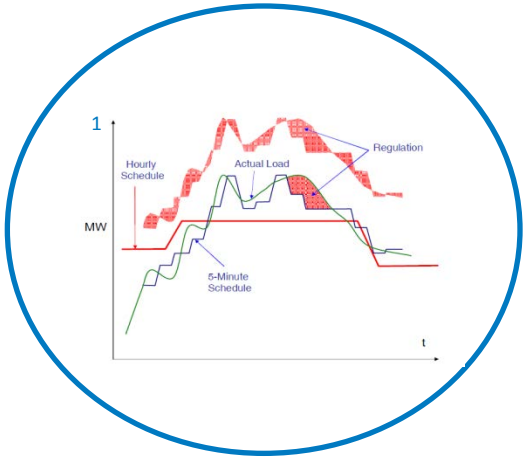
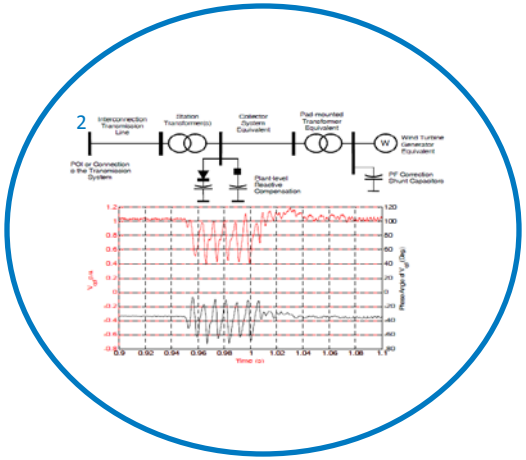
Renewable integration tools and PMU

Renewable integration



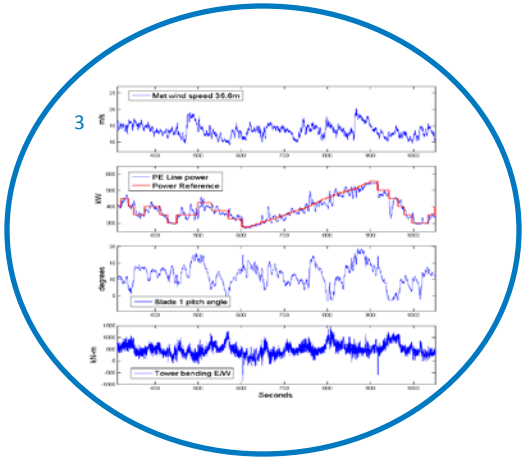
Will renewable generation qualify for regulation? What primary response and secondary response can they provide?

Power System stability studies



Are the renewable models good enough? What about energy storage, and demand response aggregated with renewables?

Renewable generation field control



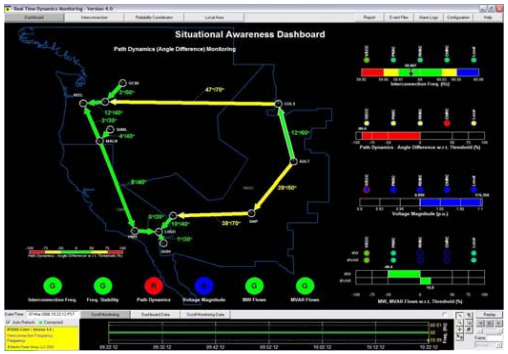
Are the current measurements adequate enough for real, reactive power and other type of control of renewable generations?

PMU provides high resolution measurements of power system states, can provide aid to close-loop control, dynamic modeling, frequency response studies, and?

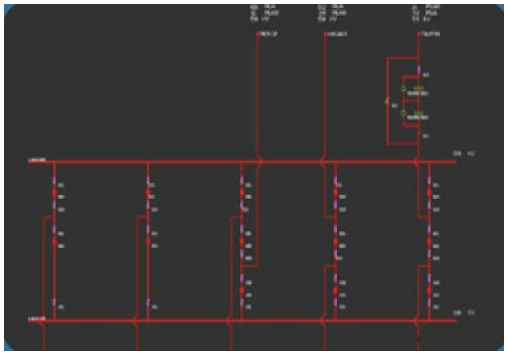
1 Impacts of Integrating Wind Resources into the California ISO Market Construct, Clyde Loutan, Taiyou Yong, Sirajul Chowdhury, A. A. Chowdhury
2 Validation of Wind Power Plant Models, E. Muljadi, A. Ellis
3 Active Power Control Testing at the U.S. National Wind Technology Center, E. Ela

Tools with/to enable renewable features

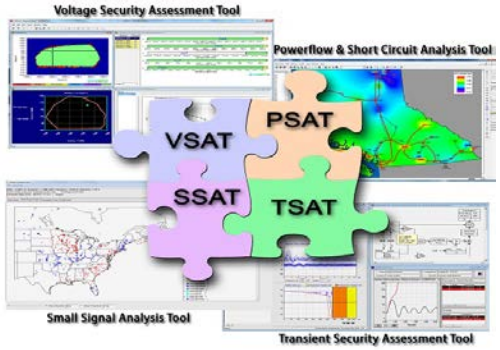
Real time monitoring



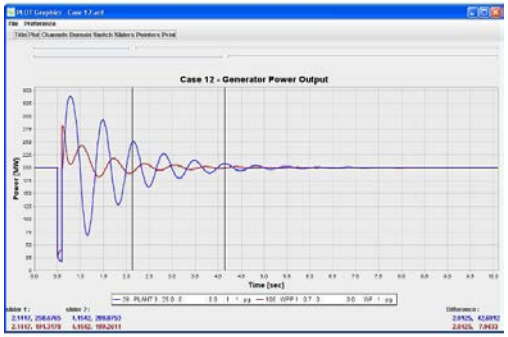
State estimation



VSA and DSA



Steady states and dynamic simulation



GIS

Unit dispatch

1 www.energy.ca.gov
2 Caiso Five Year Synchrophasor plan
3 www.dsatools.com
4 www.ge-energy.com
5 routescout.blogspot.com
6 www.aimms.com