

Promoting grid-related incentives for large scale RES-E integration into the different European electricity systems



The software tool
GreenNet-Europe –
Modelling least cost
RES-E grid integration

GreenNet – Incentives

www.greennet-europe.org

The GreenNet-Europe model

The GreenNet-Europe model simulates least-cost RES-E grid integration strategies in the liberalised European electricity market. The model covers a total of 35 European countries among which all 27 EU Member States. The core output of the GreenNet-Europe model are RES-E deployment scenarios in terms of generation and capacity and corresponding disaggregated grid integration cost. Results are derived on an annual basis for the simulation period 2006 to 2020 and are available on country level as well as on aggregated level for the EU-27 Member States.

Investment decisions result from an annual economic assessment that takes into account potentials and corresponding cost of RES-E technologies, the wholesale power price and currently implemented support schemes on country level. Non economic barriers are reflected in form of restrictions of the annual realisable potential.

The relevant integration cost components – grid connection cost, grid reinforcement cost, balancing cost and system capacity cost – are currently modelled for wind power only as these costs turned out to be minor for other technologies in the investigated time frame.

For wind power integration costs are taken into account for the economic assessment as illustrated in Figure 1. Single cost components can either be allocated to the wind power producer or to the end user. This way, effects of the cost allocation policy on wind power deployment are analysed.

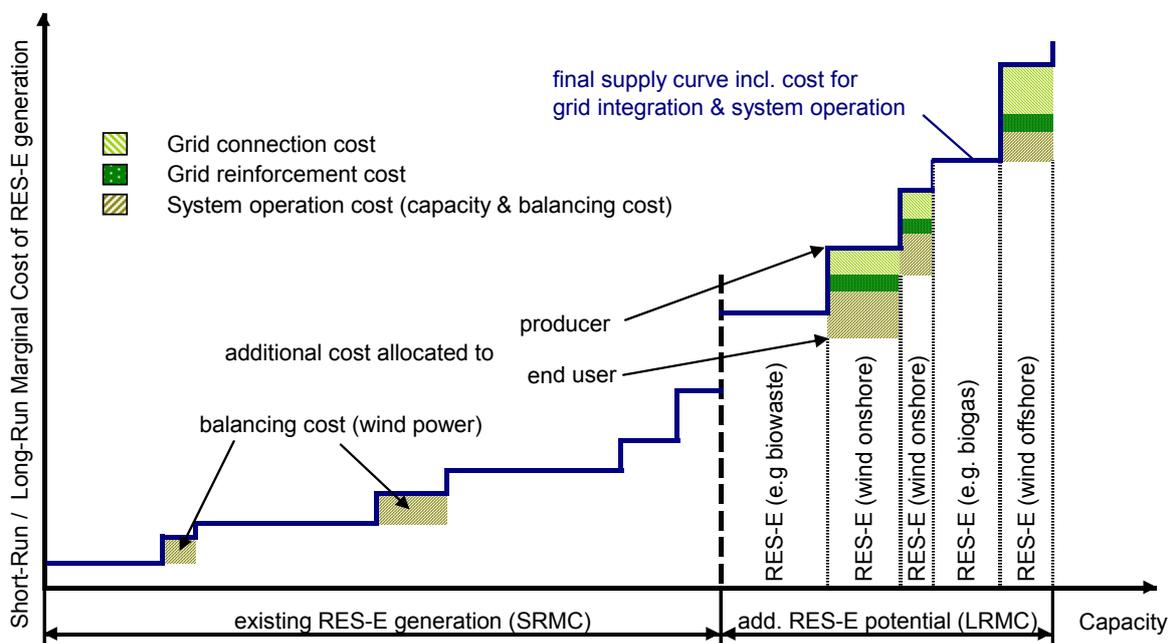


Figure 1. Implementation of additional integration cost components in the GreenNet-Europe model for the case of wind power.

In the following selected model results are illustrated for the EU-27 Member States for two support scenarios:

1. Current support policies are retained until 2020 (Business as usual scenario - BAU)
2. National support policies are improved in order to meet the 20% Renewables target in 2020 on EU-level (Strengthened National Policy scenario - SNP)

In investigated scenarios annual RES-E generation increases from 543 TWh in 2006 to 962 TWh (BAU) and 1306 TWh (SNP) in 2020 respectively. Wind power contributes most to this rise.

Corresponding specific disaggregated integration costs of wind power are drawn in Figure 3 for both BAU support (left) and SNP support (right). Specific cost (per MWh wind generation) increase for all cost components over time i.e. with increasing wind penetration. Overall integration cost reach up to 11.7 €/MWh in the BAU scenario and 19.2 €/MWh under strengthened national policies.

