



ENERGY STAR® Pool Pumps

Draft 1 Connected Criteria

Stakeholder Webinar

February 10, 2014

Call-in Information



- Audio provided via conference call in:

| | |
|----------|---|
| Call in: | +1-877-423-6338 (in the US, Canada) |
| | +1-571-281-2578 (outside the US, Canada) |
| Code: | 356609 |

- Phone lines will remain open during the presentation to allow for open discussion
- Please keep phone lines on mute (*6) unless speaking

Introductions



- **Christopher Kent**
U.S. Environmental Protection Agency
- **Amanda Stevens**
U.S. Environmental Protection Agency
- **Douglas Frazee**
ICF International
- **Erica Porras**
ICF International

Agenda



- I. Background**
- II. Connected Functionality**
- III. Why Pool Pumps**
- IV. Draft 1 Connected Criteria**
- V. Test Method**
- VI. Timeline and Process**

Agenda



- I. Background**
- II. Connected Functionality**
- III. Why Pool Pumps**
- IV. Draft 1 Connected Criteria**
- V. Test Method**
- VI. Timeline and Process**

Background



- Peak load problems and major reliability issues became apparent in the early 2000's due to record summer air-conditioning loads
- Early adopter utilities called upon demand response and time-based rate programs
- Increased distributed renewable energy generation also began to challenge system reliability
- With the combined need to replace/expand aging infrastructure, the opportunity/need to create a responsive two-way communicating smart grid became apparent

Regulatory Trends



- National and international Smart Grid efforts underway
 - US, China, Australia
- Support and funding for Smart Grid research, projects and demonstrations
 - Energy Independence and Security Act (EISA) of 2007
 - American Recovery and Reinvestment Act of 2009
- Smart grid utility pilots underway, 3 focused on pool pumps (e.g. [SDG&E](#), [SCE](#))
- Regulatory barriers being removed on a national and state level to be more favorable to demand response and time-based rate programs

Market Trends & Opportunities



- 'Internet of Things' / Connected Home'
- New markets, opportunities and business models emerging
 - Energy management products/services are being brought to market through utilities, as well as major retailers, cable companies, product manufacturers, home security and automation providers, and start-ups
- With connectivity and greater intelligence, comes new opportunities for energy-savings, convenience/ control and smart grid interconnection.
- Products with DR capabilities can support a more reliable, lower emissions electric grid, i.e., helping accommodate more intermittent renewable energy sources, provide more options for real time load balancing, and help defer the need for additional peak plants

Agenda



- I. Background
- II. Connected Functionality**
- III. Why Pool Pumps?
- IV. Draft 1 Connected Criteria
- V. Test Method
- VI. Timeline and Process

Connected Functionality



- EPA continues to seek opportunities to advance products with intelligent features that deliver immediate consumer benefit and support a low-carbon electricity grid over the long term.

Grid Benefits

Energy Savings

**Control &
Convenience**

Connected Functionality



- EPA continues to seek opportunities to advance products with intelligent features that deliver immediate consumer benefit and support a low-carbon electricity grid over the long term.

Grid Benefits

Energy Savings

**Control &
Convenience**

Open Standards, Interoperability

Approach



Grid Benefits

Energy Savings

**Control &
Convenience**

Approach



Grid Benefits

- Sizing up the load reduction opportunity
- Define Demand Response (DR) capabilities:

Manufacturers what is possible?

Utilities: what would be valuable?

Consumers: what's acceptable?

Energy Savings

Control & Convenience

Approach



Grid Benefits

- Sizing up the load reduction opportunity
- Define Demand Response (DR) capabilities:

Manufacturers: what is possible?

Utilities: what would be valuable?

Consumers: what's acceptable?

