

Residential Information and Controls Pilot: Technology Review Memo – Appendix A

This appendix provides a summary of 48 residential energy information and controls companies and their products as of February 2010. Although every effort was taken to provide a comprehensive list of vendors with existing products, there is always the potential for omission. Where omissions have occurred, please feel free to notify the author at Karen@HerterEnergy.com.

Each section summarizes for each company the energy devices they produced, including a brief physical description, the information displayed, the user interface, and where applicable, the method of communicating with the meter, utility and controlled devices. Because the number of companies and products in this field is rapidly growing and ever-changing, this list of vendors and products should not be considered comprehensive beyond the completion of this report in February 2010.

This section was completed in collaboration with Innovative Power Analytics, Inc.

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1. 2 Save Energy

2 Save Energy is a UK based company that makes a range of home energy displays. The display shown in Figure 1 uses a CT with a wireless connection to display whole building real-time consumption information.

Figure 1. 2 Save Energy "The Owl" display



Source: <http://www.theowl.com/>

Capabilities:

- Meter connection using a clip-on device
- Customer data is stored locally
- Displays whole building usage information
- Displays real-time information
- Displays current price

2. 4Home

4Home is an original equipment manufacturer (OEM) of hardware and software for home appliance interface, automation and networking. They manufacture a gateway, communicating thermostat, and plug monitors as well as offering a web connection from the utility to the customer and remote home control over the web. Their devices are shown in Figure 2, and their system diagram in Figure 3.

Figure 2. 4Home products



Source: <http://4homemedia.com/>

Figure 3. 4Home system diagram



Source: <http://4homemedia.com/>

Capabilities:

- Meter connection using Zigbee or Zwave
- Utility connects to device through 4Home's servers
- Customer data is stored locally
- Customer data is stored remotely on 4Home's servers
- Utility can send a price event to the device
- Utility can send a load control event to the device
- Displays whole building usage information
- Displays plug load (120V) consumption information
- Displays large (240V) appliance consumption information
- Displays real-time information
- Displays current price
- Provides end-use control

3. Aclara

Aclara is a Missouri based company that specializes in TWACS® powerline data transmission. They make a range of products including an in-home display (Figure 4) and appliance controls. A diagram of their powerline communication system and devices appears in Figure 5.

Figure 4. Aclara display



Source: <http://www.aclara.com/>

Figure 5. Aclara system diagram



Source: <http://www.aclara.com/>

Capabilities:

- Meter connection using powerline
- Utility connects to device using TWACS® powerline
- Customer data is stored remotely
- Utility can send a price event to the device
- Utility can send a load control event to the device
- Displays whole building usage information
- Displays real-time information
- Displays current price
- Provides end-use control

4. Agilewaves

Agilewaves is a California based company. Their system monitors electricity, gas and water usage (Figure 6) and displays information to customers through a web-based dashboard (Figure 7).

Figure 6. Agilewaves system diagram



Source: <http://www.agilewaves.com/>

Figure 7. Agilewaves customer interface



Source: <http://www.agilewaves.com/>

Capabilities:

- Meter connection using a set of CTs
- Customer data is stored locally
- Customer data is stored remotely
- Displays whole building usage information
- Displays plug load (120V) consumption information
- Displays large (240V) appliance consumption information
- Displays real-time information
- Displays current price

5. AlertMe

AlertMe is a U.K. based company that makes an energy monitoring system for residential use (Figure 8). The system consists of a meter reader, local transmitter, and NanoHub, which transmits monitored electricity data to the Internet. Customers can then view their data using the web-based AlertMe Dashboard, or using Google PowerMeter,

Figure 8. AlertMe Energy



<http://www.alertme.com/>

- Meter connection using CTs and powerline
- Customer data is stored remotely
- Displays whole building usage information
- Displays real-time information

6. Ambient

Ambient is a US company that makes a broad range of devices that make use of their proprietary wireless communication. Most of these display weather forecasts or sports scores. They make two energy display devices: the Energy Orb, which changes color based on current energy price, and the Energy Joule, a small plug-in display that displays whole building usage and current price (Figure 9).

Figure 9. Ambient Energy Orb and Energy Joule



Source: <http://www.ambientdevices.com/>

Capabilities:

- Meter connection using a wireless device
- Utility connects to device through Ambient
- Utility can send a price event to the device
- Displays whole building usage information
- Displays real-time information
- Displays current price

7. Ampy Email Metering

Ampy Email Metering is an Australian subsidiary of Landis+Gyr. They have an in-home display called the ecoMeter (Figure 10), which shows hourly usage for the most recent 24 hours for electricity, natural gas and water. Lights below the energy display illuminate to indicate the current electricity price level.

