

DOCKETED

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California Energy Commission

Draft Replacement Pool Pump Motor Standards

August 3, 2017

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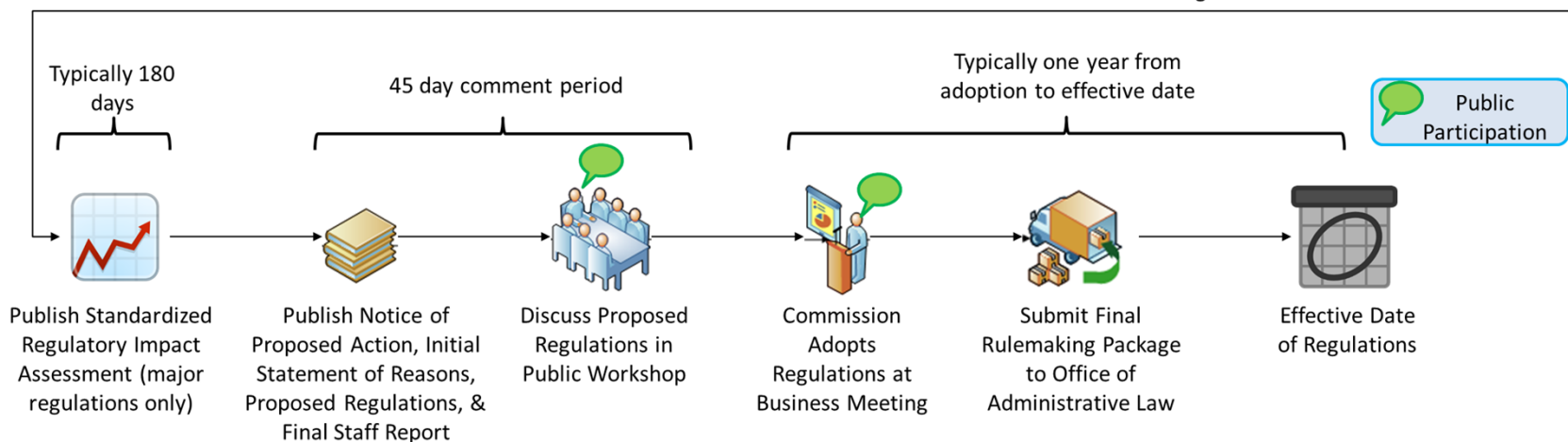
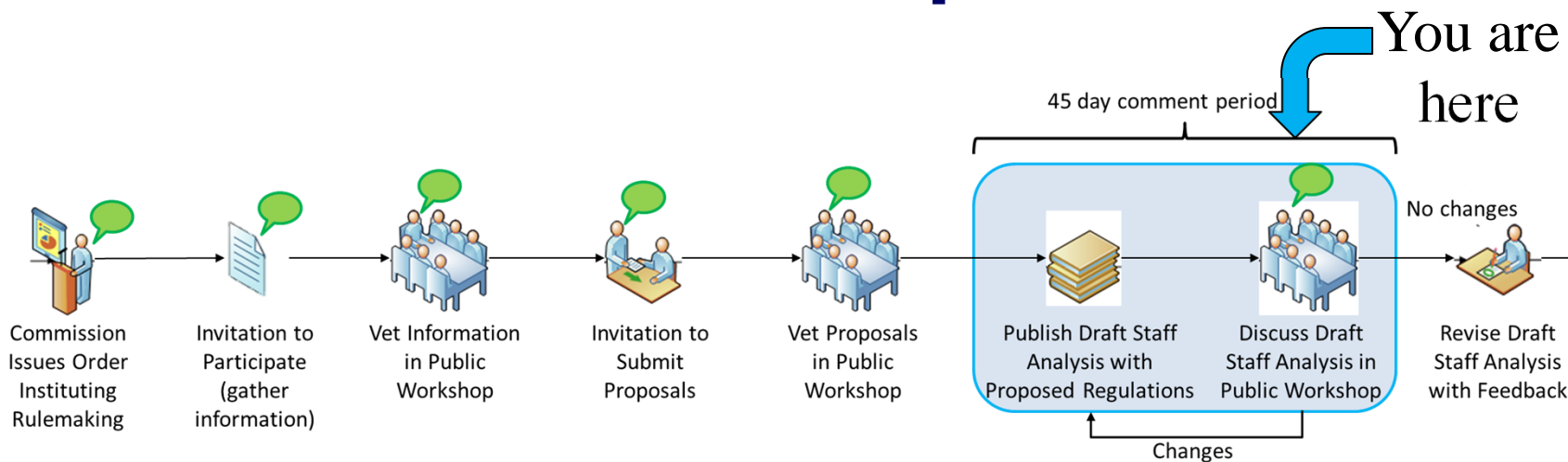
Presentation Agenda

