

# Technology Innovation Project



*Project Brief*

## TIP 295: EPRI End Use Loads – Phase 1 Non-Intrusive Load Monitoring (NILM) Device Lab Testing

### Context

The electricity industry faces growing demand for power and the imperative to maintain reliable, affordable service while reducing carbon emissions. Utilities and policy makers in the United States and abroad are turning to energy efficiency and demand response resources meet these needs. BPA works collaboratively with others to “fill the pipeline” of energy efficiency opportunities for utilities to offer their customers.

The Electric Power Research Institute (EPRI) is an independent, non-profit company performing research in coordination with its members, which represent approximately 90% of the electricity generated and delivered in the U.S. In September 2012, BPA and EPRI co-sponsored the National Energy Efficiency Roadmapping Summit to create a shared research agenda, identifying technologies and research efforts that would accelerate the energy efficiency resource nationwide.

EPRI has created a research framework to evaluate the readiness of emerging end-use technologies for utility programs, along a continuum spanning technology scouting, assessment and lab testing, research and development (R&D) field testing and demonstration, coordinated early deployment, and full program rollout.

Participation in EPRI projects includes “membership” in their base program for a particular topic, plus additional opportunities to join “supplemental projects” defined to meet the needs of a subset of utilities and other partners, and funded separately.

One supplemental project related to “End Use Loads” – or understanding the size and timing of various loads - is covered by TIP 295 and 296. Phase 1 involves testing of metering devices, and phase 2 involves planning national studies and compiling a library of information related to end use load shapes.

### Description

This TIP 295 project supports phase 1 of the end use loads project, which includes lab testing of devices, called “non-intrusive load monitoring devices” (NILMs). The purpose of this project is to assess the accuracy of NILMs devices. Devices will be tested in the laboratory to 1) assess if major (or all) residential electric end-use loads can be

disaggregated effectively and reported, and 2) measure how accurate the resulting disaggregated load values are compared to the directly-measured value. The report will be available only to funders in Q1 of 2013.

### Why It Matters

NILM devices have the potential to reduce the cost of conducting energy efficiency technology research in the field, reducing the cost of conducting end use load studies, and they also have the potential to serve as valuable sources of information for customers who may be able to reduce their energy use due to their choices and behaviors.

NILM devices include equipment that can be installed in a facility in one spot (e.g. CT at the panel, sensor on the main meter, or two plugs at any two points in the home), and through either sensing electrical signals or through software analysis they are capable of estimating the components of a load in a facility. For example, while a smart meter may be able to report total kWh used by a home in a 15 minute period, these NILM devices would be able to report what share of the load was from water heating as opposed to air conditioning.

This project is related to BPA’s commitment to acquire cost effective energy efficiency. BPA has determined that in order to meet its energy efficiency goals cost effectively over the long term, it is necessary to conduct ongoing R&D and emerging technology research. This includes development and adoption of energy-efficient and demand response technologies to accelerate their adoption into utility programs, influencing the progress of codes and standards, and ultimately creating market transformation – achieving the savings at little or no cost to the utility.

### Goals and Objectives

Objectives for this project include:

- Identification of commercially available products
- Assessment of which products are appropriate for which applications (eg research vs behavior change programs)

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**Project Start Date:** October 1, 2012

**Project End Date:** December 31, 2013

## Reports & References (Optional)

## Links (Optional)

## Participating Organizations

EPRI  
Southern  
NEEA  
KCPL

## Funding

Total Project Cost: \$160,000

BPA Share: \$20,000

External Share: \$140,000

BPA FY2013 Budget: \$20,000

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