SCS Services

• Human Resources • Information Technology • Marketing Services • SouthernLINC Wireless •
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End Use Metering Evaluation Project

Load Research

Audrey Gies

SOUTHERN COMPANY

Agenda

- Objective
- Utilized Technology
- Implementation
- Data Collection and Analysis
- Next Steps and Other Available Technology

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Agenda

- **Objective**
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Objective

- To identify and test new equipment that will integrate with AMI while obtaining quality end use data from a variety of housing types.

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Utilized Technology

- TED 5000
  - Company is partnered with Google PowerMeter
  - Measures whole house data usage

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Utilized Technology

- Echelon End Use Modules
  - Coupled with Echelon's iLon server and a SouthernLinc wireless modem
  - Captures data from specific appliances

120V module

220V module

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Implementation

How TED works

Utility delivers electricity to meter to breaker panel in home

Two clamps are clamped around the main incoming conductors of the breaker panel

The clamps connect to a measuring unit which is wired into the breaker panel. The unit sends a signal over the powerline to the Gateway, which is plugged in any outlet in the home.

The Gateway picks up the signal and stores up to 10 years worth of data

The Gateway sends a ZigBee wireless signal to communicate with the optional sleek, wireless LED display

TED 5000's Footprints software can be viewed directly on the computer, or through any internet source when the Gateway is connected directly to an existing internet router

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Implementation

- TED 5000
  - Advertised as anyone can complete the install; hire an electrician if unsure
  - Three steps to install after removing panel cover
  - Make take the average consumer an hour to complete

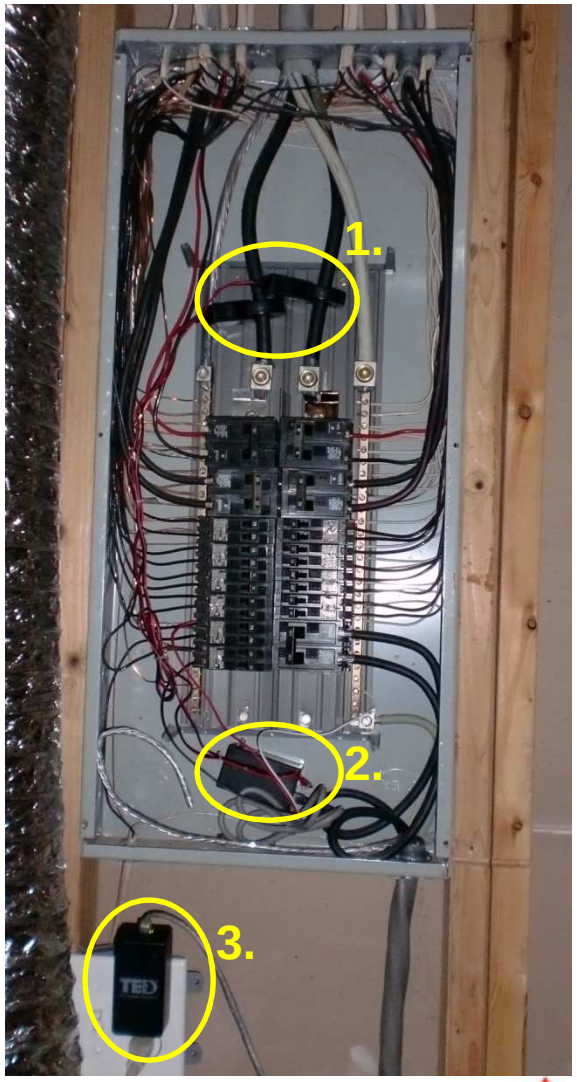

Photo from employee's installation

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Implementation

- Echelon End Use Modules
  - LR Analysts must setup each module on the server
  - Setup can be time consuming

  - Installation for the homeowner is simply plugging appliances into the device
  - Also must setup the server and modem