- Public Participation
- Background
- Staff Proposal
- Technical Feasibility
- Savings Methodology
- Cost Effectiveness
- Statewide Energy Savings
- Discussion Items
- Comments



California Energy Commission

Public Participation





Since Last Workshop – July 2016

- U.S. DOE established standards for pool pumps
- Staff proposal focuses upon replacement motors for pool pumps



Replacement Pool
Pump Motor



Staff Proposal

- Set replacement motor efficiency standard similar to Dedicated Purpose Pool Pump (DPPP) Weighted Energy Factor (WEF)
- Set replacement motor test method similar to DPPP test method
- Proposal's goal is that a replacement motor will perform like the original motor



Staff Proposal

- The draft staff report contains proposal details
http://docketpublic.energy.ca.gov/PublicDocuments/15-AAER-02/TN220120_20170712T095947_Second_Revised_Analysis_of_Efficiency_Standards_for_Pool_Pumps.pdf
- Staff seeks public comments on the proposal



Scope

- Scope: All replacement pool pump motors
 - 5 total hp (thp) or less
 - Residential and commercial applications
 - Filter pumps, pressure cleaner booster pumps, waterfall pumps
- Including replacement pool pump motors for:
 - in-ground pools
 - above ground and storable pools





Proposed Equipment Classes

- Staff aligned motor classes with pool pump classes.
 - Definitions use “designed and marketed” to identify pool pump motors



Self Priming Filter Pump



Non-Self Priming Filter Pump



Waterfall Pump



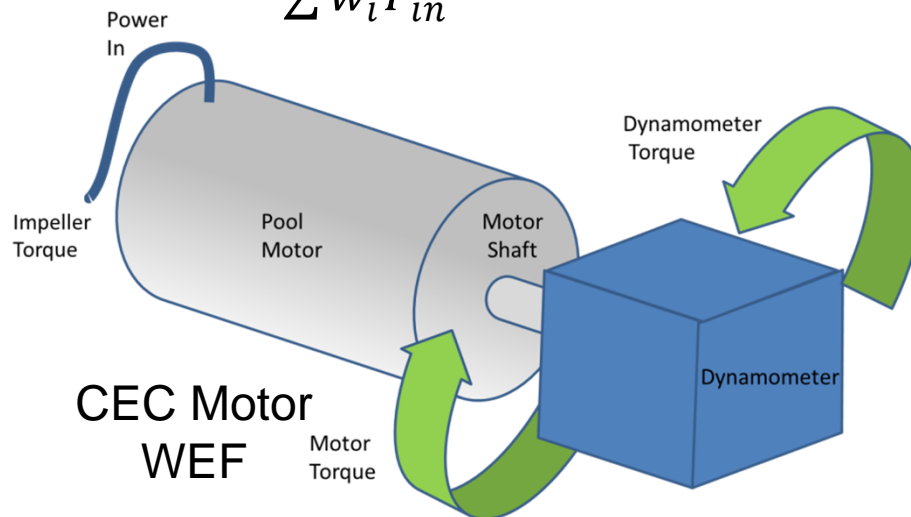
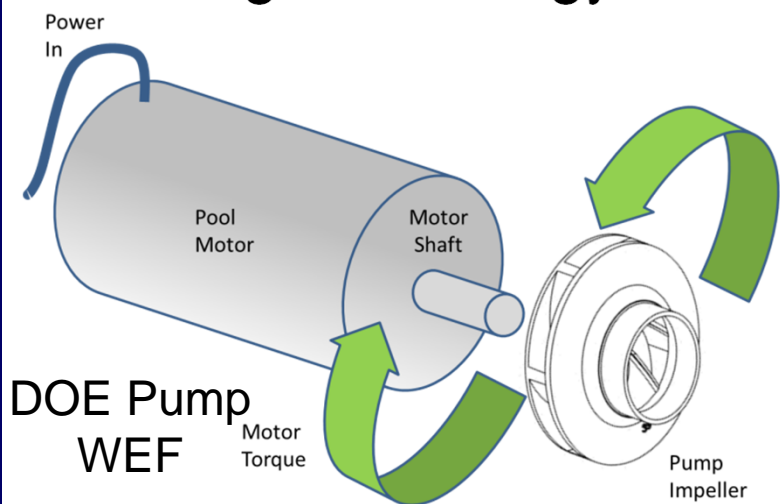
Pressure Cleaner Booster Pump



