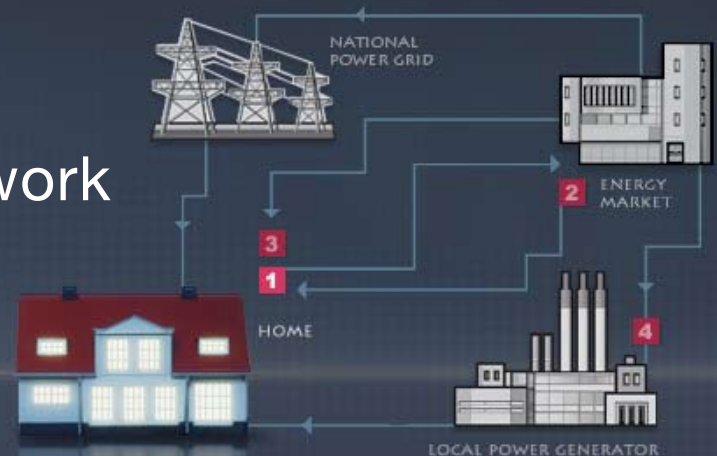


The Intelligent Utility Network



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How It Works: The Intelligent Utility Network

Power miser or energy indulgent: what kind of energy consumer are you? This is just one of the insights some 120 volunteer homeowners learned as they piloted a year-long GridWise project in the Pacific Northwest that monitored electricity usage based on real-time pricing rather than fixed rates.

Participants decided how much they were willing to spend, and their appliances adjusted the amount of energy they consumed in response to fluctuating prices (for example, if the price goes up, the thermostat shifts down a few degrees).

The Department of Energy funded the project, which included resources from its Pacific Northwest National Laboratory (PNNL). IBM and Invensys provided the technology.

Here's how it works.

1. The home: Some like it hot

First, the homeowner registers on a Web site and programs her appliances (hot water heater and thermostat) to optimize for comfort or cost. Each appliance wirelessly connects to an Invensys gateway box, which provides the raw data and control connections to IBM middleware. The middleware then bids, on behalf of the house, into a local (shadow) energy market.

2. Don't like the price? Wait five minutes

The energy market receives real-time data from a variety of sources: bids from participating households and businesses, a Dow Jones energy price feed and rates from generators. The data is sliced and diced: Prices are analyzed, cleared and reset every five minutes.

3. Home again

The new electricity price is then interpreted by the IBM middleware, and control signals are sent back to the house where the appliances react according to the parameters originally set. Cost-conscious consumers have heating and cooling switched off as prices spike, and turned back on again when prices fall. Adjustments occur only when needed, based on classic supply versus demand behavior. The goal is that the system be invisible to the homeowner but responsive to market conditions. The homeowner can override the system at any time.

4. Buy local

Increasingly, regions are developing localized sources of power to ease the stress on the national grid. This GridWise pilot market included a local "micro-turbine." As demand surges and prices climb, the micro-turbine kicks in, feeding electricity into the market, easing stress and lowering prices. Eventually, this intelligent network could handle many new sources of locally generated power, from businesses to residential housing developments.

The results

- Reduced short-term peak distribution loads by 50% and overall peak loads by 15%
- Decreased consumers' electricity bills by an average of 10%
- Projected reduction of US\$70 billion in infrastructure spending over 20 years through better control of existing resources
- Reduced impact and costs of blackouts and power shortages

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