

## DOCKETED

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# Pool Pump Motors

CEC Staff Workshop

Developed by Energy Solutions  
on behalf of the California IOUs

August 3rd, 2017



# IOU Involvement in Pool Energy Efficiency

2001- PG&E voluntary program for time clocks and 2-speed motors

2004- IOUs propose CASE study for residential filtration pool pumps motors

2006- Prescriptive pool pump motor requirements banning split-phase or capacitor start - induction run type.

2008- Two-Speed, Multi-Speed, Variable-Speed requirement for residential filtration pump motors over 1 THP

2010- Title 24 Pool efficiency requirements take effect

**2012**- Current CEC rulemaking begins

2013- Energy Star certification for pumps Energy Factor >3.8

2015/2016- Participated in DOE Working Group

2017- DOE pool pump rule is finalized



# Current Title 20 Pool Pump Motor Standards

## Motor Efficiency

Pool pump motors manufactured on or after January 1, 2006 may not be split-phase or capacitor start - induction run type.

## Two-, Multi-, or Variable-Speed Capability.

1. **Residential Pool Pump Motors.** Residential pool pump motors with a pool pump motor capacity of 1 HP or greater which are manufactured on or after January 1, 2010, shall have the capability of operating at two or more speeds with a low speed having a rotation rate that is no more than one-half of the motor's maximum rotation rate. The pump motor must be operated with a pump control that shall have the capability of operating the pump at least at two speeds.
2. **Pump Controls.** Pool pump motor controls manufactured on or after January 1, 2008 that are sold for use with a two- or more speed pump shall have the capability of operating the pool pump at least at two speeds. The control's default circulation speed setting shall be no more than one-half of the motor's maximum rotation rate. Any high speed override capability shall be for a temporary period not to exceed one 24-hour cycle without resetting to default settings.

# IOU Involvement in Current Rulemaking

July, 29<sup>th</sup> 2013- Submitted Codes and Standards Enhancement (CASE) Report on Pool Pump Motors

Jan, 15<sup>th</sup> 2014- CEC holds workshop, seeks input

March 3<sup>rd</sup>, 2014- CEC issues formal data request

May 23<sup>rd</sup>, 2014- IOUs docket response to data request

July/ August, 2014- IOUs engaged with APSP-15 Committee

Sept 30<sup>th</sup>, 2014- IOUs docket revised data request response

Oct 9<sup>th</sup>, 2014- IOUs convened Industry Roundtable w/ CEC

February 18<sup>th</sup>, 2016- Staff Workshop

July 13<sup>th</sup>, 2016- Staff Workshop

# IOUs support CEC Staff Proposal

IOUs support the CEC staff proposal and believe the proposed standards are cost-effective, achievable and will lead to significant savings statewide. (~660 GWh)

The CEC Staff proposal makes three important changes to the current Title 20 standards including:

1. Aligns replacement motors standards with DOE final rule with new Motor Weighted Energy Factor Metric (MWEF)
2. Shifts from a prescriptive standard to performance standard for motor performance
3. Closes loopholes by extending the motor design and motor standards to cover all pool pump motors under 5 THP
4. Clarification and simplification to the test procedure and reporting requirements

# Test Procedure and Reporting Changes

Current IEEE-114 test procedure is not ideal for testing motors at multiple speeds

IOUs worked with APSP-15 committee and manufacturers to identify an appropriate test procedure and testing points

CEC adopted proposal to switch to CSA C747-09

Simulating the hydraulic characteristics from DOE pump test procedure to ensure comparable replacement motors with DOE pool pump rule

Updated test procedure & reporting requirements will add clarity for manufacturers and strengthen CEC database

New reporting requirements for freeze protection, standby power and power factor will provide new useful information to utilities and consumers

# Expanding Coverage to All Pool Pump Motors

Current Title 20 language only applies to “residential filtration” applications

This has created a significant challenges with compliance as well as confusion among installers, retailers, etc.

This CEC proposal will:

- Extend the motor efficiency standards to cover all pool pump motors under 5 THP
- Align with the five DOE product classes for pool pumps

This change will greatly improve compliance with existing standard and expand savings into new applications.



Booster Pump Motors



Waterfall Pump Motors



Standard Size Self-Priming Pool Pump Motors



Small Self-Priming Pool Pump Motors



Non-Self-Priming Pool Pump Motors



# Prescriptive to Performance Standards

Shifting to a performance standard will allow all motor types to compete

The IOUs support CEC using DOE product classes and the Motor Weighted Energy Factor (MWEF) as the regulated metric.

Table 6-3: Proposed Standards for Replacement DPPP Motors

	Proposed Minimum Motor Weighted Energy Factor According to Modified CSA C747-09 Test Procedure		
Replacement Pool Pump Motor Unit Type	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*ln (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*ln (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

Source: California Energy Commission

# January 1<sup>st</sup>, 2019 Effective Date

The IOUs support the CEC's proposed standards and the proposed effective date of January 1<sup>st</sup>, 2019.

Each year of delay costs CA pool owners ~\$16.9 million dollars in electricity costs.

The IOUs support the alignment of existing *new* pump motor standards to retire when DOE standard takes effect in 2021

Table 7-2: Statewide Annual Savings

Product	Application	First-Year Savings		Annual Existing and Incremental Stock Savings	
		Electricity Savings (GWh/yr)	Savings (\$M)	Electricity Savings (GWh/yr)	Savings (\$M)
Replacement Self-Priming Pool Filter Pump Motor, standard-size (1.90 hp)	Residential	27.6	\$5.1	201	\$37.4
Replacement Self-Priming Pool Filter Pump Motor, standard-size (3.76 hp)	Residential	35.1	\$6.5	256	\$47.5
Replacement Self-Priming Pool Filter Pump Motor, small-size (0.88 hp)	Residential	2.4	\$0.5	18	\$3.3
Replacement Non-Self Priming Pool Filter Pump Motor (1.04 hp)	Residential and Commercial	2.5	\$0.5	13	\$2.5
Replacement Waterfall Pump Motor (0.80 hp)	Residential and Commercial	0.0	\$0.0	0	\$0.0
Replacement Pressure Cleaner Booster Pump Motor (1.24 hp)	Residential and Commercial	0.6	\$0.1	3	\$0.5
Replacement Self-Priming Pool Filter Pump Motor, standard-size (1.90 hp)	Commercial	8.6	\$1.6	63	\$11.7
Replacement Self-Priming Pool Filter Pump Motor, standard-size (3.76 hp)	Commercial	13.4	\$2.5	98	\$18.2
Replacement Self-Priming Pool Filter Pump Motor, small-size (0.88 hp)	Commercial	0.6	\$0.1	4	\$0.8
<b>Total Savings</b>		<b>90.8</b>	<b>\$16.9</b>	<b>657</b>	<b>\$121.8</b>

Source: Energy Commission staff calculation

# Suggestions for Improvement

The IOUs broadly support the staff proposal, but will make recommendations:

- Consider revising the motor capacity thresholds to better align with hydraulic horsepower values
- To improve the definitions.

The IOUs look forward to submitting more detailed comments in writing.