Proposed Performance Metric

- Weighted energy factor

$$WEF = \frac{\sum w_i P_{out}}{\sum w_i P_{in}}$$



Comparison of Performance Metrics

Energy Factor	Measured Output	Measured Input
US DOE Pool Pump WEF	Flow (Q) on Curve C	Electrical Power
Commission Repl. Motor MWEF	Motor Hp (T*N)	Electrical Power



Proposed Test Points

- Measure performance at motor operating modes
 - High speed for pool cleaning
 - Low speed for pool filtration (if available)
- Test points aligned with U.S. DOE's test points
- High speed turndown allowed for variable speed motors to align with U.S. DOE



Proposed Motor Standard

- Standards aligned to US DOE pool pump by size and equipment class

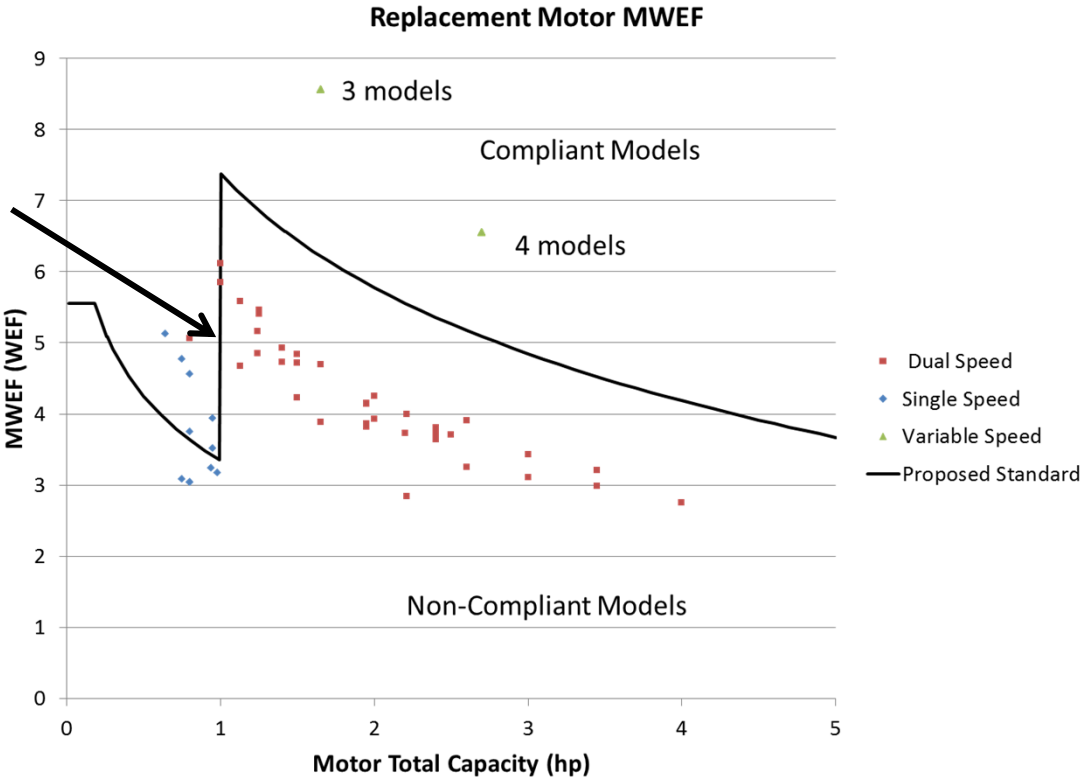
Replacement Pool Pump Motor Unit Type	Proposed Minimum Motor Weighted Energy Factor According to Modified CSA C747-09 Test Procedure		
	Total Motor Capacity (Horsepower)	Motor Phase	Minimum Allowable MWEF Score
Replacement Standard-Size Self-Priming Pool Filter Pump Motors	=>1.0 hp and <5.0 hp	Single	$MWEF = -2.30 \cdot \ln(\text{hp}/1.4) + 6.59$
Replacement Small-Size Self-Priming Pool Filter Pump Motors	< 1 hp	Single	MWEF = 5.55 for hp <=0.26 hp, $-1.30 \cdot \ln(\text{hp}/1.4) + 2.90$ for hp >.26 hp
Replacement Non-Self-Priming Pool Filter Pump Motors	< 5.0 hp	Any	MWEF = 4.6 for hp <=0.26 hp, $-0.85 \cdot \ln(\text{hp}/1.4) + 2.87$ for hp >.26 hp
Replacement Waterfall Pump Motors	Any	Any	None
Replacement Pressure Cleaner Booster Pump Motors	Any	Any	MWEF = .42



