

Empowering smarter energy choices

Deploying a smarter grid can help us realize the great promise of renewable energy sources, such as wind and solar, to help meet our ever-increasing energy appetite. Smart grid technologies will enable higher percentages of centralized and distributed renewable generation to be integrated into the grid efficiently and reliably, so they can become significant contributors to our overall energy platform.

The old way:

Today's infrastructure is unable to maximize the benefits of renewable resources. Wind and solar resources are tacked onto the grid as "one-off" solutions that are neither integrated with other generation nor optimized as a reliable first-tier energy source. Grid congestion can act as a barrier to full utilization, and renewable variability can cause reliability challenges at relatively high levels of penetration.

The smarter way:

Smart grid technologies will enable the optimization and use of high percentages of renewable power and prepare the grid to integrate widespread distributed generation. Renewable power can become as mainstream as coal is today, thereby reducing carbon emissions, natural resource depletion, and dependence on foreign oil — ultimately helping us improve our energy security.

Cleaner energy – delivered by a smarter grid



The facts:

- The increasing cost of fuel, rising carbon emissions and concern about foreign energy reliance highlight the urgent need to reduce our dependence on fossil fuels.
- While renewable energy use has been increasing, the Global Renewable Energy Forum reports that fossil fuels still represent 81% of world energy consumption.¹
- The U.S. Climate Action Partnership has called for a nationwide limit on carbon dioxide emissions that would lead to reductions of 10-30% over the next 15 years.²
- According to the American Wind Energy Association, in the United States, wind power displaces three percent of natural gas consumption and avoids the emissions of 28 million tons of carbon dioxide from traditional power plants — equal to taking six million cars off the road.³

Smart Grid technologies make high percentages of renewable energy more practical and more reliable

Renewable Energy Challenges

Smart Grid Responses

<p>In some parts of the country, overburdened power lines make it difficult to move electricity from wind farms into the grid for consumption. Trying to squeeze more power through the lines than is possible results in grid congestion. So potential power is lost.</p>	<p>Smart grid technologies can improve grid efficiency and eliminate the electrical “waste” that contributes to line congestion. For example, more voltage than necessary is often provided from the substation and delivered to the consumer’s home to ensure capacity is available to meet ever-changing demand. By making the grid more intelligent, utilities can supply voltage that more closely mirrors demand, thereby “expanding” usable capacity of the lines to help accommodate distributed energy resources, such as wind.</p>
<p>Integrating high percentages of variable renewable energy does not come without challenges. Unlike traditional power sources that are predictable, utilities have no control over when the wind blows or the sun shines. Imagine the challenge of meeting peak energy demand when the wind suddenly calms and other generation is needed to fill the gap.</p>	<p>Smart grid technologies can help reliably integrate variable renewable energy into the grid. These technologies include:</p> <ul style="list-style-type: none"> • Demand response – smart grid technologies will enable utilities to explore how reduction in consumer energy “load” (or demand) might help the utility manage variations in renewable energy production. For example, consumers may “opt-in” to utility programs that automatically adjust high energy consuming devices, such as water heaters, during periods of peak demand and higher electricity prices. • Energy storage – in the future, batteries will store energy during times of excess wind energy production and discharge that energy via smart grid automation technologies when energy demand exceeds supply.
<p>Traditionally, electricity has flowed one way, from a power station to a customer. However, as more renewable energy is generated by alternative sources, power will be entering the network from multiple locations, including the distribution network (i.e. distributed generation). The current grid was not designed with multi-directional power flow in mind.</p>	<p>Two-way power flow, sophisticated controls, and grid automation technologies can help bring wind, solar and other alternative energy solutions safely into the distribution grid and move it where it’s needed.</p>

¹ Global Renewable Energy Forum Bulletin, Published by International Institute for Sustainable Development; Vol. 128 No. 2 May 24, 2008
<http://www.iisd.ca/yimb/greb2008/html/yimbvol128num2e.html>

² U.S. Climate Action Partnership Call For Action; Page 9. <http://www.us-cap.org/ClimateReport.pdf>

³ Vic Abate’s Testimony March 6, 2008 Before The House Select Committee on Energy Independence and Global Warming
<http://globalwarming.house.gov/tools/assets/files/0375.pdf>

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