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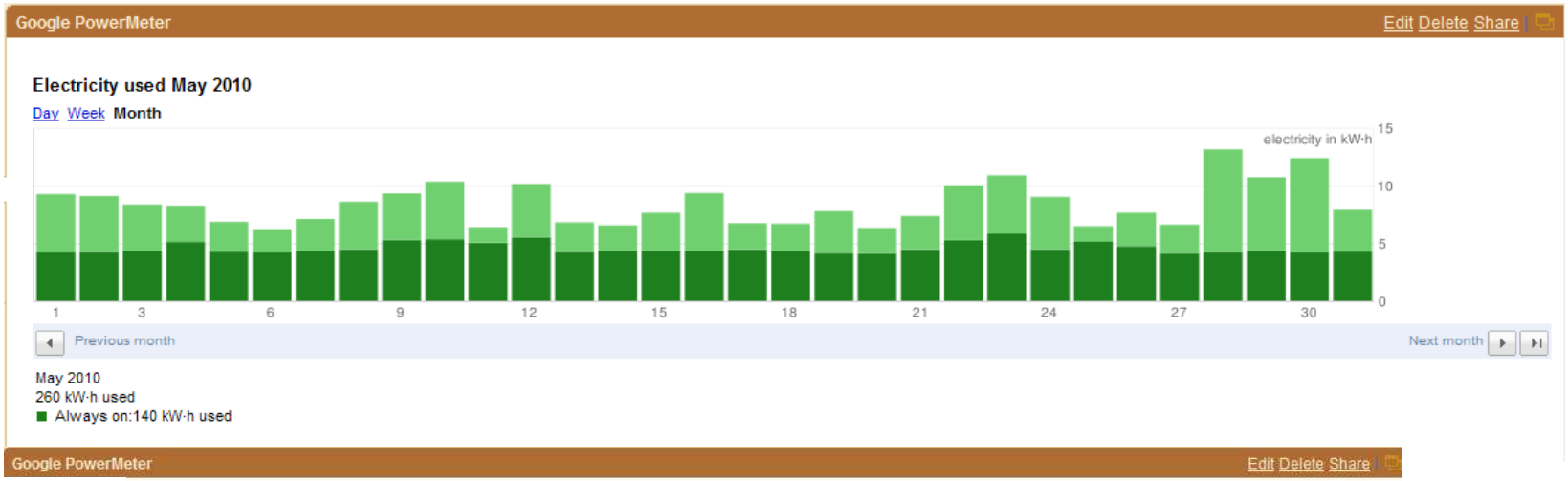
Data Collection and Analysis

- TED 5000
  - Uses homeowner's internet to transfer the data
  - The homeowner has the option to download the stored data
  - Have one device actively collecting data
    - Originally bought two
    - Recently two additional units purchased
  - Ideal requirements
    - An employee who is a GPC customer and
    - Install an AMI meter or an interval load recorder