Technical Feasibility

- Proposed standards can be met with existing models and technology

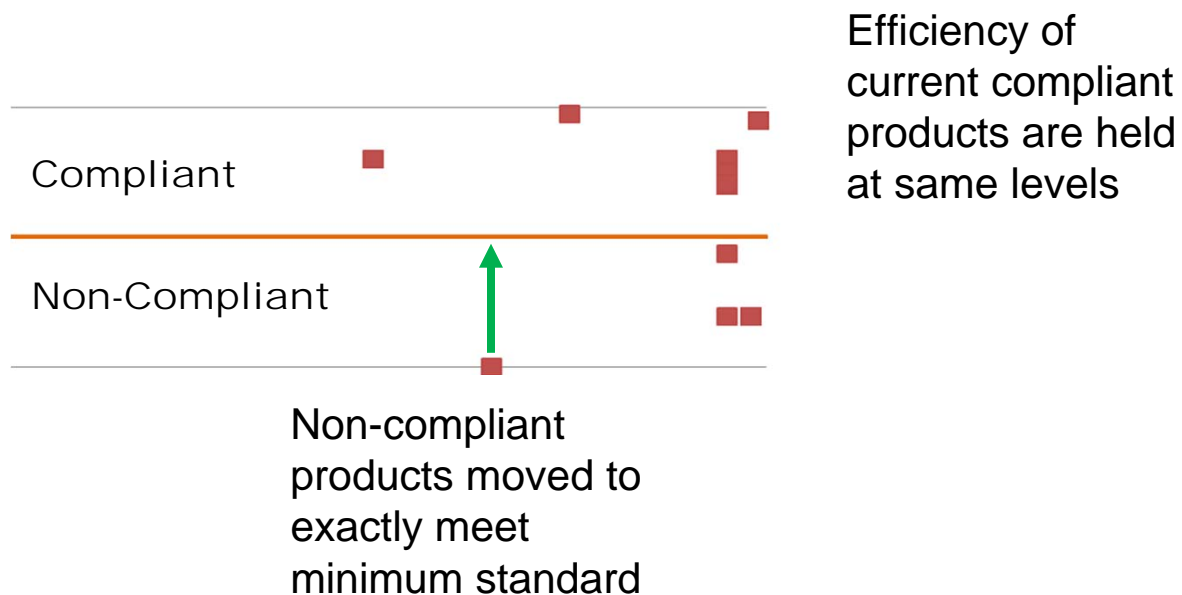
1 hp small vs. large





Savings Methodology

- The average unit energy savings calculated by comparing performance data to minimum efficiency





Cost Effectiveness (Residential)

- Proposed standards are cost effective

Product	Design Life (years)	Electricity Savings (kWh/yr)	Incremental Cost (\$)	Average Annual Savings (\$)	Life Cycle Savings (\$)	Life-Cycle Benefit (\$)
Self-Priming Pool Filter Pump, standard-size (0.95 hhp)	7.3	1,027	\$284	\$191	\$1,391	\$1,107
Self-Priming Pool Filter Pump, standard-size (1.88 hhp)	7.3	1,306	\$173	\$242	\$1,769	\$1,595
Self-Priming Pool Filter Pump, small-size (0.44 hhp)	7.3	349	\$66	\$65	\$473	\$407
Non-Self Priming Pool Filter Pump (0.52 hhp)	5.3	151	\$9	\$28	\$148	\$139
Waterfall Pump (0.40 hhp)	7.3	0	\$0	\$0	\$0	\$0
Pressure Cleaner Booster Pump (0.31 hhp)	5.3	47	\$20	\$9	\$46	\$26



Cost Effectiveness (Commercial)

- Proposed standards are cost effective

Product	Design Life (years)	Electricity Savings (kWh/yr)	Incremental Cost (\$)	Average Annual Savings (\$)	Life Cycle Savings (\$)	Life-Cycle Benefit (\$)
Self-Priming Pool Filter Pump, standard-size (0.95 hhp)	7.3	6,092	\$284	\$1,130	\$8,250	\$7,966
Self-Priming Pool Filter Pump, standard-size (1.88 hhp)	7.3	9,502	\$173	\$1,763	\$12,868	\$12,695
