

ACEEE Delegation

Extended Motor Product Label Initiative

Label Criteria Section Workshop
Portland, OR
December 4-5, 2013

Labeling of Extended Motor Products for Energy Efficiency Programs

Labeling of Extended Motor Products for Energy Efficiency Programs

Introduction

3

- Ref : Research Prospectus - August 2013

In support of DOE standards for electric **motors, pumps, fans and compressors,**

- ACEEE and Product Manufacturers recognize opportunities for **motor system energy savings** much greater than savings from individual components.
- Suggested that industry may **develop voluntary labels for the efficiency of driven component** as well as an **extended product** label that includes (e.g., fan, pump or compressor), the motor and associated controls to reflect the relative efficiency of the equipment as it is installed into a motor system application.

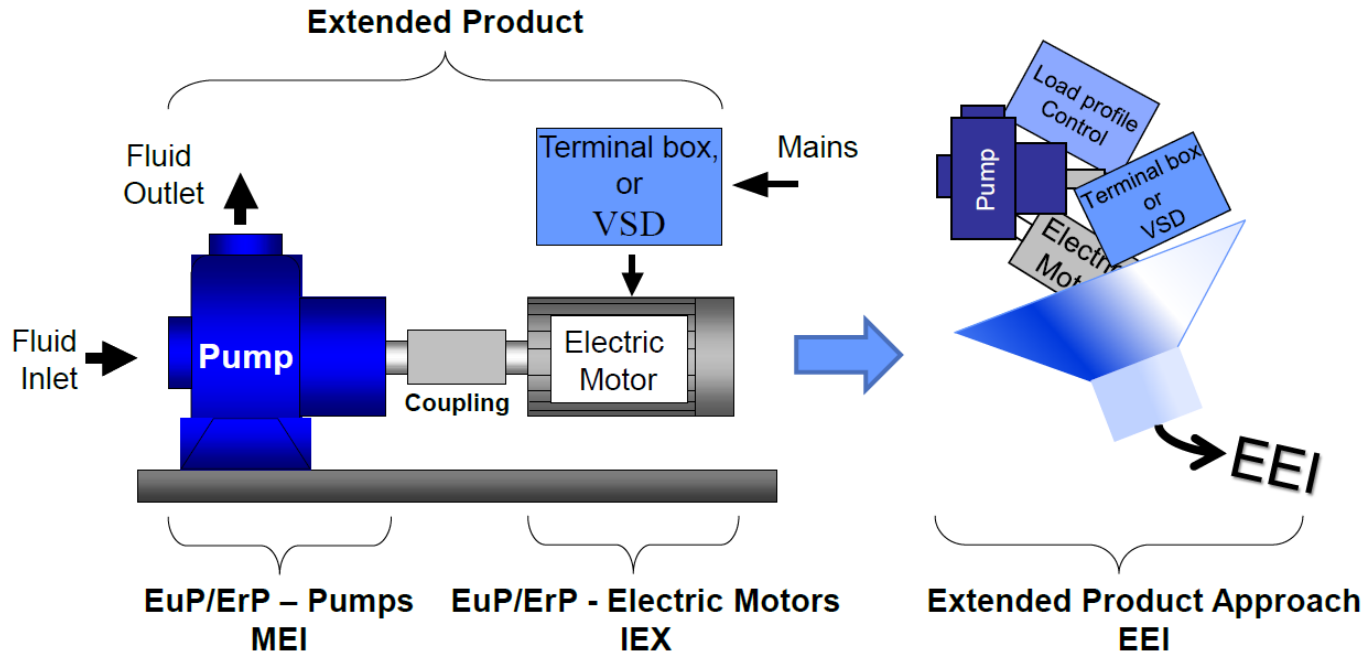


Figure 4 Definition of Extended Product Approach

EP for Pumps Includes: Pump + Motor + Drive + Feedback Loop

Extended Products - Motor- Load- Control

Ref RB12 : R.Boteler- Jan 2014

6

- HI (Hydraulic Institute)
- NEMA
- AMCA (Air Moving and Control Association)
- CAGA (Compressed Air and Gas Institute)