Data Collection and Analysis

- Images from Employee's Google PowerMeter Account



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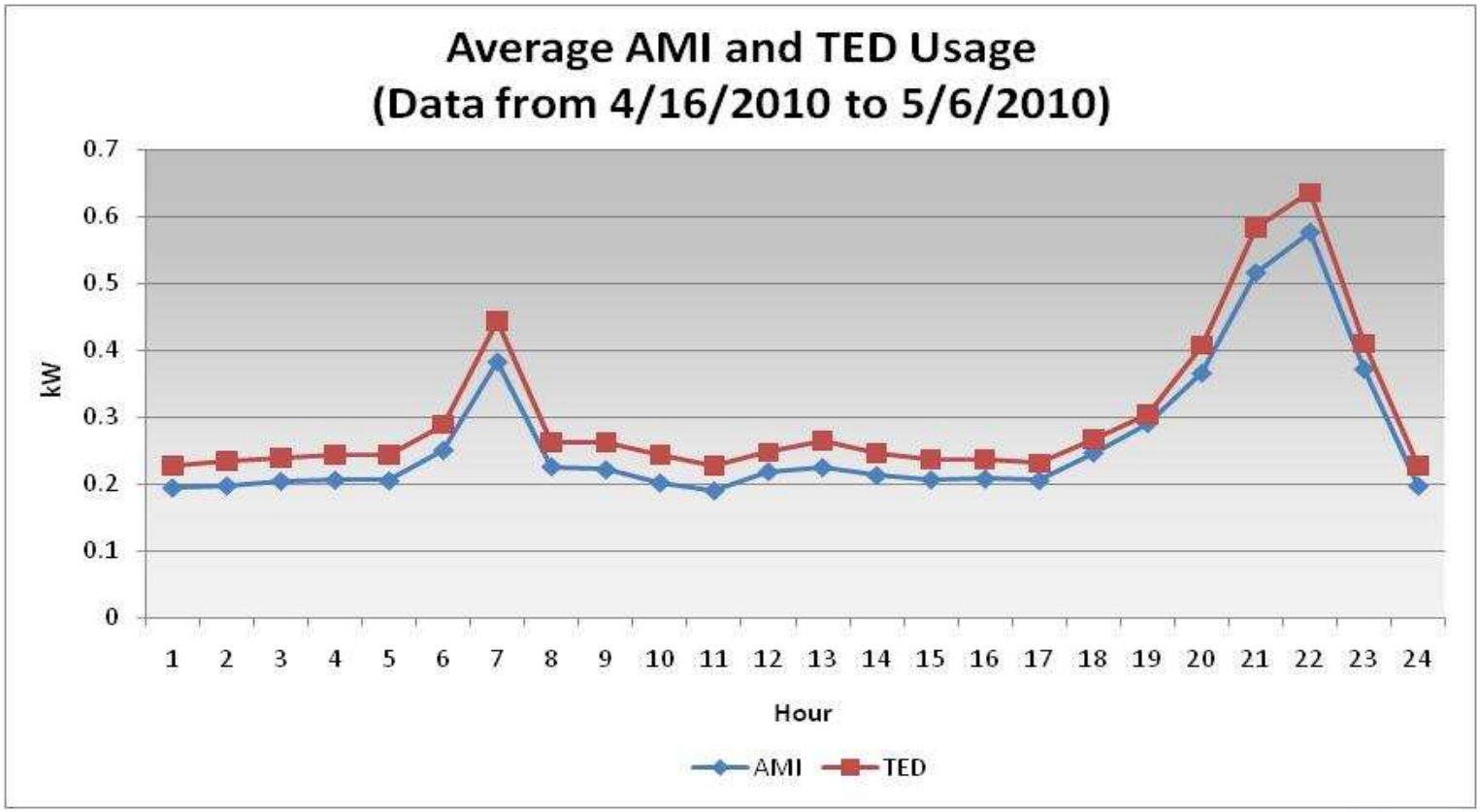
Data Collection and Analysis

