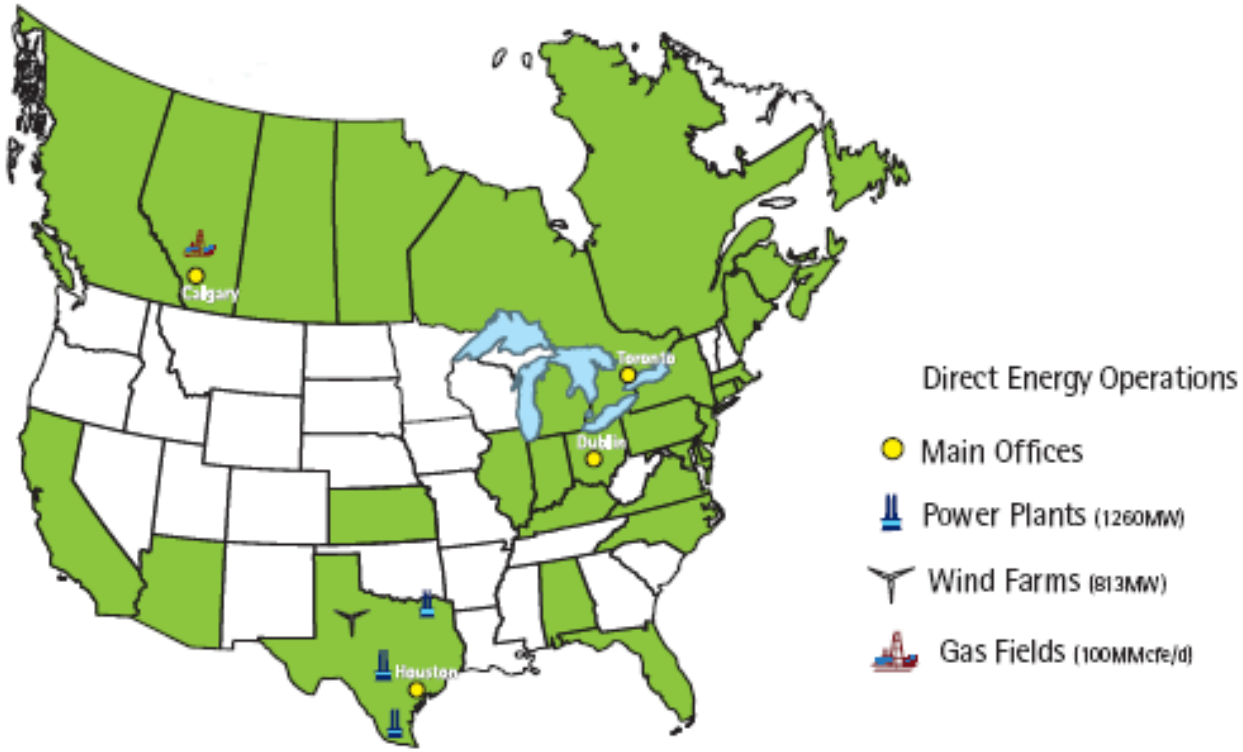
The Road to Innovation in the ERCOT Market

Effective policy leads to effective innovation….

Direct Energy™

Direct Energy, LP

- 5 million customer relationships (largest non-regulated in North America)
- S&P “A” credit rating (via parent company, Centrica plc)
- Approximately 4,700 employees
- 1260 MW of power generation in Texas, 88 mmcfe/day production and P&P reserves of 320 bcfe in Alberta
- Large Home Services operations in North America



