

How a New Middleman Might Help Balance Electricity Grids

By Lucas Laursen Posted 7 Dec 2016 | 14:00 GMT



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Bornholm is experimenting with demand aggregators in its smart grid

A few years ago almost two thousand bold households on the Danish island of Bornholm joined a surge pricing experiment run by their electricity utility. It was supposed to empower the utility and consumers with a simple, direct market ([“The Smartest, Greenest Grid,” IEEE Spectrum, April 2013](#)).

The EU-funded project, called EcoGrid, won widespread buy-in from

residents, who could also earn small payoffs when they reduced demand. Yet researchers reported last year that they could reduce demand by only [1.2 percent of peak load](#), despite early [predictions of up to 20-percent reductions](#) for so-called virtual power plants. The market model was missing something.

Now a Danish-government-funded follow-up project, [EcoGrid 2.0](#), proposes to do better by adding a new player into the grid's mix: a demand aggregator. It would operate as a middleman between consumers and utilities, bundling flexibility in electricity demand to better match demand to fluctuating available power. Analysts and researchers have been saying for years that aggregators are [a good idea](#) for smart grids, but [electricity markets do not seem to be attracting them](#) on their own.

EcoGrid was hardly a disappointment—it won an [award](#) during June's European Sustainable Energy Week. But if grid operators want to add more volatile energy sources such as wind, which Bornholm's leaders predict will provide up to 55 percent of locally produced energy next year, they will want even more control over demand. EcoGrid researchers noted that they could use more detail on how individual homes respond when homeowners turn off heating systems—this, in order to induce the maximum possible demand response while keeping residents comfortable ([PDF](#)). They also wrote that they will require better predictions of consumer behavior ([PDF](#)). Perhaps most intriguing was a finding [published by the EcoGrid team last month](#) in IEEE Transactions on Smart Grids: It is possible to group most consumers into clusters with similar behavior and electricity use patterns.

That clustering means that a third-party demand aggregator might be able to better predict and pool the electricity reduction of the most flexible consumers and sell it onward to electricity suppliers that need help balancing their loads. “I don't expect people to use less energy. I expect them to use more at certain times and to use less at certain times,” in

response to incentives from their demand aggregator, says Klaus Vesløv, head of market and development for [Bornholm Energy and Supply](#).

EcoGrid 2.0 has recruited around a thousand households whose homes use electric heating or electrically-powered heat pumps; they have more potential for demand reduction than homes with district heating. In future real-world scenarios, customers would be able to choose among aggregators. And at a presentation last week in Zurich, Switzerland, IBM research software engineer [Bernhard Jansen](#) said that, thanks to improvements in hardware, aggregators will someday have more data on household conditions and the ability to interact with more appliances.

EcoGrid 2.0 launched in April and is now gearing up for its first winter, when Bornholm's energy use will peak and put the idea of a smart grid middleman to its toughest test yet. "The first real results will come out in the spring," Vesløv says.