- Average TED and AMI data
- TED is consistently higher than the AMI



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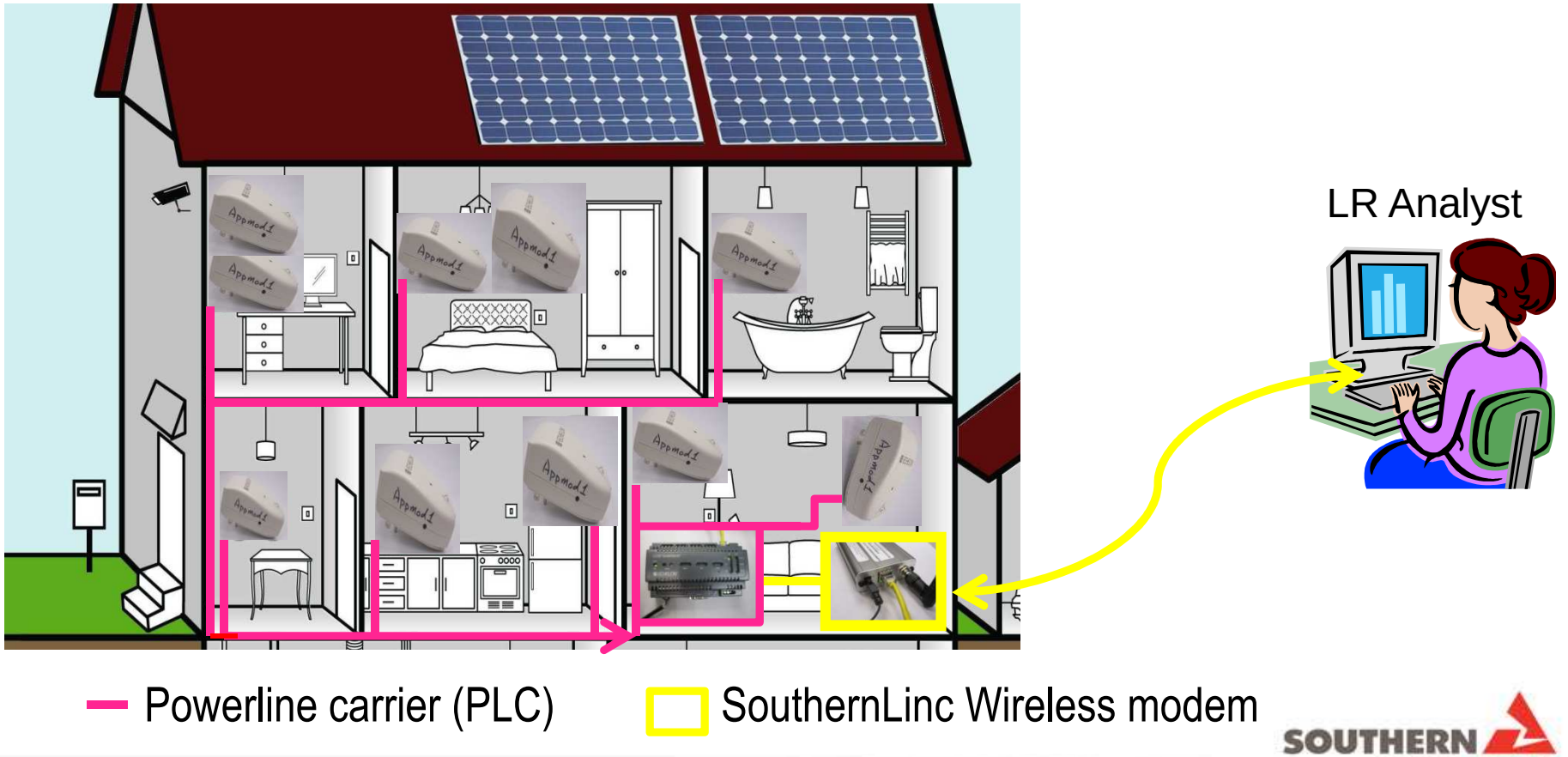
Data Collection and Analysis

- Echelon End Use Modules
  - Communication Process



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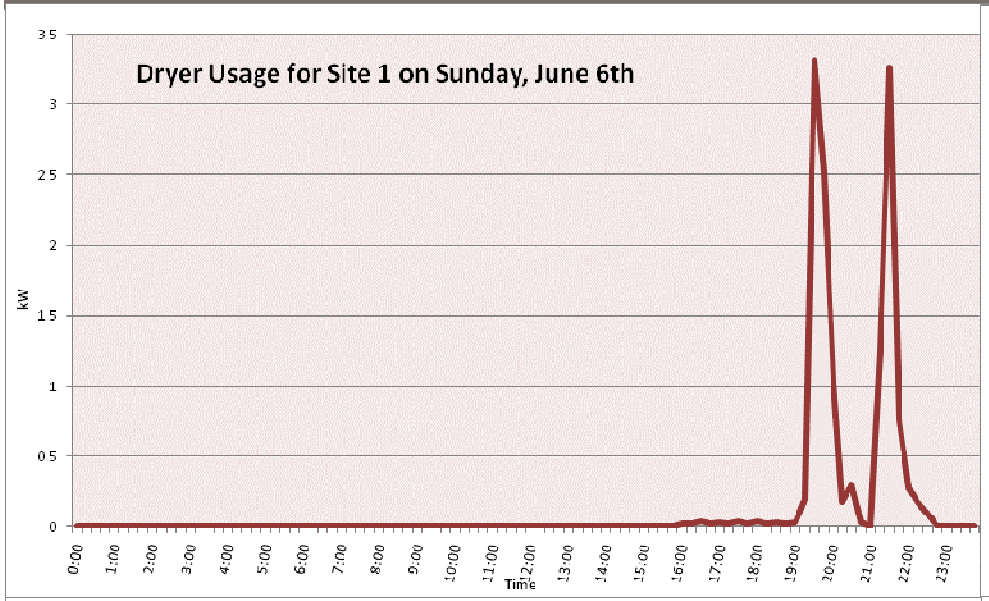
Data Collection and Analysis