Energy Savings

Control & Convenience

- Define a core set of consumer-oriented functionality that will enable new energy savings and convenience opportunities

Energy Use Feedback

Remote Control

Alerts / Diagnostics

- Facilitates introduction and interest in smart grid interconnection

Agenda



- I. Background
- II. Connected Functionality
- III. Why Pool Pumps**
- IV. Draft 1 Connected Criteria
- V. Test Method
- VI. Timeline and Process

ENERGY STAR Pool Pumps



- Launched in November 2011
 - Finalized test method January 2013
 - Finalized the efficiency criteria February 2013
- Currently 109 certified models from 6 manufacturers
 - **Energy Factor** ≥ 3.8
 - 30–72% more energy-efficient than a standard model
- Covers Residential in ground pool pumps
 - $0.5 < \text{Total HP} \leq 4$

Connected Functionality for ENERGY STAR Pool Pumps



- First discussed at the November 2012 Stakeholder meeting
- Identify ENERGY STAR products with connected functionality on the qualified product listing
 - provide consumers, rebate programs and others a consistent and easy way to identify
 - encourage more wide spread market adoption of connected pool pump functionality
- Optional, additional recognition for ENERGY STAR certified pool pumps

Why pool pumps?



Pool pumps are an ideal device to target for connected functionality and load management

- For homes with pools, they are usually the largest load
- Changes in operation are largely undetected by the consumer
- High interest for utility control
- Variable speed (VS) pumps could enable fine tuning of loads
- VS pumps are quiet and could allow for off-peak evening operation
- Manufacturers have already developed automation and remote control technologies (would need to extend development to DR controls)

Benefits



Many interest groups stand to benefit from establishing a new market for connected pool pumps including:

- **Manufacturers** – new marketable features, product differentiation, potential for additional utility rebates
- **Utilities** – new large dispatchable demand response resource for peak load shaving, and grid balancing benefits and deferred capacity investment.
- **Pool Professionals** – new business installing and maintaining connection to smart grid
- **Pool Owners** – convenience features, possible additional energy cost savings (particularly in a time-based rate structure)

Agenda



- I. Background
- II. Connected Functionality
- III. Why Pool Pumps?
- IV. Draft 1 Connected Criteria**
- V. Test Method
- VI. Timeline and Process

Linking Connected Criteria to Opportunities



| Criteria | Grid Benefits | Energy Savings | Control & Convenience |
|----------------------------------|---------------|----------------|-----------------------|
| Communications | ✓ | ✓ | ✓ |
| Energy consumption reporting | ✓ | ✓ | ✓ |
| Remote management | | ✓ | ✓ |
| Alerts, Operational status, etc. | ✓ | ✓ | ✓ |
| Peak Period Avoidance | ✓ | | |
| Demand Response | ✓ | | |

Draft 1 Connected Criteria



| Section of Criteria | Requirement | Rationale |
|--|---|---|
| Communications | Use open standards, Release technical documentation (APIs) for some functionality | Encouraging interoperability between devices and applications |
| Energy consumption reporting | Product reports interval energy consumption data via a communication link | Enables actionable energy use feedback to consumers and validation of DR responses to utilities |
| Remote management | On/off & speed/flow control | Offering new convenience through remote control |
| Operational status user settings, & messages | Actionable feedback and alerts | Providing messages/alerts that help keeps pump operating at max efficiency; provides remote access to status/schedule |