Figure 10. Ampy ecoMeter display



Source: <http://www.ecometer.com.au/index.html>

Capabilities:

- Displays whole building usage information
- Displays real-time information
- Displays current price

8. AzTech

AzTech is a Canadian company that makes an in-home display and other devices for communication from utilities to their customers. The IHD shown in Figure 11 can also display freeform messages from the utility through their AMI.

Figure 11. AzTech display



Source: <http://www.aztechmeter.com/cms>

Capabilities:

- Meter connection using Zigbee
- Utility connects to device through their AMI
- Customer data is stored locally
- Utility can send a price event to the device
- Utility can send a load control event to the device
- Displays whole building usage information
- Displays real-time information
- Displays current price

9. Blueline Innovations

Blueline Innovations is a Canadian company that makes the BlueLine Monitor, an energy display that receives site data from a meter attachment. The BlueLine Monitor, shown in Figure 12, displays whole building usage and price.

Figure 12. Blueline Monitor



Source: <http://www.bluelineinnovations.com/>

Capabilities:

- Meter connection through a clip-on transmitter
- Customer data is stored locally
- Displays whole building usage information
- Displays real-time information
- Displays current price

10. Comverge

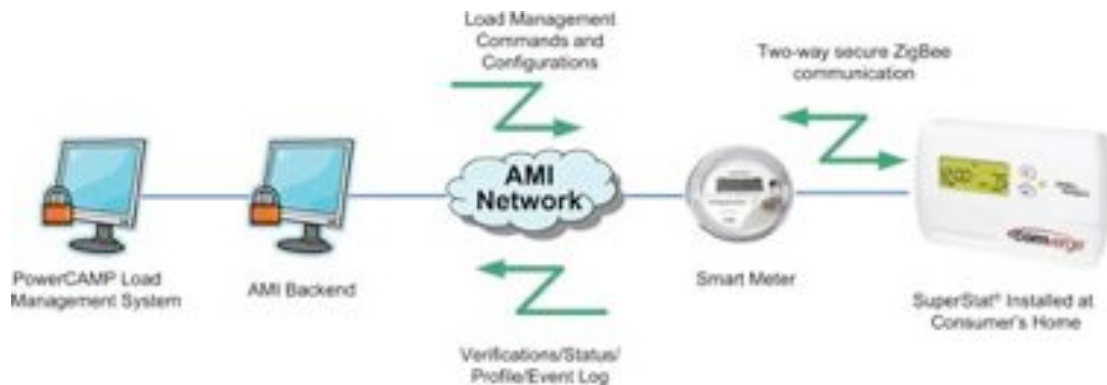
Comverge is a demand management company specializing in hardware for utility demand response programs. Their handheld usage display (Figure 13) provides electricity usage and pricing information. Figure 14 is a diagram of the communications for their Zigbee thermostat.

Figure 13. Comverge display



Source: <http://www.comverge.com/>

Figure 14. Comverge system diagram



Source: <http://www.comverge.com/>

Capabilities:

- Meter connection using Zigbee
- Utility can send a price event to the device
- Utility can send a load control event to the device
- Displays whole building usage information
- Displays plug load (120V) consumption information
- Displays real-time information
- Displays current price
- Provides end-use control

11. Control4

Control4 is a company specializing in home energy monitoring and controls products. Their new thermostat and touch screen controller (Figure 15), available in April 2010, uses Zigbee to communicate with a smart meter.

Figure 15. Control4 EC-100 display



Source: <http://www.control4.com/>

Capabilities:

- Meter connection via Zigbee
- Utility connects to device via Zigbee
- Customer data is stored locally
- Customer data is stored remotely
- Utility can send a price event to the device
- Utility can send a load control event to the device
- Displays whole building usage information
- Displays plug load (120V) consumption information
- Displays large (240V) appliance consumption information
- Displays real-time information
- Displays current price
- Provides end-use control

12. Current Cost Ltd

Current Cost is a UK company that makes several hand-held energy displays. Their devices communicate wirelessly using a proprietary system (Figure 16). Figure 17 shows their most full-featured device, called the Envi.