We think, they think…

thrilled
enthusiastic
excited
glad
impatient
proud

ambivalent
frustrated
indifferent
apathetic
useless







Before Pilots

After Pilots

Energy Use & Awareness

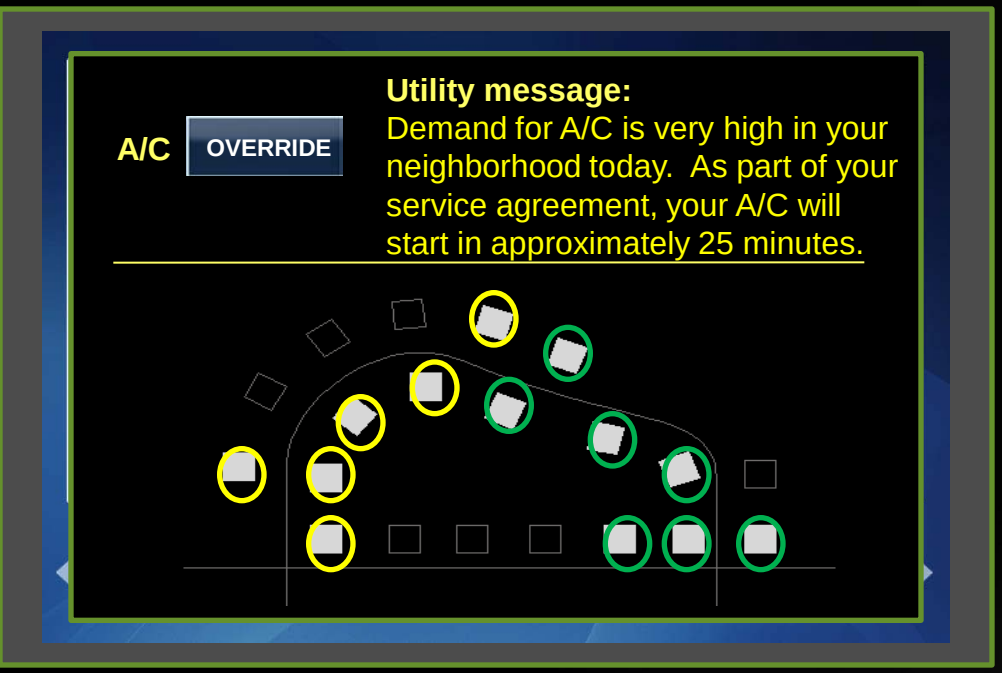


Of the methods shown to alert consumers to real time issues with their energy / home systems, consumers responded most favorably to a model (at left) that provided *at-a-glance information only when it became important* per user-defined parameters.

The red/yellow/green graphic was understood by respondents to indicate that something was amiss, and would/should appear regardless of platform. This appealed to respondents in that:
- it instilled confidence that 'something' was working in the background to monitor devices and budgets.
- it provide a simple indication of 'how much things have gone wrong'
- it was understood to be 'transient' and would disappear if ignored
- it was understood to be interactive and would take the user (if pressed) directly to the device or budget issue that required attention
- it could be 'called up' at the user's discretion

All respondents were comfortable with a 'minimally intrusive' assistant like this as it was perceived to be *a useful feature presented in a familiar format* (as in web-based email/SMS alerts or TV-based programming notes)

Energy Savings



Most consumers stated *apprehensions about the demand-response concepts* presented (41, 42, 43), usually citing a lack of control or 'intrusiveness' from companies or governments. There was a more positive response to Concept 43 (left) as consumers seemed to 'buy in' to the collective effort and sacrifice that was depicted, and appeared to promise some insight to *"who is getting power if I'm not"*.

