A new report makes recommendations on how to develop a fully integrated, pan-European grid that can secure reliable electricity for the future while incorporating more renewable energy.

The EU has set a target which states that a 20 per cent share of energy should come from renewable sources by 2020. Electricity systems will have to incorporate more renewable energy from a variety of sources, including solar, wind, biomass and tidal power. In addition, energy generation is likely to be more distributed, on both a small and a large scale. With a greater contribution of energy from renewable sources, electricity will need to be transferred across Europe from sites of generation to areas of demand, which could be long distances away.

The variety of energy sources will create challenges for operators balancing supply and demand, who are more used to dealing with supply from a small number of large power plants. The electricity grid will therefore need to become much more flexible to ensure supply and demand are matched, making greater use of storage devices and management of demand using smart meters.

The present grid cannot support this additional capacity; it is not fully integrated and there is no Europe-wide planning or coordination. The authors of the report make a number of recommendations to help Europe create a reliable grid. These fall under three categories:

1) Planning and development of the grid
To be robust, the grid must be fully integrated and not simply be a number of national grids connected together. This needs harmonisation across many areas when planning and developing the grid, including the rules which govern how electricity markets are operated, congestion management (these measures ensure that power is transmitted within the capacity of the system), transferring power across borders and cost sharing, and subsidies, where used, to give the correct price signals for different power generation methods.

Member States must collaborate in modelling the grid and electricity market. Short and long-term planning should be based on common Europe-wide grid planning principles and should include transparent top-down and bottom-up processes within a common framework. Personnel should also be trained to address the current skills shortage in this sector.

2.) The physical and market aspects of operating a European grid
Co-ordination is needed at all levels, including policies, development and operation of the grid, and particularly for collecting and exchanging data across Europe. Clear and transparent incentives should be uniformly applied across the region, for an optimal transmission system. In addition, real time control systems need to be developed to manage congestion. The demand for future electrical power must also be researched, such as the impact of the large-scale use of plug-in electric cars.

3.) Current and future technology choices
The environmental impact, costs and technical aspects of constructing overhead power lines running alternating current (AC) and High Voltage Direct Current (HVDC) transmission through underground cables need to be considered. These decisions are likely to be influenced by public opposition to the further development of overhead power lines. Improvements to telecommunications networks and measurement systems will enable exchange of information to manage congestion in real time.


Contact: John.Holmes@earth.ox.ac.uk

Theme(s): Climate change and energy, Sustainable development and policy analysis