Figure 16. Current Cost system diagram



Source: <http://www.currentcost.com/>

Figure 17. Current Cost Envi



Source: <http://www.currentcost.com/>

Capabilities:

- Meter connection using a CT and a wireless transmitter
- Customer data is stored locally
- Displays whole building usage information
- Displays real-time information
- Displays current price

13. DIY KYOTO

DIY Kyoto is a UK based company that sells a three-part energy monitoring and display system plus software that display historical data when the system is plugged into the computer. Their display device, the Wattson (Figure 18, top), displays site energy consumption in watts and glows different colors to indication low medium or high usage. A screen capture of the Holmes software display is shown in Figure 19.

Figure 18. DIY Kyoto Wattson, CT, transmitter and software



Source: <http://www.diykyoto.com/>

Figure 19. DIY Kyoto Holmes software



Source: <http://www.diykyoto.com/>

Capabilities:

- Meter connection using a CT with a wireless transmitter
- Customer data is stored locally
- Displays whole building usage information
- Displays real-time information
- Displays current price

14. Eco-eye

Eco-eye is a UK manufacturer that makes an energy display that shows whole building usage and cost information (Figure 20). A wireless transmitter sends usage data from the sensor at the meter to the display. Computer software has also been developed to allow download of monitored data to a personal computer.

Figure 20. Eco-eye Elite



Source: <http://www.eco-eye.co.uk/>

Capabilities:

- Meter connection using CTs and a wireless transmitter
- Customer data is stored locally
- Displays whole building usage information
- Displays real-time information

15. EcoDog Inc.

EcoDog is a California company that makes a system that uses CTs to monitor up to 16 circuits in a home and display that information on a Windows PC. A screen capture of their software is shown in Figure 21.

Figure 21. EcoDog software



Source: <http://ecodoginc.com/>

Capabilities:

- Meter connection using CTs and powerline
- Customer data is stored locally
- Displays whole building usage information
- Displays plug load (120V) consumption information
- Displays large (240V) appliance consumption information
- Displays real-time information
- Displays current price

16. Efergy

Efergy is a UK based company that sells several products designed to reduce home electricity use. Their energy display (Figure 22) can download the information it collects to a PC, where Efergy's software (Figure 23) can be used to look at usage trends.

Figure 22. Efergy Elite display



Source: <http://www.efergy.com/>

Figure 23. Efergy's elink software



Source: <http://www.efergy.com/>

Capabilities:

- Meter connection using a wireless CT
- Customer data is stored locally
- Displays whole building usage information
- Displays real-time information
- Displays current price

17. eMeter

eMeter is a California software company specializing in software for the smart grid. One of their offerings is the Energy Engage web portal for customers (Figure 24). The portal offers savings suggestions and current (but not real-time) usage.

Figure 24. eMeter web display



Source: <http://www.emeter.com/>

Capabilities:

- Meter connection through utility
- Customer data is stored remotely
- Displays whole building usage information
- Displays current price

18. Energate

Energate is a Canadian company specializing in home energy management controls. Their Home Energy Management Suite uses Zigbee Smart Energy to communicate with the meter, and has several communication methods for demand and price signaling. With customer energy data stored on a server, the customer can view information about their home from a remote location. Energate's Home Energy Management system (Figure 25) uses a thermostat to display usage, price and event notification. A web display can also show plug and appliance loads.

Figure 25. Energate customer diagram



Source: <http://www.energate.ca/>

Capabilities:

- Meter connection using Zigbee
- Utility connects to device using AMI, RDS, or an Internet portal
- Customer data is stored remotely
- Utility can send a price event to the device
- Utility can send a load control event to the device
- Displays whole building usage information
- Displays plug load (120V) consumption information
- Displays large (240V) appliance consumption information
- Displays real-time information
- Displays current price
- Provides end-use control

19. Energy Inc.

Energy Inc. manufactures The Energy Detective (TED) line of energy displays. The TED 5000 system has one-second resolution, and also comes with its own dashboard, called Footprints. The dashboard displays current and historical electricity usage along with weather information. When the TED system is combined with Google PowerMeter, users are provided with mobile and web access to a subset of the usage data.

Setup requires installing the CTs and a Powerline transmitter in the breaker box and connecting the Gateway to a personal computer. The Gateway can read up to four sets of CTs, so it can be used to display the energy use of hardwired or plugged appliances that have existing dedicated circuits.

Figure 26. TED Footprints dashboard



Source: <http://www.theenergydetective.com/>

Capabilities:

- Meter connection using CTs and powerline
- Customer data is stored locally
- Displays whole building usage information
- Displays real-time information
- Displays current price

20. Energy Monitoring Technologies

Energy Monitoring Technologies is a Florida based company that makes the Meter Reader (Figure 27), which is wired directly to a set of CTs.

