

Smart Grid and Climate Change

An IP-based Smart Grid can help address climate change

Global climate change is fundamentally an energy problem, and the Smart Grid can serve as a powerful instrument to reduce emissions from the electricity sector. Without policy leadership to broadly standardize Smart Grid networking, however, we limit the role that the Smart Grid can play in addressing global climate change. Internet Protocol (IP)-based networking is the key to harnessing the power of the Smart Grid to fight climate change.

Integrating renewables

Wind and solar power generate carbon-free energy. However, these attractive renewable energy sources face two fundamental challenges: intermittency and transmission. Intermittency makes wind and solar unreliable and hampers their profitability. Harnessing these energy sources also often requires construction of controversial transmission lines.

An IP-networked Smart Grid enables demand response and integrates distributed energy resources into the grid. By communicating prices to stimulate demand response or by controlling energy-intensive appliances directly, utilities can use the Smart Grid to adjust electricity demand to offset intermittent renewables. A smart grid that allows for distributed energy storage assets, such as grid-networked batteries and plug-in electric vehicles, also helps offset intermittency and allows sale of renewable power at peak prices. And connecting distributed renewable generation close to, or even in the middle of, population centers through the smart grid reduces the need for transmission to renewable projects.

Reducing line losses

Up to 15% of energy generated from power plants is wasted needlessly due to inefficient use of the electric grid. IP-based Smart Grid networks can connect remote sensors and intelligent distribution automation switches that can boost the efficiency of grid operations to reduce line losses.

Electrifying transportation

Electric vehicles can communicate through IP-based Smart Grid networks to take advantage of underutilized grid capacity, as well as to serve as mobile distributed energy devices to return power to the grid. Pacific Northwest National Lab estimates that vehicle electrification could reduce total US GHG emissions by up to 27%, perhaps the single largest opportunity for US GHG reductions.

Conclusion

Renewable energy is the centerpiece in the effort to address global climate change, improve energy security, and develop a clean energy industry. To tap the full potential of renewables, a smart grid is necessary to offset intermittency, reduce the need for new transmission, and

accelerate deployment of distributed renewable generation. The smart grid and renewable energy go hand-in-hand.