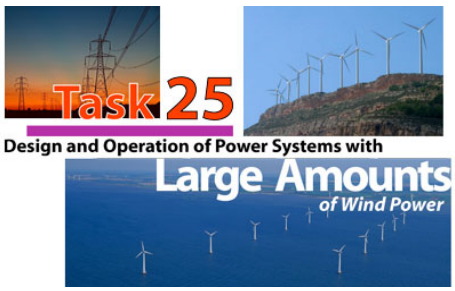
iea wind

Task 25: Design and Operation of Power Systems with Large Amounts of Wind Power

Notes for wind energy grid level system costs published by NEA 2012 report



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Nuclear Energy Agency (NEA) published a report on Nuclear energy and renewables (Nov 2011, http://www.oecd-nea.org/press/2012/2012-08.html) in which they produce very high grid level system costs for wind power. Task 25 participants have reviewed the methods the report is using and found several inconsistencies with the current knowledge about the costs of wind integration to power systems:

- Balancing and grid extension cost estimates seem reasonable, except for some countries using the high offshore wind reinforcement costs (based on German data) that are not justified. The high costs come from adequacy and grid connection costs.
- Adequacy costs are calculated based on the difference of average production of wind/solar and capacity value of wind/solar (which is a realistic starting point). However, the back-up capacity from which to draw the costs is a mix of GT, CCGT and coal plants (from "optimal mix" based on duration curves). Using the cheapest units, GTs for back-up, which we argue is a more realistic way, would lower that cost for the case of Finland 10% penetration to 5 USD/MWh for wind instead of 8-9 USD/MWh now in the report. In addition, the methodology used in the report for the estimate of adequacy costs is not correct (a more detailed assessment can be seen in KTH report available at http://kth.diva-portal.org/smash/record.jsf?searchId=1&pid=diva2:579536)
- Grid connection costs: these costs (to the closest point in the existing grid) are included in the power plant total investment costs, except for offshore grid costs in Germany and UK. It is misleading to show this as a grid system cost. Furthermore, the way this cost component is estimated is not correct for most countries. It is estimated as a % of plant cost from a 2010 publication (NEA/IEA), where the costs shown for onshore wind are so high that these would normally include grid costs. This may be due to very few projects that the 2010 publication has from which to draw the wind costs, so overall it is not a good reference for the costs. Another explanation for high plant costs is that they use 5 % cost for decommissioning, which for wind would be closer to 1 %.

Another questionable point is that no grid reinforcement costs are shown for any other power plants, which is rarely the case especially for larger power plants (more discussion in KTH report in the link above).

Lastly, the assessment of grid system costs is a challenging and not straightforward task. The field of wind integration has been tackling this issue for years, and even if the study methods, data and models are evolving, there is no totally correct method that would extract system costs for a single technology. Allocation of the costs has been deemed to be impossible in most cases, due to the fact that the power system assets are there for all producers and consumers, and any allocation method would end up with overlapping costs and partly double counting. This is the reason why these costs are to a large extent socialized to consumers, who will pay the final costs for electricity anyway.

What is Task 25

Task 25 Design and Operation of Power Systems with Large Amounts of Wind Power was approved by IEA WIND Implementing Agreement Executive Committee ExCo #56 in 2005 for years 2006-2008. The extension for second phase 2009-2011 was approved by ExCo #62 in 2008 and for third phase by ExCo #68 in 2011. The objective of Task 25 is to analyse and further develop the methodology to assess the impact of wind power on power systems. The Task has established an international forum for exchange of knowledge and experiences related to power system operation with large amounts of wind power and has actively followed parallel activities with Transmission System Operators and other R&D Task work. The participants will collect and share information on the experience gained and the studies made up to and during the task. The case studies will address different aspects of power system operation and design: balancing, grid impacts and capacity credit of wind power.

The Task started with producing a state-of-the-art report on the knowledge and results so far in 2007, updated in 2009 and 2012. The guidelines on the recommended methodologies when estimating the system impacts of wind power integration are to be published in 2013.

Table 1. Task 25 participation. Canada and Japan have joined in 2009, Italy in 2010 and China in 2012. OA is Operating Agent (coordinator), TSO is Transmission System Operator.

	Country	**Institution**
1	Canada	Hydro Quebec (Andre Robitaille), Manitoba Hydro (Tom Molinski)
2	China	SGERI (Hu Bo, Bai Jianhua)
3	Denmark	DTU Wind (Poul Sörensen), TSO Energinet.dk (Antje Orths)
4	EWEA	European Wind Energy Association (Frans van Hulle)
5	Finland, OA	VTT Technical Research Centre of Finland (H.Holttinen, Juha Kiviluoma)
6	Germany	ISET (Bernhard Lange), TSO Amprion (Hendrik Neumann)
7	Ireland	ECAR/UCD (Mark O'Malley), TSO Eirgrid
8	Italy	Terna (Enrico Maria Carlini)
9	Japan	AIST (Junji Kondoh), Kansai University (Yoh Yasuda)
10	Norway	SINTEF (John Olav Tande, Atle Rygg Årdal), TSO Statnett (Terje Gjengedal)
11	Netherlands	ECN (Jan Pierik), TUDelft (Madeleine Gibescu)
12	Portugal	LNEG (Ana Estanquiero), TSO REN (João Ricardo). INESC-Porto (J. Pecas Lopes), UTL-IST (Rui Castro)
13	Spain	University of Castilla La Mancha (Emilio Gomez)
14	Sweden	KTH (Lennart Söder)
15	UK	DG&SEE Centre for Distributed Generation and Sustainable Electrical Energy (Goran Strbac)
16	USA	NREL (Michael Milligan), UWIG (Charles Smith); DoE (Charlton Clark)