Figure 27. Energy Monitoring Technologies Meter Reader display



Source: <http://www.energymonitor.com/>

Capabilities:

- Meter connection through a hard-wired CT
- Customer data is stored locally
- Displays whole building usage information
- Displays real-time information
- Displays current price

21. EnergyHub

EnergyHub focuses on residential energy information and controls. Figure 28 shows their system, which uses Zigbee SE to communicate with the meter and also connects to a server so the customer can access their information remotely. EnergyHub's system collects data on all customers, so that the utility has in depth information about how and when energy is being used.

Figure 28. EnergyHub system diagram

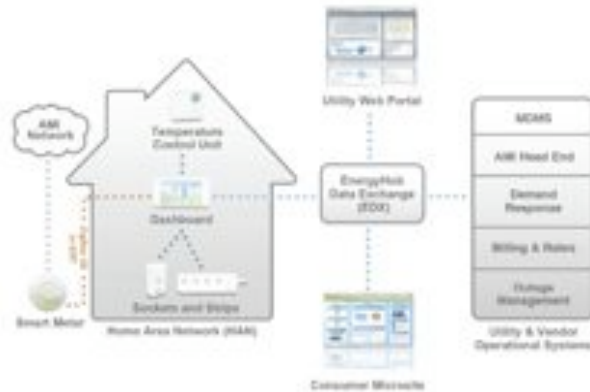


Figure 29 shows the dashboard and one of the plug load monitoring and control sockets. The dashboard is also the gateway, connecting to the meter, the server and all in-home devices.

Figure 29. EnergyHub dashboard and plug



<http://www.energyhub.net/>

Capabilities:

- Meter connection using Zigbee
- Utility connects to device using AMI or an Internet portal
- Customer data is stored remotely
- Utility can send a price event to the device
- Utility can send a load control event to the device
- Displays whole building usage information
- Displays plug load (120V) consumption information
- Displays large (240V) appliance consumption information
- Displays real-time information
- Displays current price
- Provides end-use control

22. General Electric

General Electric's ecomagination homes project makes a wall-mounted dashboard (Figure 30), which is also the interface for a home automation system.

Figure 30. GE display



Source: <http://www.ge.com/yourhome/dashboard.html>

Capabilities:

- Meter connection using Zigbee
- Customer data is stored locally
- Displays whole building usage information
- Displays plug load (120V) consumption information
- Displays large (240V) appliance consumption information
- Displays real-time information
- Displays current price
- Provides end-use control

23. Google PowerMeter

Google PowerMeter is a plug-in for the iGoogle webpage, requiring free registration with Google. It displays current and historical usage, cost estimates, and a comparison to other homes. PowerMeter can use energy data from the utility or from The Energy Detective (TED) 5000 Gateway. In addition to the web-based display, the PowerMeter website is accessible from most smart phones, so the customer can access their energy data at any time.

Figure 31. Google PowerMeter



Source: <http://www.google.org/powermeter/>

Capabilities:

- Meter connection through the utility
- Meter connection through a CT
- Customer data is stored remotely
- Displays whole building usage information
- Displays current price

24. Green Energy Options

Green Energy Options is a UK company that makes several displays for both residential and business applications. Their displays range from one providing only real-time site usage to one that shows multiple appliance loads plus greenhouse gas emissions. Figure 32 shows one of their displays, which shows both site and appliance usage.

Figure 32. Green Energy Options Duet display



Source: <http://www.greenenergyoptions.co.uk/>

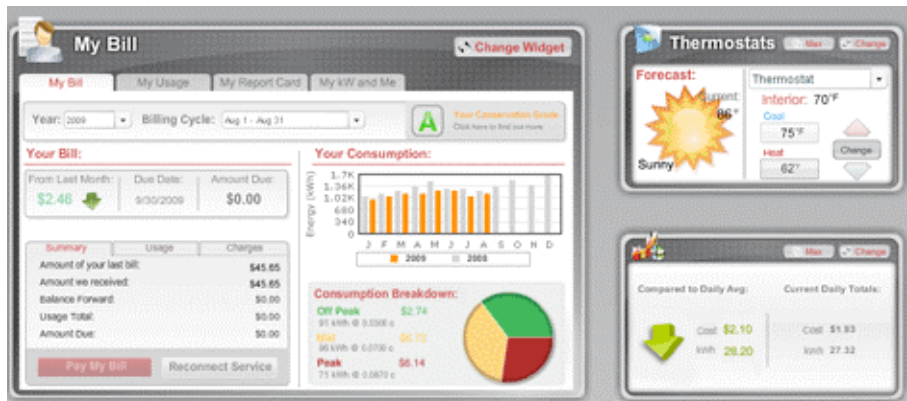
Capabilities:

- Meter connection using Zigbee or a clip-on device
- Customer data is stored locally
- Displays whole building usage information
- Displays plug load (120V) consumption information
- Displays large (240V) appliance consumption information
- Displays real-time information
- Displays current price
- Provides end-use control

25. Gridpoint

Gridpoint is a Virginia based company specializing in software solutions for smart grid integration, including load management, home energy management, renewable integration and electric vehicle management. Their customer portal (Figure 33) displays a variety of usage information, controls and enables participation in demand response events.