Compressor



Pump



Fan

Trade associations

- **NEMA**
- **HI (Hydraulic Institute)**
- **AMCA (Air Moving and Control Association)**
- **CAGA (Compressed Air and Gas Institute)**

- **ACEEE**
- **Energy Trust of Oregon**
- **Test Labs**
- **NEEA**
- **TVA**
- **VEIC**
- **SDG&E**
- **NYSERDA**

Utilities and program management

- **PG & E**
- **Com Ed**
- **North East Utilities**
- **Advanced Energy**
- **National Grid**
- **Northwest Power Council**
- **Bonneville Power Administration**
- **Southern California Edison**

Labeling of Extended Motor Products for Energy Efficiency Programs

Purpose

8

- Ref : Research Prospectus - August 2013

- The energy efficiency community has long been aware of the **large opportunity that exists from optimizing motor systems.**
- Programs to realize these savings have been **largely restricted to larger systems** which justify investment in analysis and monitoring as required for a custom rebate program.
- Prescriptive **rebates have been restricted to efficient products, such as NEMA Premium motors**, which have modest savings opportunity relative to the system opportunity. **Energy efficiency programs need a way to give incentives for improved motor system efficiency through prescription.**

Labeling of Extended Motor Products for Energy Efficiency Programs

Purpose

9

- Ref : Research Prospectus - August 2013

- Development of a driven component or **extended product label** combined with **implementation data** can be the **basis for prescriptive rebate programs with deemed savings values.**
- Accomplishing this goal **requires motor, pump, fan and compressor equipment industries to work with energy efficiency programs** on several elements as described.

Labeling of Extended Motor Products for Energy Efficiency Programs

Scope of Work

10

- Ref : Research Prospectus - August 2013

- This project will facilitate a process for interested trade associations, including **NEMA (motors and drives)**, **HI (pumps)**, **AMCA (fans)**, and **CAGI (compressors)** and interested energy efficiency programs to work together to address the following elements. The trade associations have committed to working collaboratively with energy efficiency programs to accomplish these goals.

Labeling of Extended Motor Products for Energy Efficiency Programs

Goals

11

- Ref : Research Prospectus - August 2013

- **Identify of label and supporting data needed to meet evaluation criteria** for programs requiring to qualify products for deemed savings;
- **Develop the testing and labeling specifications** that meet these criteria;
- **Collect field performance data required to estimate the savings** realized on average from the installation of label products in different actual configurations. This may result in the need to restrict the applications of labeled products for which saving can be deemed;

Labeling of Extended Motor Products for Energy Efficiency Programs

Goals

12

- Ref : Research Prospectus - August 2013

- Work with the technical associations to **establish these labels and encourage adoption** by their companies;
- **Develop model energy efficiency programs** that can use these labels to **incentivize motor system efficiency**, with supporting educational materials.
- **Where component labels do not exist** in the market, such as for pumps, **work with the trade association (e.g. Hydraulic Institute) to help establish programs** supportive of prescriptive rebate/incentives appropriately linked to extended-product labels used by energy efficiency programs to incentivize motor systems efficiency.

- Ref : Research Prospectus - August 2013

The project will produce the following outcomes:

1. **Roadmap to implementation** and acceptance of an extended-product label for two or more motor system products;
2. **Working group of stakeholders** from manufacturers and energy efficiency programs to advance this process, and work with trade associations on the creation and market adoption of component labels;
3. **Discussion with DOE** on how this process could complement the ongoing product regulatory standards process;
4. **Report** and other documentation materials that can be used to form the basis of adoption by energy efficiency programs.

Labeling of Extended Motor Products for Energy Efficiency Programs

● Status

15

- **Hydraulic Institute Extended Product Committee** agreed to support the ACEEE initiative subject to Board Approval.
- **Hydraulic Institute Board Members** approved to join the ACEEE Extended Product Labeling Coalition December 2013.
- Extended Motor Product Label Initiative Label Criteria Selection **Workshop held in Portland, Oregon December 4th and 5th, 2013**
- **Attended by HI Member Delegation.**
 - Henri Azibert, Mick Cropper, Brent Ross, Greg Towsley,

Labeling of Extended Motor Products for Energy Efficiency Programs

● Report from Workshop

16

- **The utilities provided an overview of their incentive programs :** funding, technical requirements, metric requirements, program implementation
- The workshop provided **trade associations** with an opportunity to make **presentations in which they described their products, test methods, efficiency metrics** and share general ideas of how they might integrate into a utility incentive program.
- Association members and staff members gave the utility attendees insight into the **current test methods and metrics [MEI,EEI and FEG] in place today**, used by OEM's and users of driven loads to determine savings to make comparisons between ratings and suppliers.