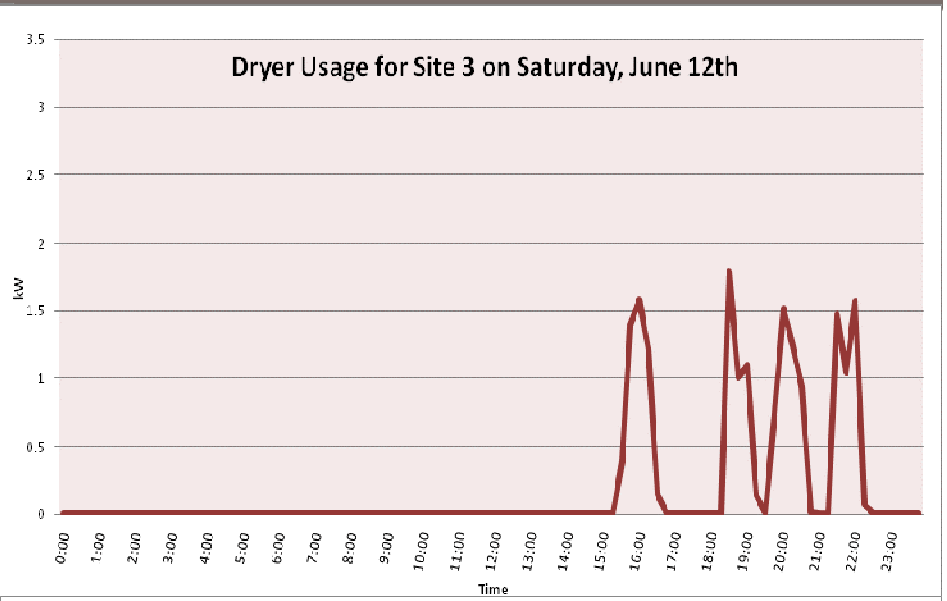
- Echelon End Use Modules
  - Server has a data log function which allows it to store the data
  - A program runs automatically at least once a day
  - SAS programs were created to clean and append the data into one SAS dataset and one CSV file