Figure 33. Gridpoint software



Source: <http://www.gridpoint.com/solutions/homeenergymanagement.aspx>

Capabilities:

- Customer data is stored remotely
- Displays whole building usage information
- Displays current price
- Provides end-use control

26. Home Automation Europe

Home Automation Europe is a Netherlands based OEM focusing on energy management, climate control, and home security. They make a wall mounted home display (Figure 34) that allows the user to set energy use goals to meet over the course of the month and year.

Figure 34. Home Automation Europe Power Player display



Source: <http://www.powerplayer.nl/>

Capabilities:

- Meter connection through CT or AMI
- Customer data is stored locally and/or remotely
- Utility can send a price event to the device
- Displays whole building usage information
- Displays real-time information
- Displays current price

27. iControl

iControl is a California based home management company, focusing on energy, home security and home healthcare. They offer an energy management system called Connected Life which supports Zigbee Smart Energy connection to the meter. Their system supports demand response applications and remote data access. Figure 35 shows iControl's dashboard, thermostat, and iPhone app.

Figure 35. iControl dashboard, thermostat and iPhone app



Source: <http://www.icontrol.com/>

Capabilities:

- Meter connection using a CT or Zigbee
- Utility can send data using the Internet or Zigbee
- Customer data is stored locally and/or remotely
- Utility can send a price event to the device
- Utility can send a load control event to the device
- Displays whole building usage information
- Displays plug load (120V) consumption information
- Displays real-time information
- Displays current price
- Provides end-use control

28. In2Networks

In2 Networks is a Utah based company specializing in home and business automation and security. They use Internet connection modules and thermostats from Honeywell to connect meters and thermostats to their website. Customers connect to the website to view their usage and control items in their home. The diagram of their system is shown in Figure 36.

Figure 36. In2 Networks system diagram



Source: <http://www.in2networks.com/>

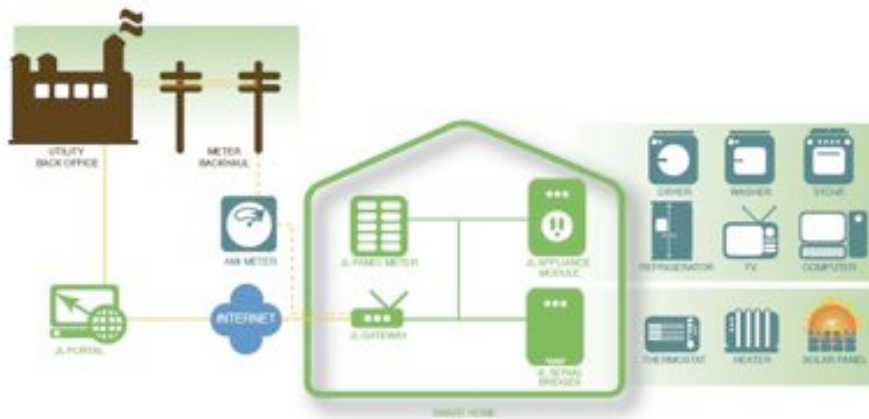
Capabilities:

- Meter connection through a Honeywell gateway to the Internet
- Utility connects to device through the Internet
- Customer data is stored locally and/or remotely on In2 Networks servers
- Utility can send a price event to the device
- Utility can send a load control event to the device
- Displays whole building usage information
- Displays real-time information
- Displays current price
- Provides end-use control

29. Jetlun

Jetlun is a Chinese company with a sales department in South San Francisco. They specialize in real-time residential energy monitoring and remote management, made to communicate with Zigbee SE enabled meters. Jetlun provides the gateway and load controls, and integrates with in-home displays and communicating thermostats provided by their partners (Figure 37). The Jetlun Intelligent Management system, or “JIM” (Figure 38), communicates with the meter and the technologies in the home. The customer data is stored in the gateway, so it never need leave the home.