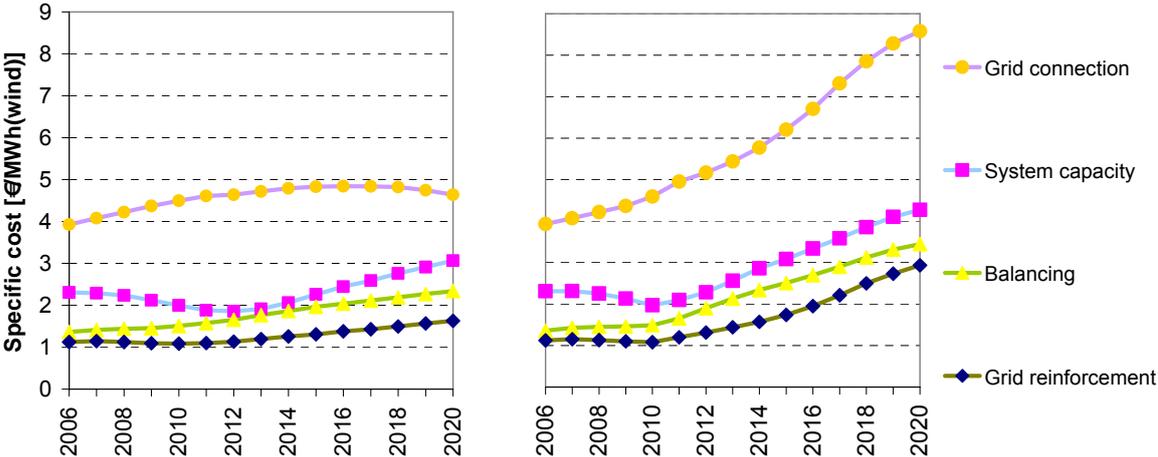


Figure 2. EU-27 – Specific grid integration cost up to 2020 for wind deployment according to the BAU (left) and the SNP scenario (right).

Effects of grid integration strategies on the deployment of new wind power installations are illustrated in Figure 3. The current cost allocation practise (BAU) is compared with the extreme allocation scenarios “deep” (all integration cost except from system capacity cost are borne by the producer) and “shallow” charging (all cost are allocated to the end user). The sensitivity of wind power deployment on the pure economic effects of cost allocation is moderate with 7% (BAU support) to 15% (SNP support) of total generation from new installations in 2020.

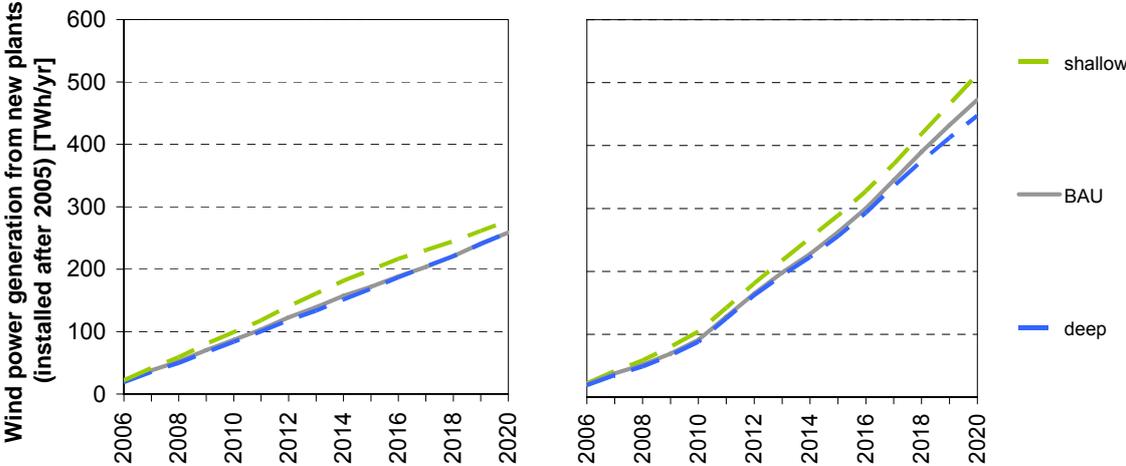


Figure 3. EU27 – Annual generation of wind power installed after 2005 depending on the cost allocation policy for BAU support (left) and SNP support (right).

The full report on the topic of this brochure, summary presentations and the documentation of a broad range of events dedicated to large scale RES-E grid and system integration as well as a report on energy policy recommendations and action plans towards "green" electricity grid policies can be downloaded from the project website:

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Guiding Large Scale and Least Cost Grid and Market Integration of RES-Electricity in Europe

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WELCOME

Welcome to the project website **GreenNet-Europe: Guiding Large Scale and Least Cost Grid and Market Integration of RES-Electricity in Europe**.

GreenNet-Europe incorporates a series of different projects having been supported in different programmes of the European Commission in recent years (**GreenNet** (2003-2004); **GreenNet-EU27** (2005-2006); **GreenNet-Incentives** (2006-2009)). Several of these projects have been coordinated by Energy Economics Group (EEG) at Vienna University of Technology, Austria.

Energy Economics Group (EEG), together with several partners of the consortia in the different projects, tries to establish a common understanding on large scale and least cost grid and market integration of RES-Electricity in Europe under a variety of different constraints (e.g. technical, economical, legal, societal) and energy policy settings. In particular, **GreenNet-Europe** emphasises the necessity of a convergence of different coexisting policies of RES-Electricity grid and market integration (e.g. renewable technology support policy, grid regulation policy, unbundling implementation policy) as well as comprehensively addresses also the grid operator's and system operator's point-of-view in this context.

In **GreenNet-Europe** a variety of different products have been developed, e.g. simulation software tools, empirical data bases, policy recommendation reports, presentations, and brochures. The portfolio of outputs of **GreenNet-Europe** is continuously extended and several of these products and materials are available on this website free of charge. In **GreenNet-Europe** also comprehensive dissemination activities are conducted in order to reach several key decision makers and stakeholders (incl. their associations) in the field of large scale RES-Electricity grid and market integration, as there are e.g. policy makers, regulatory authorities, RES-E generators, system operators, grid operators and end-users.

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Project Coordinator

Dr. Hans Auer
Energy Economics Group (EEG)
Vienna University of Technology
Gusshausstrasse 25-29 / 373-2
A-1040 Vienna, Austria
Email: auer@eeg.tuwien.ac.at
Phone: ++43-(0)1-58801-37357

Lukas Weissensteiner
Energy Economics Group (EEG)
Vienna University of Technology
Gusshausstrasse 25-29 / 373-2
A-1040 Vienna, Austria
Email: weissensteiner@eeg.tuwien.ac.at
Phone: ++43-(0)1-58801-37368

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