● Report from Workshop

17

- The product portion of the workshop opened the discussion to **product scope**.
- Each of the trade associations will provide test standards and metrics to be used for their products and labels.
- **Harmonization of labels could be beneficial to the utilities**, particularly in reaching hundreds of utilities that are not directly involved with this project.
- Methods covering their **use will belong to the respective trade association**.

Labeling of Extended Motor Products for Energy Efficiency Programs

● Report from Workshop

18

- Actions – Workgroups assigned for Pumps, Fans, Compressors

Each product working group recommended one or two sub-categories to start in developing a working paper template that each product work group could use to satisfy needs of a qualified program.

Each workgroup completed the template and discussed required data.

Action 3: In progress - First pass at the template using the product[s] as selected in action one.

Action 4: In plan : Discuss first draft template at group conference call Feb 13th 2014

Labeling of Extended Motor Products for Energy Efficiency Programs

Pumps Team

Neal Elliott – ACEEE

Erin Hope - Bonneville Power Administration (BPA)

Amanda Gonzalez - Energy Solutions / PG&E

Greg Towsley - HI / Grundfos Pumps

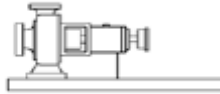



Henri Azibert - HI (FSA)/ Chesterton Seals

Mick Cropper - HI / Sulzer

Brent Ross - HI / Armstrong Pump

Facilitator

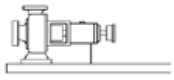

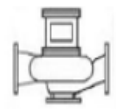

Rob Boteler - NEMA / NIDEC Motors / ACEEE

Product Type	Hp
OHO / OH1 	1-5
	7.5 - 20
	25 - 50
	60 - 100
	125 - 200
OH7 	1-5
	7.5 - 20
	25 - 50
	60 - 100
	125 - 200
OH3 / OH4 / OH5 	1-5
	7.5 - 20
	25 - 50
	60 - 100
	125 - 200
VS8 	1-5
	7.5 - 20
	25 - 50
	60 - 100
	125 - 200

- **Choose one area to start with and then expand**
 - **Building Services chosen as first choice**
 - **Agriculture Services second**
 - **Confirmed ok by pump committee utility members**
 - **Need confirmation of HI Membership**
- **Use of HI EEI, test standard and test accreditation is viable**
- **Need EEI levels for**
 - **Baseline, incentive , high incentive**
 - **Perhaps different by market**

- **Use method of calculation to determine population levels**
 - **Utility field data available.**
- **HI to provide input on channels to market**
- **Utility test labs may confirm EP performance.**
- **Confirm manufacturer label by EP (string) test**
 - **or individual component test and calculations.**

- Condenser
- Primary chilled water
- Secondary chilled water (chosen for first pass)
- Primary Heating water
- Secondary Heating water (chosen for first pass)
- Pressure booster
- Ashrae 2010 is base line