Figure 37. Jetlun system diagram



Source: <http://www.jetlun.com/>

Figure 38. Jetlun Intelligent Management system: circuit meter, gateway and plug



Source: <http://www.jetlun.com/>

Capabilities:

- Meter connection through Zigbee
- Utility connects to device through an Internet portal
- Customer data is stored locally and/or remotely
- Utility can send a price event to the device
- Utility can send a load control event to the device
- Displays whole building usage information
- Displays 120V and 240V consumption information
- Displays real-time information
- Displays current price
- Provides end-use control

30. LS Research

LS research is a wireless product development company in Wisconsin. Figure 39 shows their Zigbee handheld display, which runs on two AA batteries.

Figure 39. LS Research RateSaver display



Capabilities:

- Meter and utility connection through Zigbee
- Utility can send a price event to the device
- Utility can send a load control event to the device
- Displays whole building usage information
- Displays plug load (120V) consumption information
- Displays real-time information
- Displays current price

31. Microsoft Hohm

Microsoft Hohm is a free website-based energy display that shows monthly gas and electric energy use. Hohm displays monthly data collected from the customer's utility, and then uses detailed information about the user's home to estimate monthly and annual appliance usage. Hohm does not display any real-time information.

Hohm also offers suggestions for saving energy. These suggestions vary from lowering the temperature setting of the water heater to insulating the slab perimeter.

Figure 40. Microsoft Hohm dashboard



Source: <http://www.microsoft-hohm.com/>

Capabilities:

- Customer data is stored remotely
- Displays whole building usage information

32. Onzo

Onzo is a UK based company that make a three part in-home display using a CT with a transmitter, a handheld display, and a web display. Their CT and display are shown in Figure 41.

Figure 41. Onzo CT and display



Source: <http://www.onzo.co.uk/>

Capabilities:

- Meter connection using a CT
- Customer data is stored locally and/or remotely
- Displays whole building usage information
- Displays real-time information

33. OpenPeak

OpenPeak is a Florida based company that makes a series of products using an Internet-connected platform on which any of a number of applications can be run (Figure 42). Although some of the early applications were designed for the telecommunications industry, more recently created applications address home energy use, appliance control and utility messaging capabilities.

Figure 42. OpenPeak's OpenFrame® and OpenTablet®



Source: <http://www.openpeak.com/>

Capabilities:

- Meter connection via CT or Zigbee SE
- Utility connection to system via Internet or Zigbee SE
- Customer data is stored locally and/or remotely
- Utility can send a price event to the device
- Utility can send a load control event to the device
- Displays whole building usage information
- Displays plug load (120V) consumption information
- Displays large (240V) appliance consumption information
- Displays real-time information
- Displays current price
- Provides end-use control

34. P3 International

P3 International is a New York based corporation that sells a range of electronic equipment, including the Kill-A-Watt line of plug load monitors. The Kill-A-Watt, shown in Figure 43, displays current usage and cost for a single plug or power strip.

Figure 43. P3 International Kill-A-Watt display



Source: <http://www.p3international.com/>

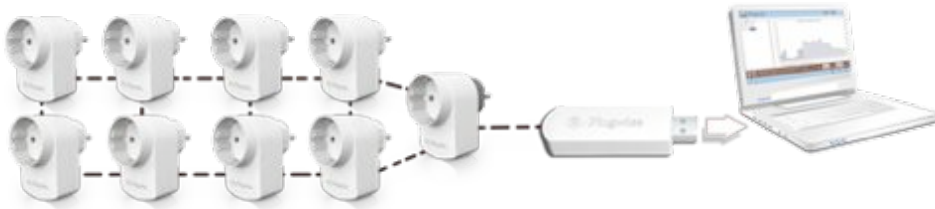
Capabilities:

- Customer data is stored locally
- Displays plug load (120V) consumption information
- Displays real-time information

35. Plugwise

Plugwise is a company in the Netherlands that makes a system for monitoring and controlling plug loads in the home using a mesh network. The system is comprised of a system of plugs that deliver information to PC-based software. The software, in turn, can be used to control the connected plug loads (Figure 44).

Figure 44. Plugwise system diagram



Source: <http://www.plugwise.com/>

Capabilities:

- Customer data is stored locally
- Displays plug load (120V) consumption information
- Displays real-time information
- Provides end-use control

36. PowerHouse Dynamics

PowerHouse Dynamics is a Massachusetts based company that makes a home energy management system that uses Zigbee or CTs to measure whole house usage. Smaller CTs are used to measure usage for each circuit. The customer can then see their usage on a dashboard on their computer (Figure 45).