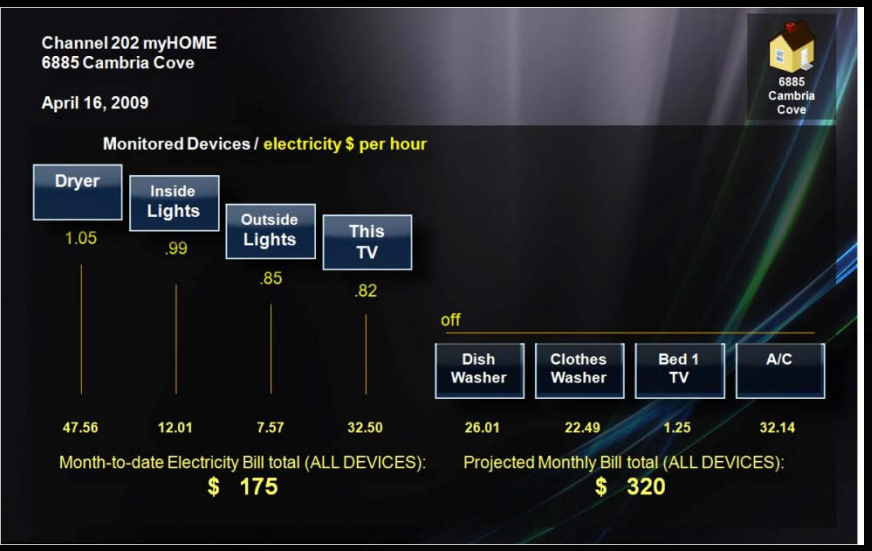
Absolute appeal of the demand-response concepts is difficult to quantify, and was wide-ranging:
-"I understand that I need to share the responsibility for keeping the lights off"

to

-"I'm paying good money for my electricity, and I want it when I want it, no excuses"

Nearly *all respondents insisted on an override feature* for all of the concepts, with some assuming that a 'net pricing effect' feedback would be provided. *"If I pressed 'override', I would want to know how much it would cost me".*

Energy Use Monitoring



All consumers expressed an interest in "*as much information as I can get, when I want it*". To that end, consumers reacted favorably to images that conveyed *clear, unambiguous data* in terms of *real dollars and cents*.

Most consumers understood (unaided) that the information obtained could be presented in the manner of their choosing (bar graph vs. pie chart, etc.) and expect to be able to choose among multiple executions the graphic representation that makes the most sense to them.

Of several executions shown (32 at left, 71, 72), concept 32 was most well received as it provided several types of simple information concurrently:

- real time usage by device
- amount of usage by device depicted relative to other devices
- current dollars spent
- projected end-of-month dollars

Most consumers expected that the *button/icon figures were interactive* (regardless of platform) and would allow for access to additional device-specific information.

Bad Consumer Products – *A Cautionary Tale*

•In the beginning there was the album, which begat the compact disc and life was good for the music distribution companies.
• For the consumer, well, they had the privilege of purchasing 16 songs to get the 1-3 they actually wanted.
•Then came technology, the monster which was Napster, and all of a sudden the consumer could get what they really wanted.
•Howls of protests from the distribution companies, "*thieves I say, nothing but thieves".*
•Then ensued lawsuits, injunctions, smear campaigns, the raiding of teenage computers, all to stop this travesty, billions spent, billions wasted, trying to protect and defend the status quo. And we all know how this turned out.

Were the consumers the thieves - or did the industry abuse it's monopoly power and technology provided for bit of a correction?

Do you really think you can regulate consumer technology?

Consumer Expectations – *that thing attached to your hand*





Google search results for "energy management"
136 million 'hits' in 0.33 seconds

ATT mobile real time usage and billing information
45 seconds

iTunes download of entire Beatles anthology:
3 minutes

Delayed stock price information on CNN.com
20 minutes

Digital acceptance of Federal Tax Return from Internal Revenue Service
2 days

Average delivery time for an energy bill
30 days

Consumers don't view the meter or thermostat as the primary interface for the
data rich and intelligent real-time assistance
that is expected from a home energy management solution.
And you need a multi-screen solution.

The shifting energy paradigm….*data to action*

Where can I get help? **Services**

What's wrong and what needs to be done? **Diagnostics**

Analytics *How can I spend less?*

Prognostics *What will I spend next month?*

The Basics *What did I spend last month?*





Energy management can't require a manual.

Today's successful consumer networks provide an intuitive user interface and an intelligence-assisted user experience.
(they are "brain dead simple")

Aggregated Energy Services – A Consumer Solution



HVAC Management and Diagnostics



Meter



Appliance Management and Diagnostics

Multi-screen strategy



OpenPeak

Advanced Data Analytics

Benchmarking

mpg/Home

Customer Apps promote stickiness





Schedule an Appt



Need an Audit?



