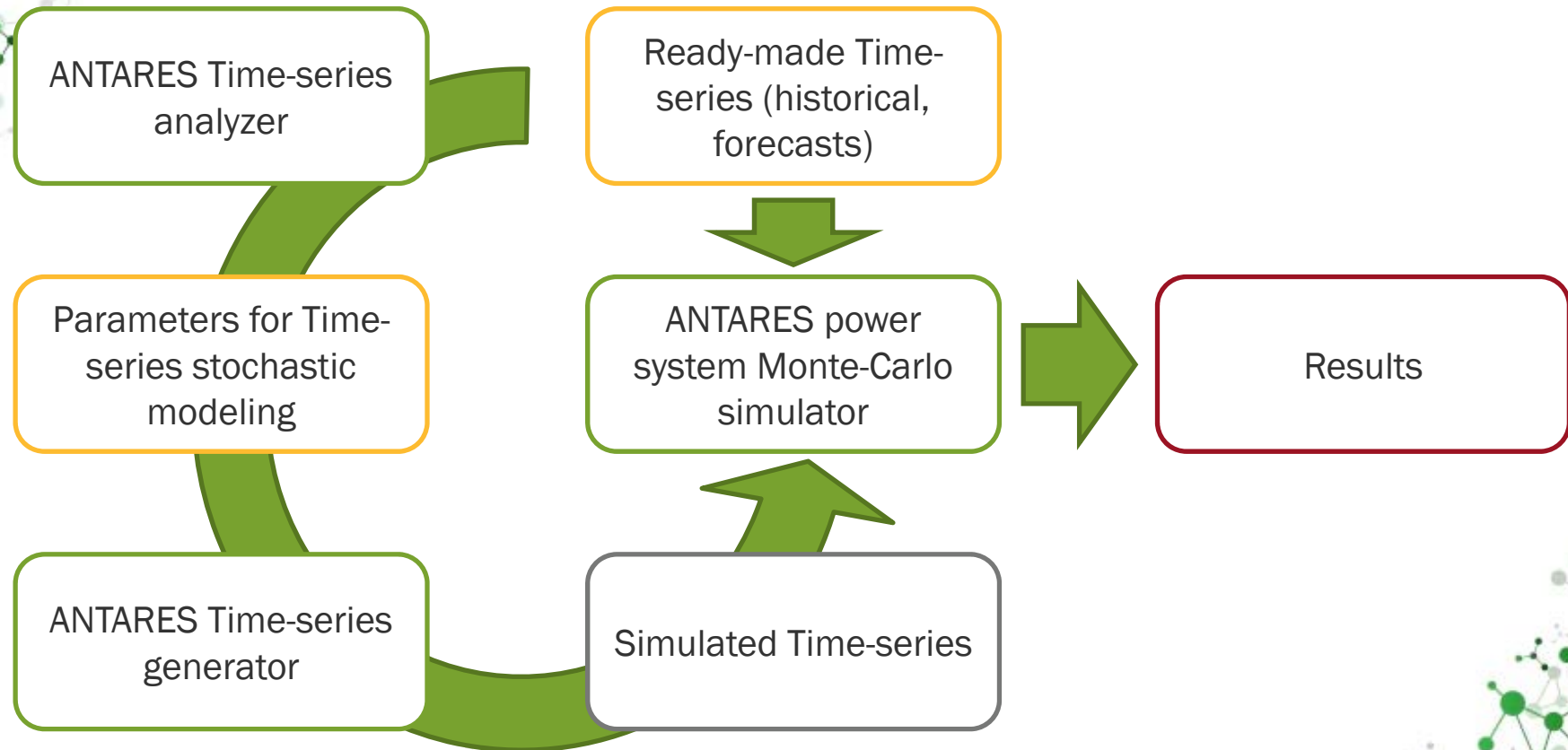
Results, event calendar and all related news can be found on: **[www.market4RES.eu](http://www.market4RES.eu)**