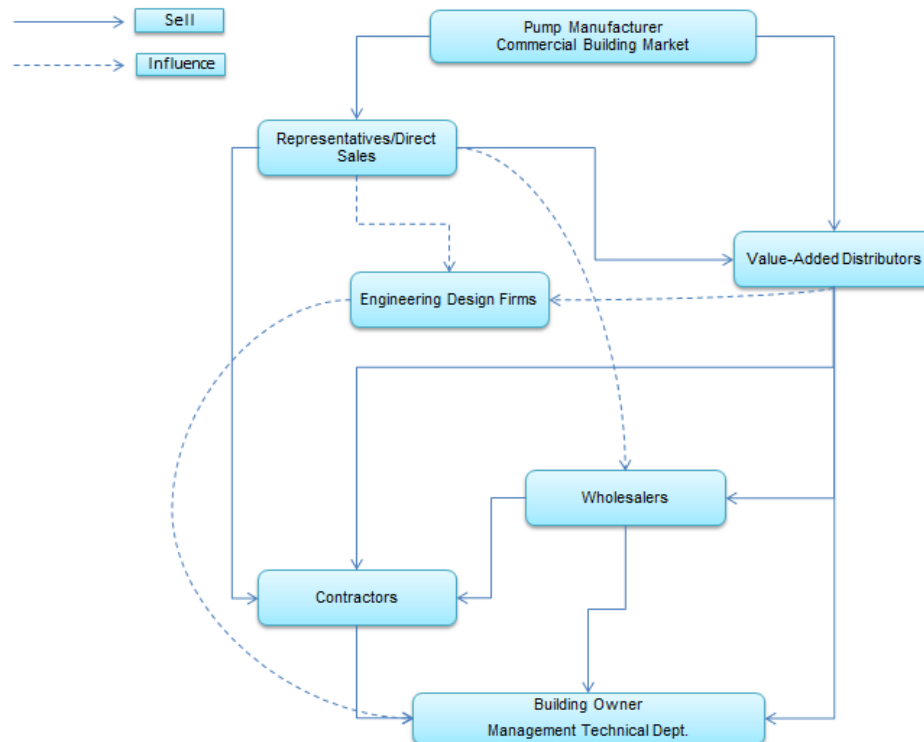
Product Type	Hp
OHO / OH1 	1-5
	7.5 - 20
	25 - 50
	60 - 100
	125 - 200
OH7 	1-5
	7.5 - 20
	25 - 50
	60 - 100
	125 - 200
OH3 / OH4 / OH5 	1-5
	7.5 - 20
	25 - 50
	60 - 100
	125 - 200
VS8 	1-5
	7.5 - 20
	25 - 50
	60 - 100
	125 - 200

- **Western regions**
- **Vertical turbine deep well**
- **Centrifugal shallow well**
- **Pressure boosters**

