Early warning system could keep lights on

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(PhysOrg.com) -- Researchers at The University of Manchester are developing 'early warning systems' that could prevent power blackouts in the UK.

Prof Vladimir Terzija and colleagues in the Electrical Energy and Power Systems (EEPS) Group are working on an intelligent monitoring system that can detect potentially serious problems with the electricity network at an early stage.

There are concerns there could be delays in connecting clean and renewable energy generation because of capacity issues within the UK's power transmission network.

With energy networks expanding and becoming ever more complex and

unpredictable, an overload of the UK's power system could result in blackouts - which could cost the UK millions of pounds in lost productivity.

By integrating monitoring technology - based on GPS synchronised Phased Measurement Units (PMUs) - into the network together with fast communication links, an instant snapshot of the way electrical energy is flowing through the network can be seen.

Prof Terzija and his team, based in the School of Electrical and Electronic Engineering (EEE), have successfully integrated a PMU monitoring the state of the transmission network in the Manchester area into a Europe-wide Area Monitoring System known as WAMS.

This is the first successful integration of an UK PMU into a European WAMS, which also monitors electricity flow in three European countries - Holland, Germany and Slovenia.

The system gathers and analyses system data in 'real time' in just milliseconds - compared to several seconds in conventional network control systems.

Prof Terzija said: "The stability of power networks is becoming an increasingly important issue, particularly with the UK Government's aim of producing 30 per cent of our electricity from renewable sources of generation by 2020."

"This is going to mean a wider variety of energy sources feeding into the UK network - and real time wide area monitoring of electricity flows and the state of the power system will be essential in providing early warning of potential network stresses and potential catastrophic blackouts."

“This technology will allow emerging network problems to be recorded and even predicted, as precise and GPS synchronised measurements can be taken consistently across the grid. Operators will also be able to detect emerging problems before they build up, allowing them to take preventative or corrective actions.

“Integrating PMUs into a network enables system dynamics, such as frequency, voltage and power oscillations to be observed in real time, regardless of the large geographical distances between measurement points, and provides valuable early warning of serious problems.”

“Through our work on this technology, we can make a positive contribution to the use of greener electricity in a safer and more reliable manner and this would lead to the reduction of carbon dioxide emissions.”

Prof Terzija’s research has been supported by National Grid, Scottish Power and Scottish and Southern Energy, while Schweitzer Engineering Laboratories have donated three PMUs to the University.

Next year The University of Manchester, working with Imperial College London and The University of Strathclyde, hope to integrate further PMUs in London and Glasgow, as part of the Supergen FlexNet project, which is funded by the Engineering and Physical Sciences Research Council (EPSRC).

Provided by University of Manchester (news : web)