Renewables super grid proposed to solve Europe's energy dilemma

A pan-European electricity system powered by decentralised renewable energy supply and connected across a high-volume super grid has been described as the least-cost option to provide an optimal pathway to achieving the goals of the Paris Agreement while at the same time solving key obstacles towards developing a functional European Energy Union.

Researchers from Lappeenranta University of Technology (LUT) in Finland have for several years now been developing 100 per cent renewable energy super grid models for global regions, and in 2016 even developed a first-of-its-kind planetary renewable energy model.

Further, in November 2017, on the sidelines of the United

Nations Climate Change Conference COP23 in Bonn, Germany, LUT researchers showcased how a 100% global renewable energy grid is not only a viable option but the most cost-effective option.

Focusing their attention on the European Union, LUT researchers recently published an article in the journal *Renewable Energy* entitled *Flexible electricity generation, grid exchange and storage for the transition to a 100% renewable energy system in Europe*which reveals the results of two scenarios: the first depicts a scenario made up of 20 European regions acting as independent energy "islands"; the second scenario depicts those same 20 regions connected through a pan-European super grid.

This second option, labelled as a "SuperSmart" energy system – as it acts as a compromise between two European Energy Union approaches that have been floated in recent years; a decentralised renewable energy Smart Grid approach, and a centralised and regulated Super Grid – would utilise decentralised renewable energy generation across the European Union combined with a super grid to facilitate pan-European energy trade.

"The results clearly show that the least cost solution is based on domestic and decentralised supply with cross-border trade, as this reduces the total electricity system cost from 69 €/MWh in 2015 to 51 €/MWh in 2050," said Christian Breyer of the LUT Solar Economy group who coordinated the research.

"A substantial economic benefit through cross-border trade is worth 26 b€ per year, by trading only 12% of total end user electricity demand in Europe."

"A SuperSmart approach respects the unique contributions that different regions of Europe can make while adhering to a clearly defined target of net-zero greenhouse gas emissions by 2050" added Michael Child, LUT researcher and lead author of

the research.

The study modelled the two scenarios out to 2050 and considered the current capacities and ages of power plants, as well as project increases in future demands. Further, the LUT study weighs important elements of the European power sector which are not always taken into account by other modelling studies.

Specifically, the study looked at prosumers – those who both produce and consume energy – and the impact they have on the amount of energy that flows through a centralised grid and found that up to 6% less peak interconnection capacity would be necessary when considering prosumers, which naturally leads to lower costs.