

REALISEGRID: a FP7 project for assessing the benefits provided by infrastructure development in a pan-European power system

Angelo L'Abbate, Gianluigi Migliavacca
ERSE (former CESI RICERCA) S.p.A.
Project Coordination



Presentation outline

- Motivation of the REALISEGRID project
- Description of activities
- Numbers and facts of REALISEGRID
- Some important achievements

Challenges for the pan-European transmission grids for 2020 and beyond

Integration of very large amounts of **variable RES**, while keeping network security and reliability at acceptable levels

Renewable generation that exceeds local needs at a given time requires **transport elsewhere**

Aging of the present transmission grid; difficult to get **consensus** for building new overhead lines

Liberalization of market inducing increased **cross-border power exchanges** rising uncertainties and congestion problems

Increasing role of **active demand**: demand response programs at peak consumption to relieve stress on European electricity system



European electricity grid are on the critical path to meet the EU climate change and energy policy objectives

The EU Energy Policy

Promoting competition:

- eliminating cross-border bottlenecks;
- harmonizing market regulation throughout Europe;
- promoting the creation of a common Internal Energy Market

- Green Paper “A European Strategy for competitive, sustainable and secure energy” (2006)
- Communication “An Energy Policy for Europe” (2007)
- Communication on Strategic Energy Technology Plan (SET-Plan, 2007)
- Climate and Energy Package (2008) and Directive 2009/28/EC
- Third Liberalization Package (2009) and Directive 2009/72/EC

Climate change mitigation:

- reducing CO₂ emissions;
- promoting green generation;
- boosting efficiency in the consumption (energy saving)

Increasing security of supply

■ Necessity to invest in the grid:

- the PIP (Jan. 2007) underlined that electricity and gas networks are the “heart” of a well-functioning energy market;
- The Second Strategic Energy Review (Nov. 2008) clarified that EU will never realize its objectives unless the grid will be soon significantly expanded.
- Green Paper “Towards a secure, sustainable and competitive European energy network” (Nov. 2008)
- TEN-E Guidelines refer to 32 projects labelled as “of European interest”:
 - only 19% is completed,
 - 5% under construction,
 - 76% in the authorization path and/or in the study phase.

Goals of REALISEGRID

- REALISEGRID stands for “*RE*se*Arch*, *methodo*Logles and *technologie*S for the effective development of pan-European key GRID infrastructures to support the achievement of a reliable, competitive and sustainable electricity supply”
- The ultimate objective of REALISEGRID is to **develop a set of criteria, metrics, methods and tools to assess how the transmission infrastructure should be optimally developed to support the achievement of a reliable, competitive and sustainable electricity supply in the EU**

Activities of REALISEGRID

- Identification of technical performances, economic benefits and costs of novel **technologies** aimed at increasing capacity, reliability and flexibility of the transmission infrastructure
- Definition of long term **scenarios** for the EU power sector, characterized by different evolutions of demand and supply, such as the integration of a large amount of intermittent renewable energy sources (e.g. wind power), meeting specific targets concerning security of supply and sustainability
- Implementation of a framework to facilitate harmonisation of pan-European approaches to electricity infrastructure evolution and to evaluate benefits of **transmission investments**

REALISEGRID: the consortium

Research centers and universities

- ERSE (I), Coord. & WP3
- Politecnico di Torino (I), WP2
- Technische Universiteit Delft (NL)
- Technische Universität Dortmund (D)
- Technische Universität Dresden (D)
- EC Joint Research Centre - Inst. Energy
- Univerza v Ljubljani (SL)
- The University of Manchester (UK)
- Observatoire Méditerranéen Energie (F)
- R&D Center for Power Engineering (RU)
- Vienna University of Technology, EEG (A)

TSOs

- RTE (F)
- Verbund-APG (A)
- Terna (I)
- TenneT (NL)

Industry

- Technofi (F), WP1
- ASATREM (I)
- KANLO (F)
- Prysmian (I)
- RIECADO (A)

REALISEGRID: data and numbers

- **Start:** September 2008
- **Duration:** 30 months
- **Beneficiaries:** 20
- **Co-ordinator:** ERSE
- **Client:** EC, DG Energy and Transport
- **Engagement:** 335 person-months
- **Budget:** €4.21 million

- **Stakeholders' Board:** 36 members (ENTSO-E, CEER, TSOs, Regulators, Manufacturers, R&D and Industry). Open to new entries!