Partners











Center for the Commercialization of Electric Technologies

Technology Solutions for Wind Integration in ERCOT

…a CCET Project

Overview

Center for the Commercialization of Electric Technologies

This end-to-end smart grid demonstration project will help us better understand how to integrate and commercialize the vast Texas wind energy resources into the grid.

The first of its kind around the world, this Project will demonstrate three classes of technologies …

1. Synchrophasor Technology
2. Smart Meter Texas Portal
3. Smart Grid Community of the Future

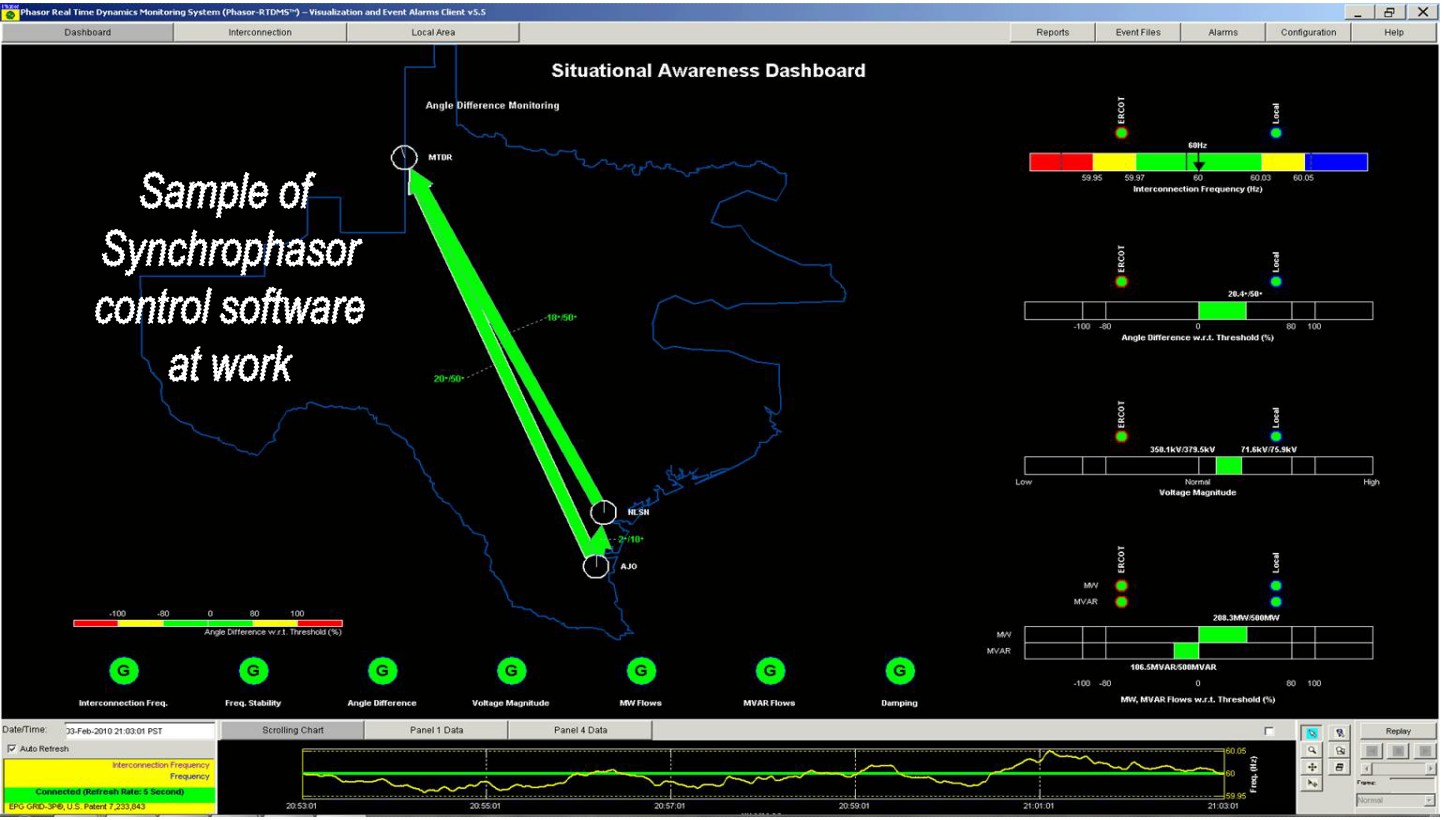
Why Texas?