Self-Priming Pool Filter Pump, small-size (0.44 hhp)	7.3	1,579	\$66	\$293	\$2,139	\$2,073



Statewide Energy Savings

Product	First Year Savings		Annual Existing and Incremental Stock Savings	
	Electricity Savings (GWh/yr)	Savings (\$ million)	Electricity Savings (GWh/yr)	Savings (\$ million)
Total Savings	90.8	\$16.9	657	\$121.8



Discussion Items

- Proposal's goal is that a replacement motor will perform like the original motor
- Discuss the approach to measuring motor performance
 - Does testing align to U.S. DOE DPPP testing?
- Discuss the motor performance standard
 - Does standard align to U.S. DOE DPPP standard?



Discussion Items

- Are some pool pump motors covered by the U.S. DOE Small Electric Motor rule or the Electric Motor rule?
 - Does staff's proposal overlap with the U.S DOE motor rules?
 - If so then how best to resolve overlap?



Comments

- Comments due **by 5:00 p.m. on September 1, 2017**
- To submit electronically:
 - Go to <http://www.energy.ca.gov/appliances/2015-AAER-02/rulemaking/>
 - Click on “Submit eComment”
- To send a hard copy:

California Energy Commission
Dockets Office, MS-4
Re: Docket No. **15-AAER-02**
1516 Ninth Street
Sacramento, CA 95814-5512
- To send a digital copy: docket@energy.ca.gov, include docket number **15-AAER-02** and indicate Replacement Pool Pump Motors in the subject line



California Energy Commission

Thank You!

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