- **Web:** <http://realisegrid.erse-web.it>

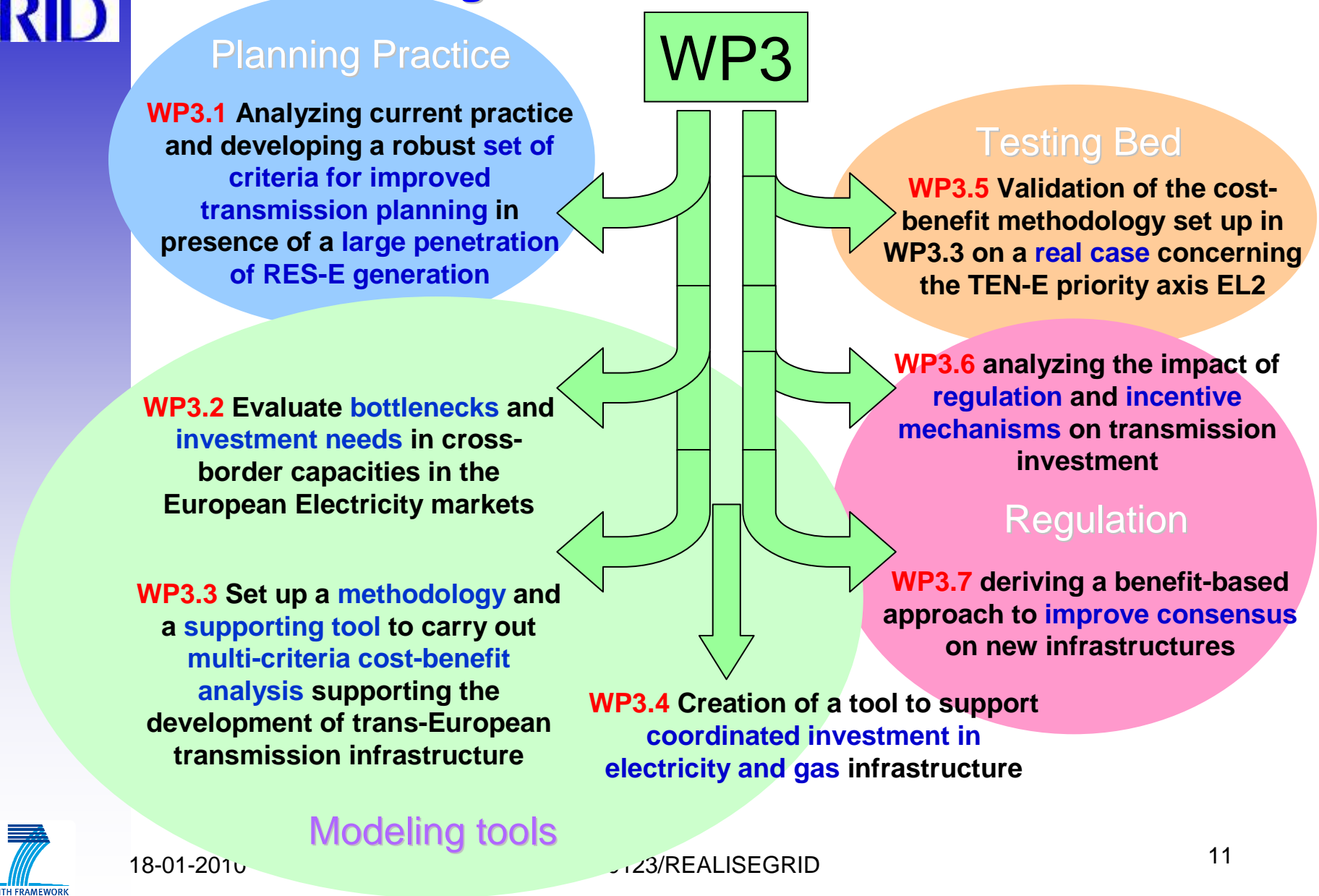
Work Package 1 “Innovative grid technologies”

- scanning the **technology options**, including WAMS, FACTS, HVDC, that will be available to the European TSOs, identifying their effectiveness and efficiency at guaranteeing reliability and controllability of the increasingly interconnected European transmission system
- assessing the possible **impact** of such new technologies on the power system (cost/benefit analysis)
- developing a **roadmap** for the incorporation of new transmission technologies in the electricity grids
- analyzing perspectives of **interconnecting the IPS/UPS system** to the UCTE system, for improving stability and reliability of the pan-European power system

Work Package 2 “Long term energy scenarios”

- developing quantitative long term pan-European scenarios based on the tool TIMES-MARKAL (ETSAP, Implementing Agreement of IEA). Considered countries: EU27 plus Norway, Switzerland, Iceland and Balkan Countries. The latter are important since interested by important pan-European energy infrastructure extensions.
- adapting the modelling tool so as to perform scenario analyses considering both electricity and natural gas infrastructures
- analyzing impacts of different scenarios on future electricity and gas exchanges between European countries, with a particular eye to system reliability

Work Package 3 “Transmission investments”



Cost-benefit analysis: test bed

REALISEGRID is going to use the new methodology to carry out a cost/benefits classification of the most important projects belonging to Trans European Network priority axis "*EL.2. Borders of Italy with France, Austria, Slovenia and Switzerland: increasing electricity interconnection capacities*". This region is one of the most interesting ones to assess the impact and the benefits of future cross-border transmission projects.



- Lienz (AT) - Cordinano (IT) line
- New interconnection between Italy and Slovenia
- Udine Ovest (IT) - Okroglo (SI) line
- S. Fiorano (IT) - Nave (IT) - Gorlago (IT) line [reinforcements completed]
- S. Fiorano (IT) - Robbia (CH) line [completed]
- Venezia Nord (IT) - Cordinano (IT) line
- St. Peter (AT) - Tauern (AT) line
- Südburgenland (AT) - Kainachtal (AT) line
- Austria - Italy (Thaur-Brixen) interconnection through the Brenner rail tunnel.

Key achievements of REALISEGRID

- On September 18th 2009, the document **“The European Electricity Grid Initiative (EEGI): a joint TSO-DSO contribution to the European Industrial Initiative (EII) on Electricity Networks”** was published. This document contains a proposal for future research activities to cope with present issues of transmission European backbones. It expressly quotes REALISEGRID as a very important project providing a basis for the future research in the field.
- REALISEGRID is also quoted several times in the ENTSO-E document (in consultation): **“Research and Development EUROGRID 2020 – European grids towards 2020 challenges and beyond”**.
- The Commission is interested to receive from REALISEGRID important results to take into account for the on-going revision of the TEN Guidelines. **A meeting of DG-TREN with the coordinators of REALISEGRID, SUSPLAN and IRENE-40 is foreseen in Brussels on January 28th 2010.**
- **Next meeting: WP2 Workshop, Paris, 25 March 2010.**

Thank you for your attention

Dr. Angelo L'Abbate

Angelo.LAbbate@erse-web.it

Gianluigi Migliavacca

REALISEGRID Project Coordinator

Gianluigi.Migliavacca@erse-web.it