Pecan Street demonstrates the potential of smart grid technology

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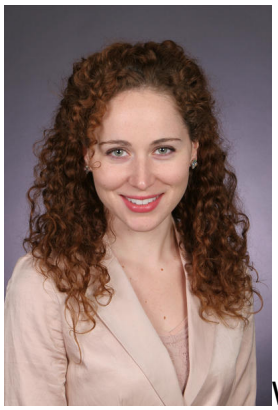


When I first learned of Pecan Street, Inc. and the Smart Grid Demonstration Project, I knew little of the consortium's mission. I had heard of smart grids before, but I was curious to know more about what the Pecan Street's project was and how it was significant to the advancement of "green" technology. After learning more about the foundation's intent from Communications Director, Colin Rowan, I discovered the importance of the research currently underway. As it turns out, Pecan Street is conducting quite a noteworthy study, with the potential to impact future technology and energy use.

Formerly known as the Pecan Street Project, the nonprofit consortium is headquartered in Austin, with the cooperation of the University of Texas. The research and development organization was founded for the purpose of accelerating innovation in smart grid technology through the partnership of energy-conscious companies and their consumers.

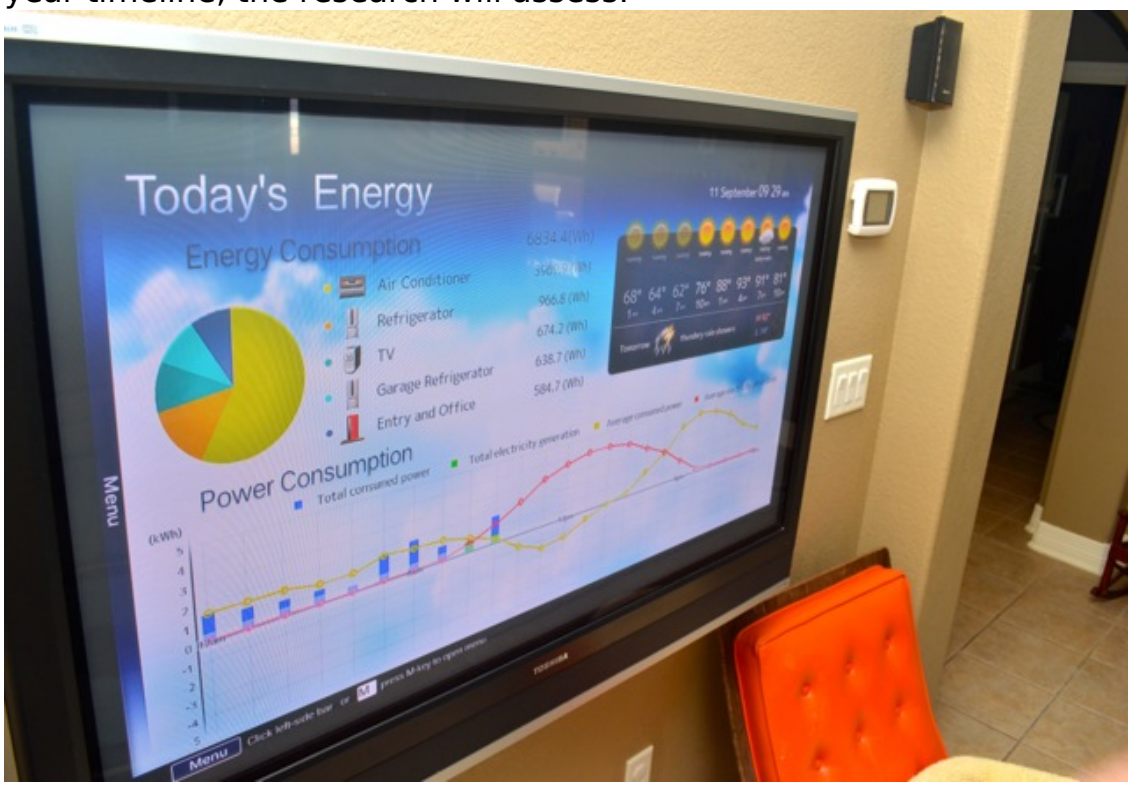
The Mueller Community

Located at the site of Austin's former municipal airport, the Mueller neighborhood strives to serve as a model for the ideal green community. When the airport was decommissioned in the 90s, the city sought to entirely redevelop the district into a multi-serving, self-sufficient community. The Pecan Street collective saw this up-and-coming neighborhood as the ideal location to carry out their research. The company sought an urban setting with energy conscious volunteers possessing an eagerness to adopt green technology tactics.
The Mueller community and surrounding neighborhood is comprised of more than 500 participating homes. Boasting 700 acres of carbon-sequestered landscaping, the Mueller neighborhood is a possible glimpse into future sustainable and energy-rich communities.

With Pecan Street's partnership and the support of local businesses, the neighborhood is still growing. It seems the level of eco-consciousness among its residents is infectious. The growth is evident in the more than 60 homeowners who have since purchased or leased electric vehicles, and the more than 200 residents who have recently installed solar panels.

