



# Preparing Consumers

THE FUTURE ENERGY-MANAGED HOME

**BY GALE R. HORST**

**IN THE SUMMER** of 2006, Whirlpool completed a three-year residential energy pilot program evaluating future energy-managed appliance technology. The program studied how the design of residential products can help consumers embrace time-based electricity-pricing structures. Input from the utility industry along with Whirlpool consumer focus groups revealed that consumers might view time-based pricing negatively if it forces a change in lifestyle.

Each pilot home was equipped with three appliances that, once loaded with laundry or dishes, can start automatically when the electric rate drops to the off-peak rate. In addition, each home was outfitted with a color touch-screen monitor that displays and logs real-time and historical data on each circuit in the home. This technology along with the pilot appliances showed a positive benefit for the pilot consumers. The detailed data was analyzed for impact on appliance design and utility issues.

Whirlpool continuously refines the processes performed by residential appliances to provide consumers with the cleanest clothes, spotless dishes, and maximum convenience at reasonable cost. "Reasonable cost" applies both to the cost of the product and the cost of ownership. An energy-managed appliance can take electric supply-and-demand issues into consideration as well as reduce the cost of ownership. The consumer is in control of an appliance that processes other consumer products. They have to put the food, dishes, and clothing into the appliance. The consumer also has expectations ("requirements") regarding when these process-oriented appliances operate.

New appliance technologies not only inform the consumer, but also help them manage this cost-impacting event. If the consumer is preparing to start the dishwasher, the red light indicates the critical peak-price event. The consumer finishes loading the washer but presses the "auto-delay" instead of the "start" button. When the signal passes through the meter indicating the end of the critical peak event, the washer starts automatically. If, for some reason, the consumer must have the dishes clean right away, the critical peak event can be overridden at the appliance console. Having to go somewhere else in the home to override is considered unacceptable.

Whirlpool found that consumers would rather not think about energy consumption every day. The study indicated that when armed with more understanding and some visibility as to where their energy dollars are going, consumers will utilize appropriate features to manage energy consumption with minimal lifestyle impact. If residential consumers don't have tools to manage this situation effortlessly, they may view it as an unfair cost increase.

## IMPLICATIONS

The many segments of the utility industry have differing needs based on regional issues including managing cost and supply. With the influx of Advanced Metering Infrastructure (AMI), the utility industry gains a reliable technical communications gateway into the home. AMI should not stop the signal at the power meter. Rather, the dispatched time-based pricing signal should also pass data on to devices in the home that are designed to respond.

If AMI supports time-based pricing to provide a hedge against unfavorable wholesale market fluctuation, the consumer also needs a method to manage demand and cost. Here lies what could be an arguable point. This technology may successfully change residential demand or bring residential revenue more in line with cost. Which effect results is left up to the consumers.

Some of our contacts in the utility industry seem uncomfortable with not having ultimate control over dispatched demand response. However, our research indicates that direct control of process-oriented appliances is not reasonable based on both safety and consumer acceptance. We need to view these as significant benefits in addition to more finite controls of the simpler persistent devices such as the water heater. The aggregate effect will impact the



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Future appliances may utilize information on grid conditions.

grid by including additional residential appliances that may consume as much as 6,000 watts, as in the case of the dryer for example.

AMI systems must be able to pass information along into the home. This could be done any of a number of ways. The key is being able to leverage this AMI infrastructure for further advantage and consumer benefit. The electronic controls of residential appliances must be modified to accept a critical peak price or demand response-type signal. A common, simplified specification is envisioned that is easily adapted to any AMI system. If standardized, then the method of getting the signal from the utility's meter to the appliance becomes immaterial.

All parties involved become equipped to map the cost justification and the appliance becomes an additional tool to help both the consumer and the utility manage energy demand and energy cost.

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