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**Battelle Number(s):**

16166

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Available Technologies

# Grid Friendly™ Water Heater Controller

## SUMMARY

The Grid Friendly™ Water Heater Controller is a device that provides smart grid services from existing, installed electric water heaters. The device uses the water heater's thermal energy storage to provide fast, autonomous regulation (both up and down) and short-duration spinning reserves for the power grid. Additionally, as part of a communicating energy management system the Water Heater Controller can shift the power demand for heating hot water to non-peak power demand periods. These services promote grid stability and potentially reduce costs to consumers without sacrificing the service provided by the water heater.

This smart device hosts the Grid Friendly™ Appliance chip (also developed at Pacific Northwest National Laboratory) and provides the load-management capabilities of that chip to household water heaters. Among the device's benefits is that it eliminates the need for a separate, external control box; in fact, this technology is simply retrofittable on current models of water heaters within about 5 minutes time using only a screwdriver. The autonomous benefits begin accruing immediately without significantly impacting the availability of hot water. If the device is connected to a home energy management system or other communicating system, the device can also participate in available demand-response programs.

## ADVANTAGES

Autonomous benefits: \* Frequency regulation (both up and down)

\* Spinning reserves (both up and down)

\* Augmented conservation voltage regulation (ACVR, a PNNL innovation)

\* Cold-load pickup after outages

Potential benefits as part of a communicating system:

\* Participate in available time-varying rates

\* Participate in demand-response programs

\* Respond to communicated regulation signals



\* Avoid peak demand charges

## STATE OF DEVELOPMENT & AVAILABILITY

Post prototype. The Grid Friendly controller has been field tested on 50+ water heaters over a year-long period. The Water Heater Controller has been operated for prolonged periods in a laboratory setting. **Related Links**

### » Grid Friendly Appliance Controller

For more information about the chip hosted within the Water Heater Hijacker

<http://availabletechnologies.pnl.gov/technology.asp?id=61>

### » Home Energy Management System

Learn more about this technology, also developed at PNNL, and how it can incorporate the Water Heater Hijacker

<http://>

### Technology Portfolio(s)

- » Electric Utility Operations
- » Smart Grid Devices

### Potential Industry Applications

- » Consumer Products
- » Energy & Utilities
- » Manufacturing & Warehousing

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