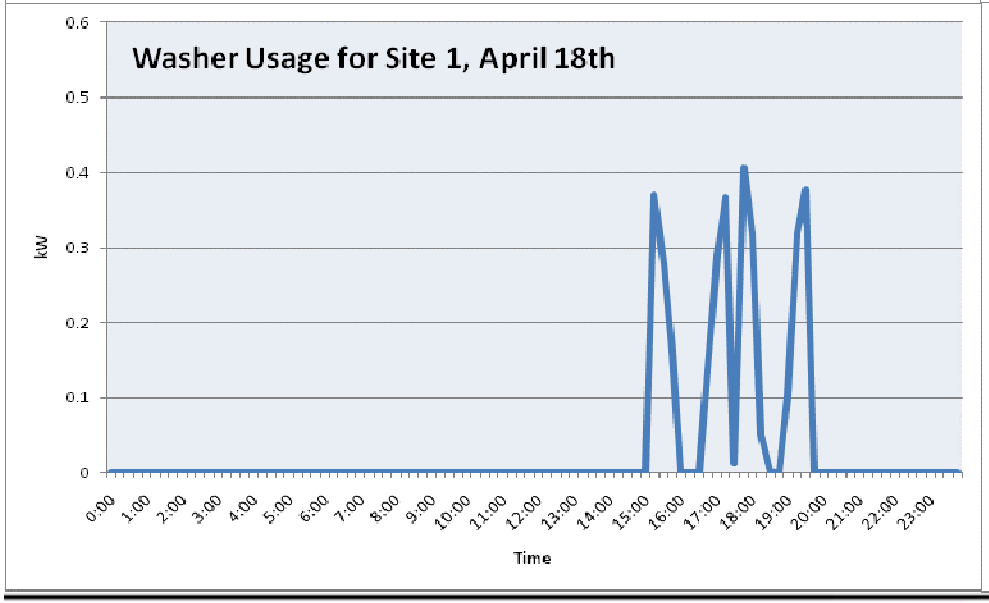
Data Collection and Analysis

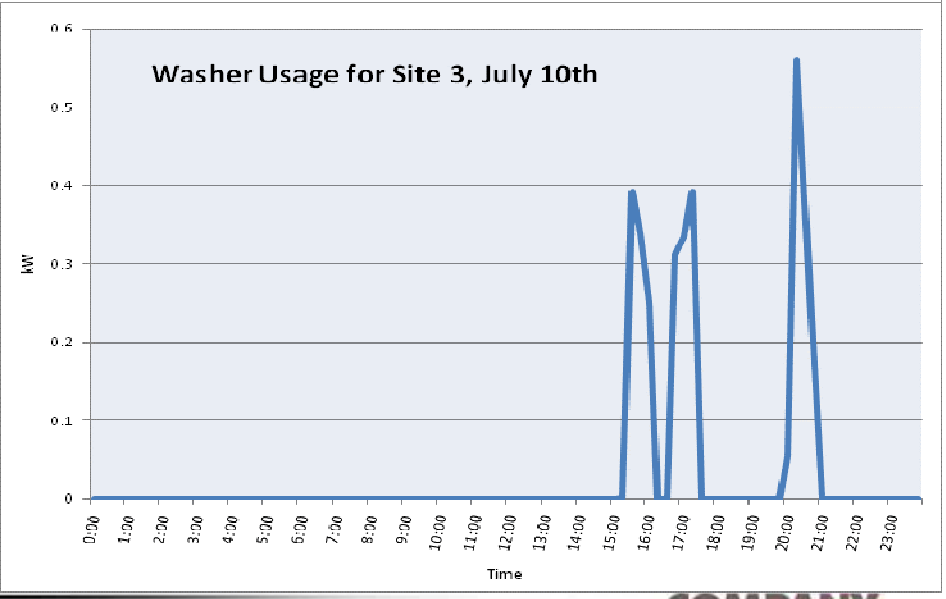
- Echelon End Use Modules
  - Currently monitoring 3 sites:
    - Site 1 has 17 modules since mid-April 2010
    - Site 2 monitoring Plug in Electric Vehicle since March 1, 2010
    - Site 3 monitored usage at apartment for 22 modules starting mid-May 2010 and 19 modules at SF home since July 2010
    - Site 4 monitored 50 modules from late February to early May 2010 at her townhouse
    - One set of 25 modules remains with a defective server