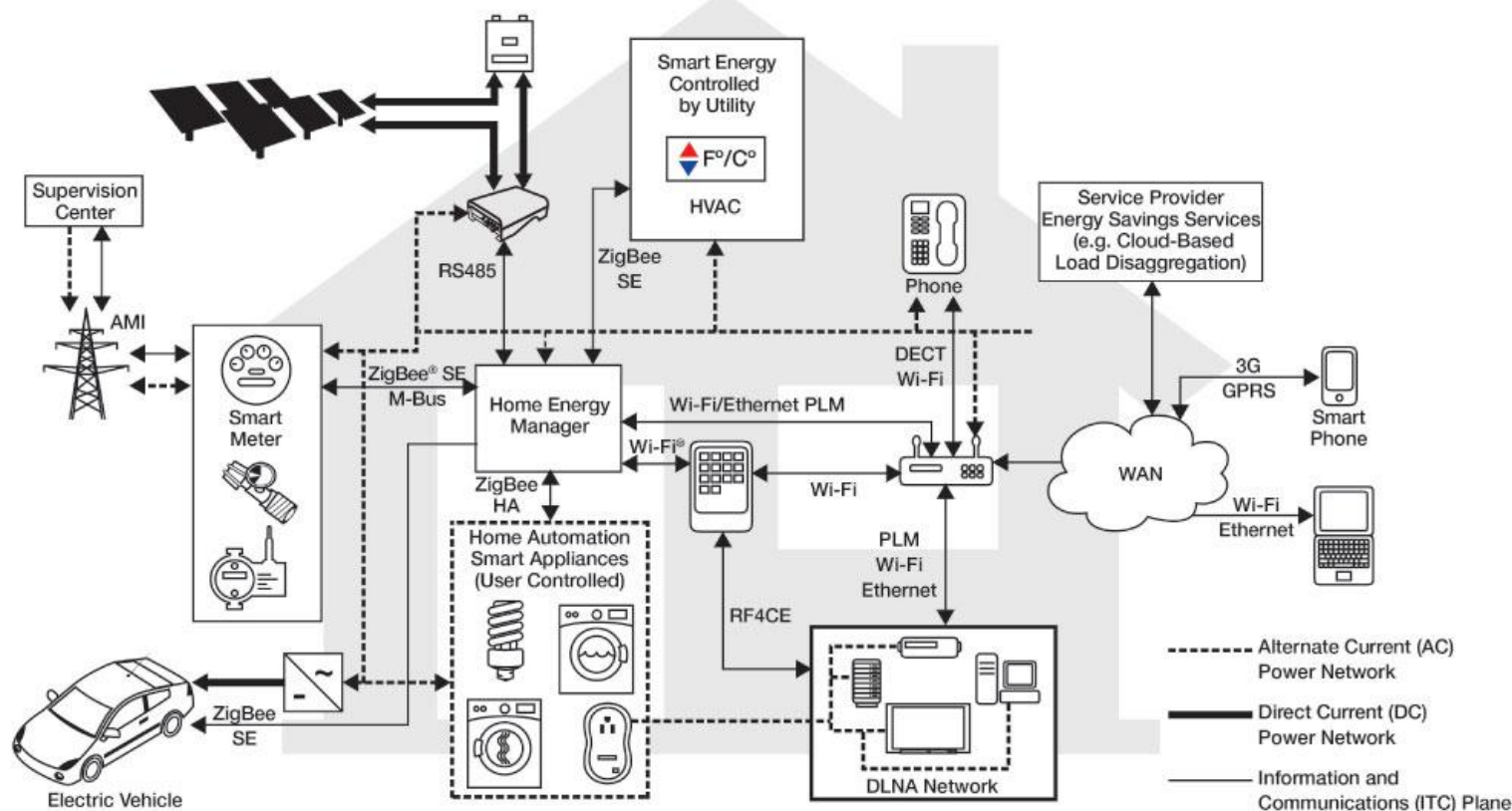
Draft 1 Connected Criteria



| Section of Criteria | Requirement | Rationale |
|-----------------------|--|--|
| Peak period avoidance | Default scheduling to avoid high-speed pumping during peak hours | Enabling grid benefits from reduced peak demand, possible monetary savings for consumers enrolled in variable pricing programs |
| Demand response | Response types 1, 2, 3 – reduce pumping (4 hrs) – suspend pumping (10 min) – increase pumping | Enabling grid benefits through demand response capabilities, possible consumer energy cost savings |

Why Open Standards?

Consumers benefit when there is greater interoperability with other devices and applications



Source: <http://eecatalog.com/smart-energy/2012/02/23/empowering-consumers-with-home-energy-management-systems/>

Key Questions



EPA is seeking stakeholder feedback to better understand the range of communication protocols being tested and explored by utilities, manufacturers, and third-parties.