Figure 45. PowerHouse Dynamics dashboard



Source: <http://www.powerhousedynamics.com/>

Capabilities:

- Meter connection using Zigbee or CTs
- Utility connects to device using an Internet portal
- Customer data is stored locally
- Customer data is stored remotely
- Utility can send a price event to the device
- Utility can send a load control event to the device
- Displays whole building usage information
- Displays plug load (120V) consumption information
- Displays large (240V) appliance consumption information
- Displays real-time information
- Displays current price
- Provides end-use control

37. PowerMand

PowerMand is an Oregon based company that makes a Zigbee gateway designed to connect to a wide range of meters and controls. Their gateway (Figure 46) connects the Zigbee network to the Internet. Customer information is then available through a web interface (Figure 47).

Figure 46. PowerMand DreamWatts gateway



Source: <http://www.powermand.com/>

Figure 47. PowerMand web display



Source: <http://www.powermand.com/>

Capabilities:

- Meter connection through Zigbee
- Customer data is stored remotely
- Displays whole building usage information
- Displays real-time information
- Displays current price
- Provides end-use control

38. PRI

PRI is a UK based company that specializes in meters and produces several energy displays. The fullest-featured product is a touch screen display with a direct connection to the utility for prepayment (Figure 48). The device displays real-time usage for both electricity and gas.

Figure 48. PRI display



Source: <http://www.pri.co.uk/>

Capabilities:

- Meter connection using Zigbee
- Utility can send a price event to the device
- Displays whole building usage information
- Displays real-time information
- Displays current price
- Provides end-use control

39. Residential Control Systems

Residential Control Systems (RCS) is a home automation and energy management company. Figure 49 shows one of their communicating thermostats, which can display site and appliance usage information, in addition to utility messages and event notification.

Figure 49. RCS thermostat



Source: <http://www.resconsys.com/>

Capabilities:

- Meter connection using Zigbee or CTs
- Utility connects to device using Zigbee or RDS-UMC
- Customer data is stored locally and/or remotely
- Utility can send a price event to the device
- Utility can send a load control event to the device
- Displays site electricity usage information
- Displays plug load (120V) usage information
- Displays large (240V) appliance usage information
- Displays real-time information
- Displays current price
- Provides end-use control

40. San Vision Energy Technology

San Vision Energy Technology is a California firm that manufactures an IHD that uses a set of CTs to measure whole-building consumption and display real-time usage on a small, mobile display. The display, shown in Figure 50, has been used in pilots by EPRI and SDG&E.

Figure 50. San Vision display



Source: <http://www.svetinc.com/>

Capabilities:

- Meter connection through CTs
- Customer data is stored locally
- Displays whole building usage information
- Displays real-time information
- Displays current price

41. Seasonic

Seasonic is a company based in Taiwan that specializes in high performance and energy-efficient computer power supplies. They also make the PowerAngel plug load monitor (Figure 51), which displays power and usage information for the connected plug load.

Figure 51. Seasonic PowerAngel monitor



Source: <http://www.seasonicusa.com/>

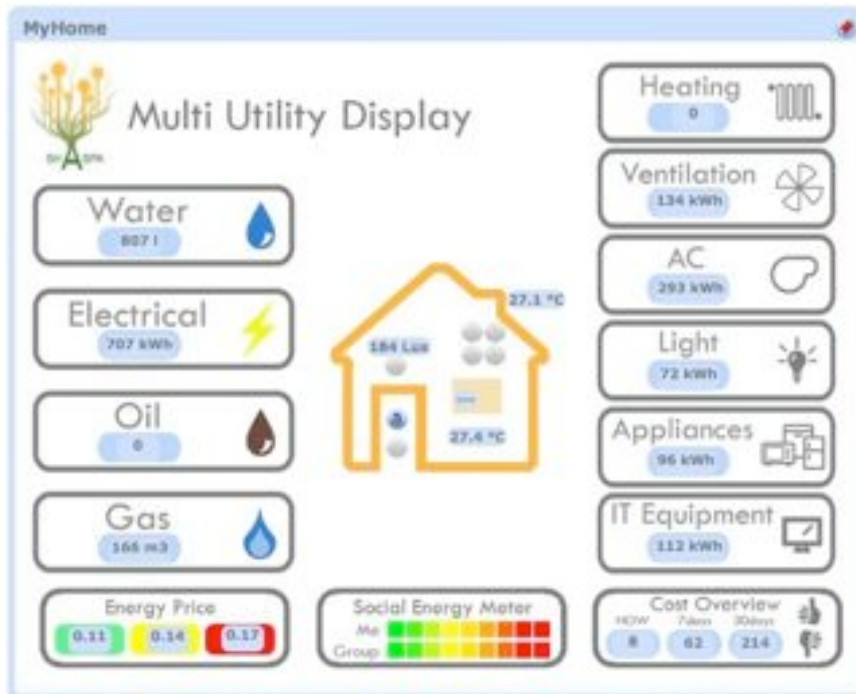
Capabilities:

