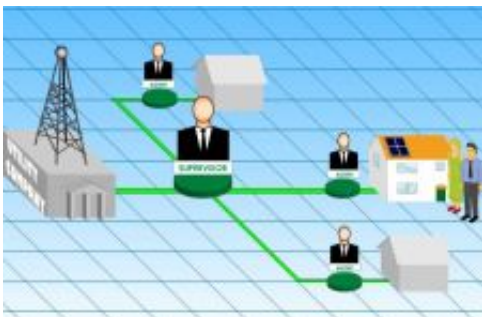# Neighbourhood grids promise energy gains

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(PhysOrg.com) -- European researchers are creating technology that will treat neighbourhoods like a miniature power grid, sharing energy generated at each house according to need. Allied to a host of other developments, the concept promises huge energy savings.

European researchers at the Beywatch project will create 'smart' homes that balance energy needs within the neighbourhood and even generate electricity and hot water at each household.

Beywatch - which stands for Building Energy Watcher - will achieve this through a comprehensive, integrated chain of technologies and innovations that work at every level of the grid, from light switchs to power stations.

It is developing ultra-high efficiency home appliances and smart home

and neighbourhood information networks for monitoring and control, and real-time links with the energy provider.

It includes in-home power and hot water generation using combined photovoltaic and thermal solar panels, neighbourhood level load-balancing for the grid, and it will even develop innovative exploitation plans to identify feasible business models that will make the system's commercialisation possible.

Combined, Beywatch's efforts will provide a best-of-breed smart energy network, reduce energy demand, maximise resource efficiency and minimise costs.

Keen utilities

Utilities are keen, too, because the system promises to help them lower costs, manage the network efficiently, at the level of neighbourhoods, and it will provide them with priceless, real-world energy usage data. This data can help utilities plan for infrastructure upgrades and long-term power generation planning.

A complete system would consist of highly efficient appliances linked together in a smart home network. This network would be managed by a hardware and software agent, which the consortium is currently developing.

The agent is the heart of the system. The homeowner can program the washing machine, for example, to complete a load before he or she returns from work, say at 6pm. The agent will then turn on the machine when energy costs are at their lowest, but early enough so that the load is ready by the time the owner is home.

Very clever agent

Similarly, the agent can turn on the heating, the dishwasher, or even the fridge, to take advantage of low-cost energy rates. "The very efficient home appliances we are designing - like fridges and fridge freezers - could in certain circumstances be turned off, without any risk to stored food, for a short period of time.

"The agent can then turn them on again when they need a boost," explains Pierre Plaza, coordinator of the Beywatch project. Users can even update the agent, or change its settings, by TV, mobile phone or computer.

Linked into this smart network is a home-scale energy generation system, in this case a combined photovoltaic and thermal solar panel that can provide both hot water and electricity. That power and heat can be used wherever it is needed locally.

When it is not needed, it can be fed back into the grid and, ultimately, to the utility. A Supervisor Entity, another type of agent, takes over at this point. It links together all the houses in a particular neighbourhood to the utility.

This neighbourhood level of control is an extremely clever element in the project. "Too much energy would be lost transferring it back to the utility and then on to another destination," explains Plaza. "Instead, the supervising agent can direct the energy to another house in the neighbourhood that needs it."

Load balancing

While solar energy cannot currently supply an individual house with all

its needs - because the sun does not always shine when you need power - by spreading the power around the local neighbourhood there is a much greater chance of balancing the load, thus matching supply to demand.

This means that all renewable energy is used efficiently, and used first, before there is any power drain from the grid. On a large scale this degree of economy could have a huge impact by making the most efficient use of available renewable energy, reducing to a minimum the need for industrially generated energy.

Allied to all these benefits are highly detailed usage data, the primary resource for [energy](#) management, control and planning, and this data make the package even more attractive for utilities.

Beywatch began its work just last year, but all systems are already under development. There is an early prototype of the home agent, and a prototype of the Supervisor Entity is expected shortly. There will be prototypes of the highly efficient home appliances in 2010.

Off the shelf

"But we are not reinventing the wheel. We are using off-the-shelf parts where possible," reveals Plaza. "For example, we will use the Zigbee [Smart home](#) network to link all the home appliances and power control systems together."

Allied to this hardware and software development is an equal effort at Sell-Ware - finding the business ideas and models that will make this type of system a viable option.

Currently, Plaza says the team is looking at solutions that provide a win-win. Cheaper rates and short-term return on investment for consumers that sign up, while the utility gains better data and more granular control,

with neighbourhood level load balancing for the utility.

But there will be investment required from the consumer, though Plaza hopes that ultimately the return on investment will be relatively short. One model currently under consideration is a set-up subsidy. Here, utilities would work like a mobile phone company; they would offer a useful subsidy on equipment - home appliances, solar panels, control systems - and the consumer signs up for a agreed contract period, say five years.

Other models are under consideration, too, though Plaza cautions that it is early days and time will tell what the most viable models will be. In all though, Beywatch represents a very ambitious project with nonetheless attainable aims.

More information: Beywatch project - www.beywatch.eu/

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