Questions for stakeholders:

- What communication protocols are being piloted, deployed, or considered by utilities, third parties, or product manufacturers, and why?
- Do current or planned protocols support on-premises open-standards based communications?
- Do current or planned protocols support concurrent connection to both utility and non-utility applications, devices or systems?

Key Questions



EPA would like feedback on the demand response capabilities (Types 1, 2 and 3) and if the minimum requirements for duration, frequency, and allowable pumping should be adjusted.

Question for stakeholders:

- What changes, if any, do stakeholders recommend in order to provide increased grid benefits, or conversely to limit consumer impacts?
- For response Type 3, the AS/NZ standard supports similar functionality – are there any stakeholder concerns from including this response type?

Agenda



- I. Background
- II. Connected Functionality
- III. Why Pool Pumps?
- IV. Draft 1 Connected Criteria
- V. Test Method**
- VI. Timeline and Process

DR Test Method



- DOE responsible for developing and validating ENERGY STAR Test Methods (TM)
 - Including all “Connected Criteria” test methods
- DOE is considering the development of a Connected Pool Pumps TM
 - Intended to verify demand response (DR) capabilities

DR Test Method



- Connected TM overview
 - Test setup per ENERGY STAR Pool Pumps TM (Rev. Jan 2013)
 - Additional specifications for communications setup
 - Intent is to evaluate each model for all three DR response types
 - Type 1 – ensure unit meets requirements set in Table 2 of the Connected Criteria
 - Type 2 – ensure unit ceases operation for duration of period
 - Type 3 – ensure unit pumps required volume without increasing energy consumption

DR Test Method



- Proposed TM development would follow normal ENERGY STAR cycle
 - If needed, publish Preliminary Approach to get stakeholder feedback
 - Perform validation testing on connected pumps
 - Publish Draft TM(s) to get stakeholder feedback
 - Finalize TM

DR Test Method



- DOE performs investigative testing to validate all TMs to ensure
 - TM is understandable and repeatable
 - TM provides accurate and representative results
- DOE would like to perform testing of products or prototypes in order to valid the TM
- Testing Obstacles
 - Availability of Pool Pumps with DR capabilities
 - Availability of signal simulators necessary for testing

DR Test Method



- DOE requests stakeholder feedback regarding:
 - Product Availability
 - What is the current status of DR capabilities in Pool Pumps?
 - Are any products or prototypes available that could be tested?
 - Signal Generation
 - How are utility signals being generated?
 - Is proprietary equipment required for signal generation?
 - Testing
 - Is there any test data available that can be shared with DOE and EPA?
 - Would manufacturers be willing to allow DOE to witness testing at their facilities?
 - Do utilities have any information or data from pilot programs with connected pool pumps?

Agenda



- I. Background
- II. Connected Functionality
- III. Why Pool Pumps?
- IV. Draft 1 Connected Criteria
- V. Test Method
- VI. Timeline and Process**

Connected Criteria Development Timeline



| | |
|---|----------------------|
| Draft 1 Connected Criteria | January 2014 |
| Draft 1 Comments due to EPA | February 2014 |
| Draft 2 Connected Criteria | April 2014 |
| Web-based discussion and stakeholder presentations | May 2014 * |
| Draft 2 Comments due to EPA | May 2014 * |
| Final Draft Connected Criteria | June 2014 * |
| Final Draft Comments due to EPA | July 2014 * |
| Final Connected Criteria | August 2014 * |

* Subject to change depending on input and resources

Contact Information



Please send any additional comments to
poolpumps@energystar.gov or contact:

| | |
|--|--|
| Christopher Kent EPA ENERGY STAR Program Kent.Christopher@epa.gov | Erica Porras ICF International Erica.Porras@icfi.com |
| Amanda Stevens EPA ENERGY STAR Program Stevens.Amanda@epa.gov | Douglas Frazee ICF International Frazee.Douglas@icfi.com |
| Bryan Berringer DOE ENERGY STAR Program Bryan.Berringer@ee.doe.gov | Kurt Klinke Navigant Consulting, Inc. Kurt.Klinke@navigant.com |

www.energystar.gov/productdevelopment