- Customer data is stored locally
- Displays plug load (120V) consumption information
- Displays real-time information

42. Shaspa

Shaspa is a UK-based company specializing in home automation and data display. Their system includes both an in-home display and a web interface (Figure 52).

Figure 52. Shaspa's web-based customer dashboard



Source: <http://www.shaspa.com>

Capabilities:

- Meter connection through Zigbee, CT, Zwave, powerline, or others
- Utility connects to device through the Internet
- Customer data is stored locally
- Customer data is stored remotely on Shaspa servers
- Utility can send a price event to the device
- Utility can send a load control event to the device
- Displays whole building usage information
- Displays plug load (120V) consumption information
- Displays large (240V) appliance consumption information
- Displays real-time information
- Displays current price
- Provides end-use control

43. Silver Spring Networks

Silver Spring Networks is a California company specializing in smart grid technology. They recently acquired Greenbox Technology, which has a web-based home energy display. The Silver Spring Network system diagram is shown in Figure 53.

Figure 53. Silver Spring Networks system overview



Source: <http://silverspringnetworks.com/>

Capabilities:

- Meter connection through Silver Springs AMI
- Utility connects to customer portal through Silver Springs AMI
- Customer data is stored remotely
- Utility can send a price event
- Utility can send a load control event
- Displays whole building usage information
- Displays current price

44. Tendril

Tendril is a Colorado based company specializing in residential energy displays and controls. Their system currently offers direct load control, but does not support price events. Their modular system makes use of a web-based interface, a Zigbee-enabled thermostat, and plug load monitors (Figure 54).

Figure 54. Tendril interface, thermostat and plug



Source: <http://www.tendrilinc.com>

Capabilities:

- Meter connection using Zigbee
- Utility connects to device?
- Customer data is stored locally?
- Customer data is stored remotely?
- Utility can send a price event to the device?
- Utility can send a load control event to the device?
- Displays whole building usage information
- Displays plug load (120V) consumption information?
- Displays large (240V) appliance consumption information?
- Displays real-time information
- Displays current price
- Provides end-use control

45. Tenrehte

Tenrehte is a New York based company that is developing a WiFi device to monitor and control a single plug. The device is a small router combined with a plug-load monitor and controller (Figure 55).

Figure 55. Tenrehte plug



Source: <http://www.tenrehte.com/>

Capabilities:

- Customer data is stored locally
- Displays plug load (120V) consumption information
- Displays real-time information
- Provides end-use control

46. Trilliant

Trilliant sells networks and AMI infrastructure for utilities. As part of their AMI system, they have residential information displays and controls. These displays and controls can only be used in residences that are served by meters connected to their AMI. The information display displays whole building usage, but not appliance usage. They also have controls and signals for DR events that can change thermostat settings according to customer programs.



Source: <http://www.trilliantinc.com/>

Capabilities:

- Meter connection to customer devices through Zigbee
- Utility connects to device through Trilliant AMI
- Customer data is stored remotely on utility servers
- Utility can send a price event to the device
- Utility can send a load control event to the device
- Displays whole building usage information
- Displays real-time information
- Displays current price
- Provides end-use control

47. UCSL Corporation

UCSL is a California based company that sells two products under the trademark EnergyCite: a wall-mounted energy display and a smart meter. The EMS-2020 display communicates wirelessly with the Ultrasmart meter, which communicates with the utility to provide real-time pricing information.

Figure 56. EnergyCite EMS-2020



Source: <http://www.uslcorp.com/>

Capabilities:

- Wireless meter connection
- Utility price messaging
- Customer data is stored locally
- Utility can send a price event to the device
- Displays whole building usage information
- Displays real-time information
- Displays current price

48. Wireless Monitors Australia

Wireless Monitors Australia makes the Cent-A-Meter display for site electricity usage and price (Figure 57).

Figure 57. Wireless Monitor Cent-A-Meter display



Source: <http://www.centameter.com.au/>

Capabilities:

- Meter connection using a clip-on device
- Customer data is stored locally
- Displays whole building usage information
- Displays real-time information
- Displays current price