Data Collection and Analysis

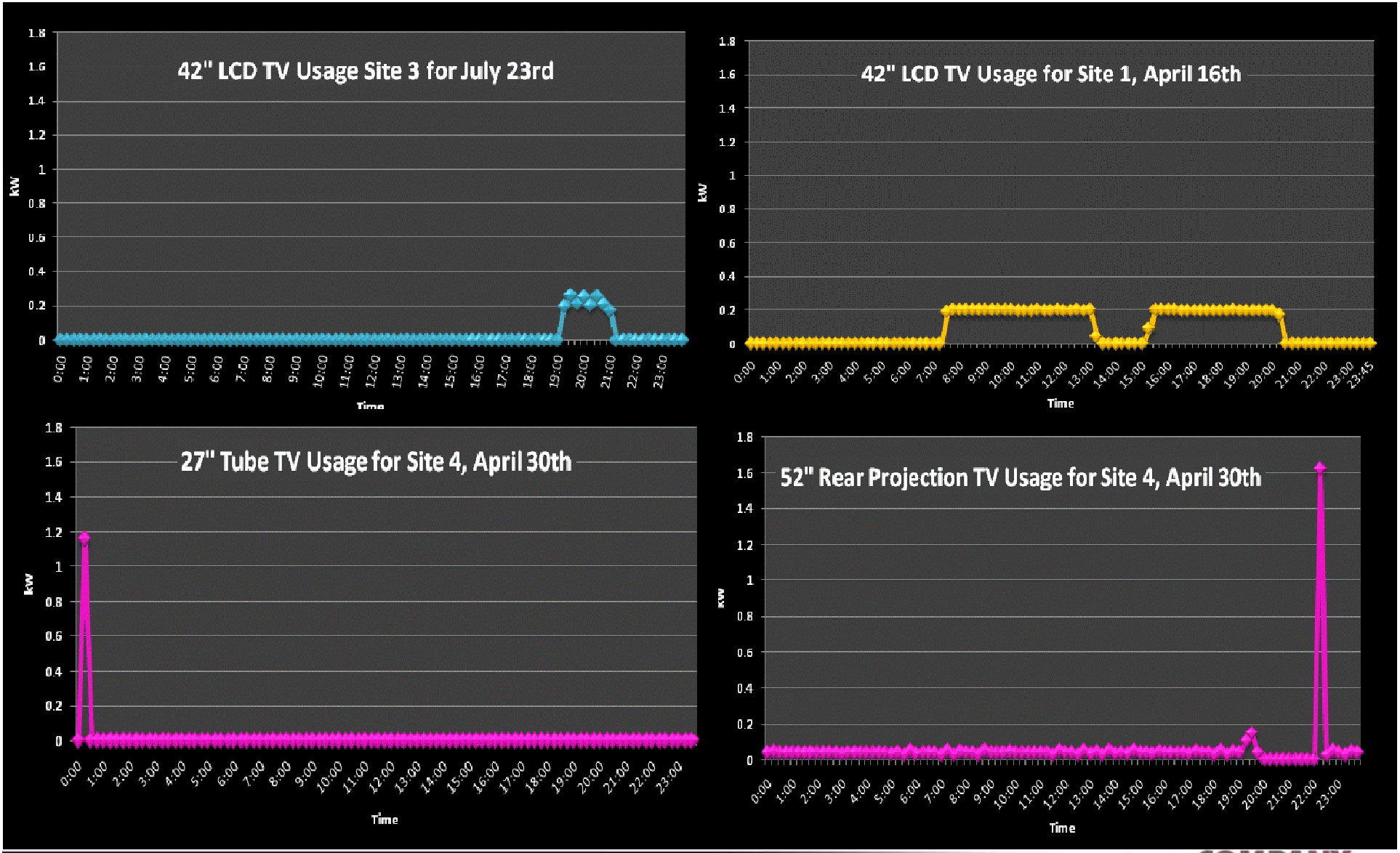




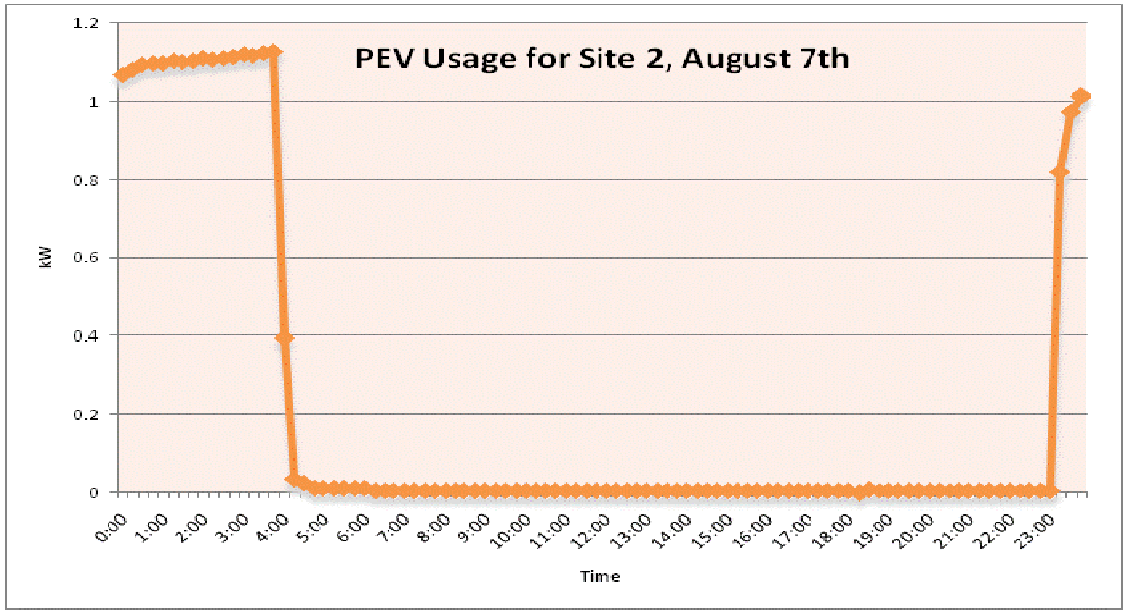




Data Collection and Analysis

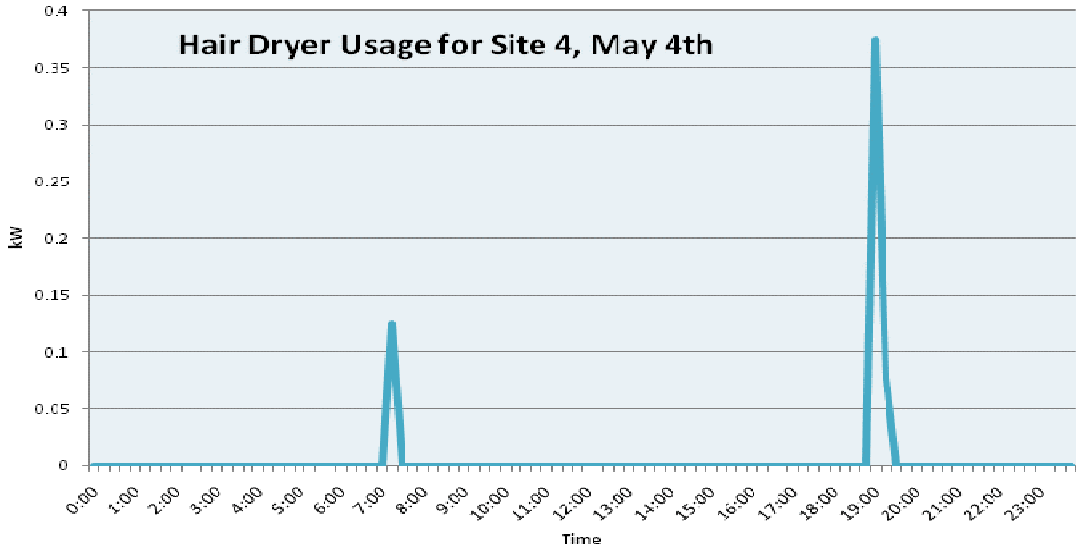


Data Collection and Analysis



- PHEV usage for Site 2

- Hair dryer usage for Site 4



Data Collection and Analysis

TED 5000

- Pro's:
  - Easy to capture the data
  - Does not require additional equipment
  - No communication problems
- Con's:
  - Only captures whole house data
  - Could be an intimidating installation
  - Must use the customer's internet connection
  - Unsure of the accuracy of the data when compared with AMI

Echelon Modules

- Pro's:
  - Very granular data
  - Easy to install; plug and play
- Con's:
  - Missing the large loads hard wired at the panel (such as WH, AC, Heating)
  - Potential noise issues interfering with the PLC
  - Server setup for 25 modules (each home) for 100 homes would not be time consuming and tedious

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Next Steps

- TED 5000
  - Two new participants to investigate accuracy
- Echelon Modules
  - Yearly rotation of equipment for a variety of problem solving situations and a robust data set
    - Rotation will allow testing in different housing types and different customer behaviors

Other Available Technology

- Variety of end use monitoring equipment but price points vary drastically
  - Andrew Berrisford, BC Hydro, currently conducting an end use study
    - Plogger – measures individual appliances
    - For their experiment there was a laptop, to capture the data, at each home
    - Uses ZigBee radio communication

Other Available Technology

- Our IT department has filed a patent for a replacement circuit breaker which will measure the usage at that circuit
- eMonitor + SmartOutlets
  - Uses CT's to measure each individual load
  - Customer's internet connection used
  - Installation takes 1-1.5 hours and may require an electrician
  - SmartOutlets (plug device) not available until fall 2010

Other Available Technology

- ecoDog device + plug devices
  - ecoDog uses CT's to measure each individual load
  - Communicates within home with PLC and ZigBee for AMI meters and thermostats
  - Installation takes 2 hours and may require an electrician
  - Plug devices not available until fall 2010

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Conclusion

- Overall
  - Echelon modules:
    - Captures end use data
    - Issues with larger project setup
  - TED 5000:
    - Easy to capture the data
    - Accuracy is questionable
  - Plan to continue testing other equipment

- **Any questions?**

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