The Smart Grid Demonstration

Through the use of smart grid technology and monitoring systems, Pecan Street is able to track and define the consumers' energy habits. The information provided is then used to discover and test new methods of energy conservation. Over their five year timeline, the research will assess:



- Distributed clean energy
- Energy storage technologies

- Smart grid water and smart grid irrigation systems
- Smart appliances
- Plug-in electric vehicles
- Advanced meters and other home energy management systems
- Green building
- New electricity pricing models

Each home in the community is installed with a special smart meter. The meter then consistently gathers data from the entire house and its individual electrical circuits in 15 second increments. Energy monitoring systems such as eGauge give the homeowners real-time web access to their energy use through smart thermostats as well as from remote access points. The participants can view their energy usage in detail and see their habits taking shape. Not only can the systems track electric usage, but water and gas as well. The data, held in some of the most advanced super computers yet developed, is housed at the University's Advanced Computing Center, where researchers analyze and report on a vast array of data taken from the homes.

Home Energy Monitoring

Though the concept of home energy "monitoring" may at first seem like an invasion of privacy, it should be noted that Pecan Street's research is not being used to control an individual's usage without their consent. The data being collected is meant to serve as a tool for the modern consumer in effectively moderating their own use for better efficiency. The shared knowledge will also allow the industry to provide better services.

With a keen sensitivity to privacy, the data being collected is first encrypted before it is sent to the data centers and used within the boundaries of the research itself. All participants are volunteers at will in the program, and therefore are involved in the data gathering process along the way. The main purpose of the research lies in the quest for creating innovative consumer electronics as well as allowing consumers to have more control over their energy consumption. Thus, the data being collected, analyzed, and recorded is focused on ways to further the development of these products.

With a number of companies involved in the consortium research, Pecan Street hopes others will join in the valuable quest. Since their labs exist in the real-world, real-time setting, the organization gives companies a place to test prototypes and services with real customers. The current consortium includes more than a dozen member companies, including:

- Freescale

- Green Mountain Energy
- Intel
- Landis+Gyr
- LG Electronics
- Lockheed Martin
- Oncor
- Onstar
- Oracle
- Sony
- SunEdison
- Texas Gas Service
- Whirlpool

The Research Findings

The researchers and their participants have already made some intriguing discoveries. As it turns out, electric car chargers are in fact all created equal when it comes to efficiency and quality. In Pecan Street's analysis of the most common chargers, they found no significant differences in efficiency. They concluded that any major differences were related to user-friendly designs and personal preference.

Another interesting discovery involves the use of home solar roof panels. Traditionally, solar panels have been installed on the south-facing side of a house in order to absorb what was assumed to be the most amount of sunlight possible. However, they found that west-facing panels were in fact more efficient. This is partly due to the fact that electricity costs vary throughout the day, as peak demand times vary. Therefore, since west facing solar panels produce more energy in the afternoon, they are more useful during peak demand periods when electricity is most scarce and expensive for the utility.

Further research has found that the consumers' habits are quite predictable. For example, people are plugging in their electric vehicles when they get home, which is adding a significant amount of stress to the overall system at certain times. Thus, utilities have the potential to use this data to develop incentives for customers to delay their charging until late at night.

The Future of Smart Grid Technology

Pecan Street's research projects have received overwhelmingly positive response from the volunteers and companies involved. The Mueller residents are thrilled to be a part of a thriving community, which may impact the infrastructure of the entire country. Outside of the neighborhood, the reaction has been highly supportive.

Many companies are finding that the future of energy increasingly involves smart technologies, smart homes, and smart living. In order to accomplish this, an intelligent, data-driven grid may provide the key to companies' attempts at improving new technologies. In the hopes that their work is replicated across the country, Pecan Street seeks to develop insights that will help companies speed up their own innovation. Realizing that customers play a major part in this journey, the company has involved them in the best way possible. By learning what excites, confuses, frustrates, and interests consumers, they are able to tailor and test new modes and techniques directly.

In order to further engage other companies, the Pecan Street is building a new custom commercialization lab within the Mueller community. The Pike Powers Lab will provide all companies, both newly-emerging and larger corporations, a place to

test new products. The lab will offer state-of-the-art testing facilities to researchers, member companies, and technology start-ups.

Perhaps the most encouraging and valuable aspect of the research is the immediate access the consumers have to their own energy information. Since they are able to view and track energy use in real time, consumers are able to better adjust their habits for improved efficiency. In turn, the energy providers may also adjust the ways in which they serve the consumer for greater efficiency and satisfaction on both parts.

Pecan Street sought to establish itself in a previously untapped market with this type of practical and innovative research. In so doing, the folks in the Mueller community can be seen as a foundation for outside initiatives. Having already made important discoveries towards the advancement of smart energy consumption, Pecan Street's future remains bright.

For more information visit: http://www.pecanstreet.org/ [1]

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