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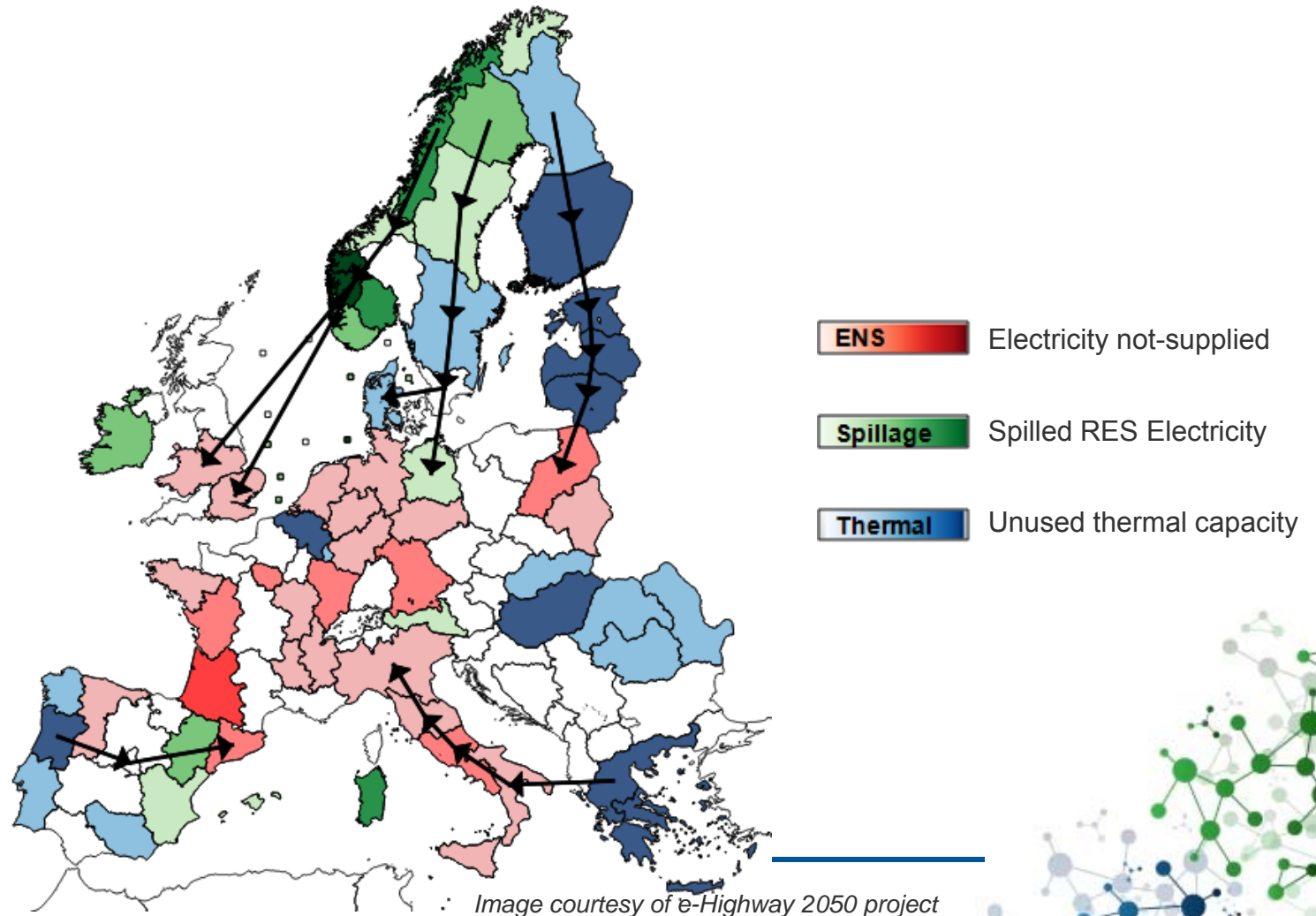
Market  **RES**



## APPENDIX – ANTARES Platform



## APPENDIX – Example of analysis





## APPENDIX – ANTARES – some users

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### External uses

- ENTSOE: Regional Adequacy Forecast and Ten Year Network Development Plan (benefit assessment of network projects such as new interconnector)
- European Project: e-Highway 2050, Twenties (North Sea Off Shore), OPTIMATE...

### RTE uses

- System Adequacy Report (“Bilan Prévisionnel”) : identify risk of curtailment in the near future Y+2/Y+10
- Network development
- Capacity mechanism
- Smart Grids projects