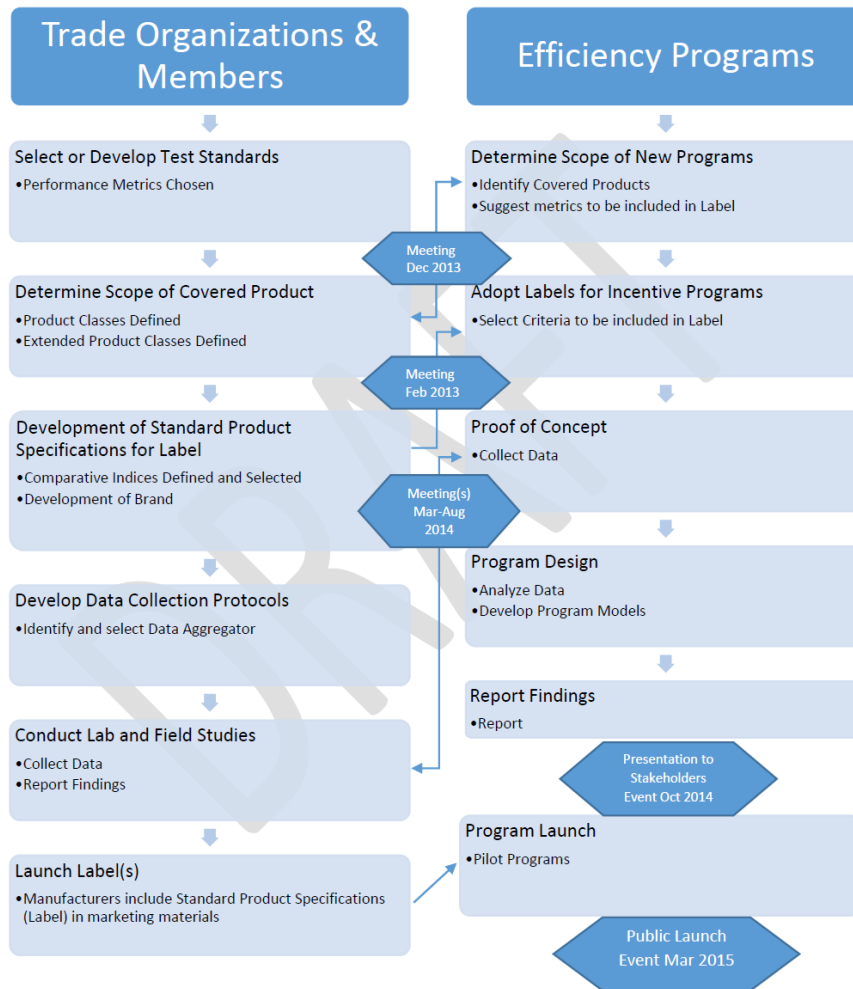
Channels

25

- **Utilities need to know the channel(s) to market to determine where to incent and how much**
 - **Building owner**
 - **Consultant writes spec**
 - **Schedule with application, flow / head**
 - **Contractor buys and installs**
 - **Above process defined in template**