- Largest wind generation state in the U.S.
- 9,000 MW of wind generation in.
- 32% of U.S. wind generation capacity.
- Plans for an additional 9,000 MW by 2020.
- Most aggressive Advanced Metering Implementation (AMI) in the U.S.
- The soon-to-launch Smart Meter Texas Portal will give access to usage data at a 15-minute level of granularity for all AMI customers.
- ERCOT settles wholesale transactions at a 15-minute level of granularity.
- The Regional Demonstration results will be transferable to other U.S. regions as “best practices”.

Synchrophasor Technology

Center for the Commercialization of Electric Technologies

Although we already know the many benefits of wind power, it is critical that we manage its effect on reliability of the grid before wind can become a viable energy source in the Texas electricity market.



Synchrophasor technology measures variations across a transmission grid in absolute real-time. The measurement includes a time stamp that provides an easy method of correlating values from different locations that take different amounts of time to arrive at a common collection point. This gives us a tool to view the power system as a whole or to compare different points in real time.

Smart Meter Texas Portal

Center for the Commercialization of Electric Technologies

ERCOT and the largest electricity companies in Texas are in the process of launching the most aggressive Advanced Metering System (AMS) deployment in the U.S. The *Smart Meter Texas Portal* initiative is a several-year collaboration to properly integrate these meters into the ERCOT market. The grant Project will plan the expansion of the Portal capabilities.

This Project and all of its stakeholders will plan an extension of Portal capabilities with the prospect of testing them in the Texas Future Community including:

- Direct Load Control (DLC) enabled by the newly-deployed AMS,
- An investigation of the prospects of expanding AS market in ERCOT to include aggregated residential load enabled by SMT Portal
- Back office enhancements, with lower levels of granularity, so that financial settlements are not out-paced by enhanced technology,

Smart Grid Community of the Future

Center for the Commercialization of Electric Technologies

Providing a homeowner solution is the 3rd step and will involve creating a "Smart Grid Residential Community of the Future" in Spring, TX. Spring is a growing suburb 25 miles north of Houston and an excellent test bed for this kind of demonstration. This Community will feature homeowner services such as:



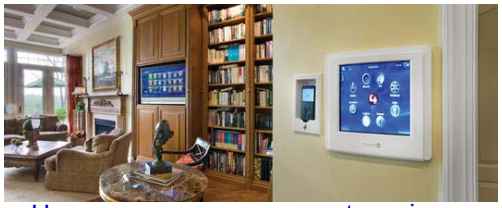
High efficiency HVAC systems with central Indoor Air Quality (IAQ) systems



Electronic Vehicle (EV) charging



Rooftop solar for serving as Distributed Generation (DG) for each home



Home energy management services including an in-home display & software applications to help homeowners manage their electricity more efficiently

2-way metering capabilities to support DG and new-generation demand response programs





Solar farm to supply common areas such as a water treatment plant, community center and swimming pool



Extraordinary high building envelope efficiencies





Home Battery storage



Smart appliances

Project Team

Center for the Commercialization of Electric Technologies

This diverse group of stakeholders arms this project with a deep understanding of all three phases of this Project.

AEP American Electric Power

EcoEdge

GE imagination at work

Sharyland Utilities

CenterPoint Energy

Electric Power Group

ENERGY XTREME CONSERVATION THROUGH INNOVATION

Department of Energy United States of America

ERCOT

LAND TEJAS COMPANIES

Southwest Research Institute

TXU Energy

Direct Energy

FRONTIER ASSOCIATES

ONCOR

VALENCE ENERGY Smart Microgrid Solutions

Drummond group