Labeling of Extended Motor Products for Energy Efficiency Programs

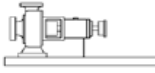

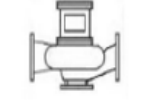



• Next Steps

Work Template

	Final Output from Work paper that Utility needs for Program Justification	Data Needs to get Output	Data Source (Where will the data come from?)	Research Plan (Who's tasked with doing it?)	Status
A	Measure Description: a) For residential pool pump market in CA, replace a two-speed pool pump and motor with a variable speed pool pump and motor (P50) or replace a two-speed pool motor with a variable speed pool motor (P50) for residential pool filtration.	<p>Initial focus is provide improved energy efficiency solutions with the extended product lifespan and motor with an advanced float, designed as "secondary pump" to filter/distribution systems and hot water heating system ("primary secondary systems") in commercial buildings. The scope of the products to include:</p> <ul style="list-style-type: none"> Flexibly coupled horizontal, frame mounted overhead (H1 OH1) Flexibly coupled horizontal, foot mounted overhead (H1 OH2) Close coupled single stage, and suction (H1 OH3) Flexibly coupled vertical, inline overhead (H1 OH4) Rigidly coupled vertical, in-line overhead (H1 OH5) Close coupled vertical, in-line overhead (H1 OH6) In-line casing offset (H1 OH7) <p>Range of products to include units with motors from 1/2 HP up to and including 200 HP.</p> <p>Additional applications within the commercial building market and agricultural irrigation will be considered later.</p>	H1 members with consensus from Inside Group - survey of H1 members	None/NA/Req T. (other team members if needed)	
B	Energy Impact Common Data: per table (i.e., one extended product)	To harmonize with existing activities of the Hydraulic Institute and ultimately IECI with regard to energy conservation standards for pumps. The Energy Efficiency Index (EEI) would be defined. The EEI is defined as a ratio of expected power requirements based on a "standard" operation versus projected power requirements based on a reference or actual pump operation. The EEI is a dimensionless value, and is not intended to be a specific efficiency value. EEI values would be linked with the EE Index.	H1 members, including application consideration. If needed for EE for included products is being developed	None/NA/Req T. (other team members if needed)	
C	Base Case Description: a) Two-Speed Pool Pump and Motor (as required by CEI Title 24)	Base case calculation utilizing standardized load profiles from multiple regions and climate zones, ASHRAE 90.1-2005, and California Title 24 regulations.	EEI target data information by region, with load profile information. H1 to provide impact of potential EEI improvements for example scenarios (three (3) building types)	Req T. (Other team members/Req - title 24)	
D	Market Size (total & annual shipments)	Shipments and Stock by Sector (e.g., Deep well irrigation pumps) by Service Area of Utility (if possible/available) units by shell type HP	EEI total market? State or regional data for base cases to be able to quantify change. Confirm how data reflects regional aspects.	None/NA/Req T. (other team members if needed)	
E	Product Segmentation What are ways we could list or consolidate base models within a given sector? (e.g., HP, flow, motor with 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 70, 75, 80, 90, 100, 125, 150, 175, 200, 225, 250, 275, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000, 2100, 2200, 2300, 2400, 2500, 2600, 2700, 2800, 2900, 3000, 3100, 3200, 3300, 3400, 3500, 3600, 3700, 3800, 3900, 4000, 4100, 4200, 4300, 4400, 4500, 4600, 4700, 4800, 4900, 5000, 5100, 5200, 5300, 5400, 5500, 5600, 5700, 5800, 5900, 6000, 6100, 6200, 6300, 6400, 6500, 6600, 6700, 6800, 6900, 7000, 7100, 7200, 7300, 7400, 7500, 7600, 7700, 7800, 7900, 8000, 8100, 8200, 8300, 8400, 8500, 8600, 8700, 8800, 8900, 9000, 9100, 9200, 9300, 9400, 9500, 9600, 9700, 9800, 9900, 10000)	Potential lines based on pump types (H1 A above) and motor horsepower	H1 members	None/NA/Req T. (other team members if needed)	See additional tab. In Progress. Not review by H1 members
F	Market Channels - NEW Construction Describe how a customer acquires the product to inform concept for incentive delivery - direct, distributor, contractor or other	Information from H1 members	H1 members	None/NA/Req T. (other team members if needed)	See additional tab. In Progress. Not review by H1 members
G	Market Channels - RE-TOOTH (ready retirement, replace vs repair) Describe how a customer acquires the product to inform concept for incentive delivery - channel influences distributor, contractor, EPCO?	Information from H1 members	H1 members	None/NA/Req T. (other team members if needed)	See additional tab. In Progress. Not review by H1 members
H	Factors Influencing Energy Consumption of Product? Describe individual factors associated with energy consumption and/or selecting a duty/cycle/temperature of use (i.e., school)	<p>Initial prevailing base line</p> <ul style="list-style-type: none"> Power consumption Power cycle, average Duty Cycle (load factor) Site load factor. (Should we use an average load assumption about it given other another factor to include or product specification) 	Department of Agriculture or Department of Ecology?		
I	Duty Cycle (load factors)				
J	Base Case Energy Consumption (by product and product segmentation)	WHP/yr + convert EEI + other inputs into kWh/yr	Based formula to convert from EEI to kWh. duty cycle 1 kW 77		
K	Base Case Demand (by product and product segmentation)	W	How can bank calculate kWh per year from an MHD or EEI metric		
L	Measure Energy Consumption (by product and product segmentation)	WHP/yr + convert EEI + other inputs into kWh/yr	Based formula to convert from EEI to kWh. duty cycle 77		
M	Measure Case Demand (by product and product segmentation)	W	We can bank calculate from kWh per year		
N	Costs Common Items:	Per Pump/Per basic model			
O	Base Case Equipment Cost \$/kW:	\$1200 (equipment) + \$557.32 (labor) = \$1557.32			
P	Measure Equipment Cost \$/kW:	\$1800 (equipment) + \$557.32 (labor) = \$2357.32			
Q	Efficiency Useful Life (years)	10			
R	Program Type:	Retire (EEI), New Construction (NWC), and Replace or Renew (RR)	Should we go other routes? New Construction? Early retirement? What are the barriers?		
S	Information required to verify or calculate energy savings	Specific information required to determine energy savings.	What information specific to the measure is required for the verification or savings determination? (This includes typical unit rating/energy information. This is the information such as HP, duty cycle, CMX, GPM, etc. needed to determine energy savings. It should be as simple as documenting HP if the savings lines are segregated by HP)		
T	Estimated cost or time to complete documentation (documentation forms or calculated savings)	labor required to complete information collection and documentation completion	Estimate of time and skill set to collect and report data required.		
U	Important Comments:				

- Next Steps
- Confirm Product Types
- Data gathering
- Pump data
- Site data
- Market data

Product Type	Hp
 OH0 / OH1	1-5
	7.5 - 20
	25 - 50
	60 - 100
	125 - 200
 OH7	1-5
	7.5 - 20
	25 - 50
	60 - 100
	125 - 200
 OH3 / OH4 / OH5	1-5
	7.5 - 20
	25 - 50
	60 - 100
	125 - 200
 VS8	1-5
	7.5 - 20
	25 - 50
	60 - 100
	125 - 200

Adjournment

28

Q & A

