

California's Flexible Demand Appliance Standards for Pool Controls Program

Employing Load Shifting to Lower Peak Demand and Avoid Emissions

August 15, 2024



Celebrating 20 Years of State Leadership

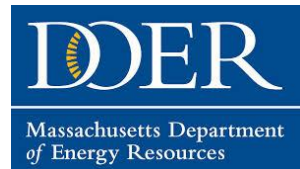


The Clean Energy States Alliance (CESA) is a national, nonprofit coalition of public agencies and organizations working together to advance clean energy.

CESA members—mostly state agencies—include many of the most innovative, successful, and influential public funders of clean energy initiatives in the country.

CleanEnergy States Alliance

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California Energy Commission

Flexible Demand Appliance Standards
for Pool Controls

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Webinar Speakers

- **Andrew McAllister**, PhD., Commissioner, California Energy Commission
- **Nicholaus Struven**, Lead Technical Engineer, California Energy Commission
- **Michael Sokol**, Director, Efficiency Division, California Energy Commission
- **Warren Leon**, Executive Director, Clean Energy States Alliance



CALIFORNIA
ENERGY COMMISSION





2024 Clean Energy States Alliance: Pool Controls Flexible Demand Appliance Standards

August 15, 2024, State Leaders in Clean Energy Award

Today's Presenters:

Commissioner Andrew McAllister

Michael Sokol, Efficiency Division

Nich Struven, Senior Engineer



Intention of this Webinar



- Introduce Flexible Demand Appliance Standards



- Discuss the adopted standards for pool controls



- Review the development of flexible demand standards for pool controls



- Outline the benefits of standards to Californians



Introductory Remarks

Commissioner Andrew McAllister, Ph.D.
California Energy Commission





Framing Flexible Demand Appliance Standards

Michael J. Sokol

Efficiency Division, Director
California Energy Commission



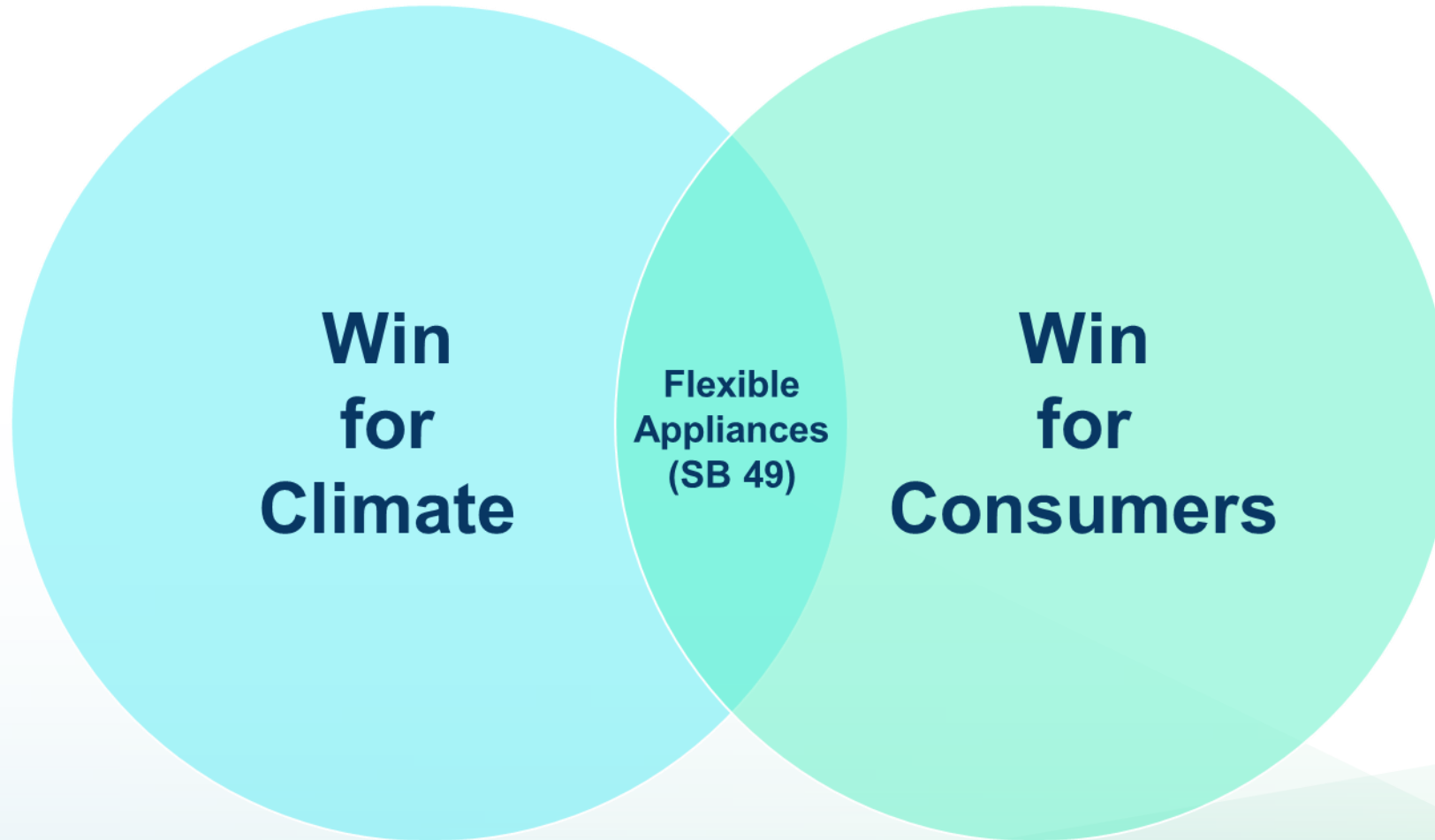


Senate Bill 49 (Skinner, 2019)

- Requires **Flexible Demand Appliance Standards** to be:
 - Cost-effective
 - Value of associated reduced GHG emissions
 - Contribution to grid reliability
 - Configurable, requiring consumer's consent
 - Open source and cybersecure
 - Readily available load-management technologies



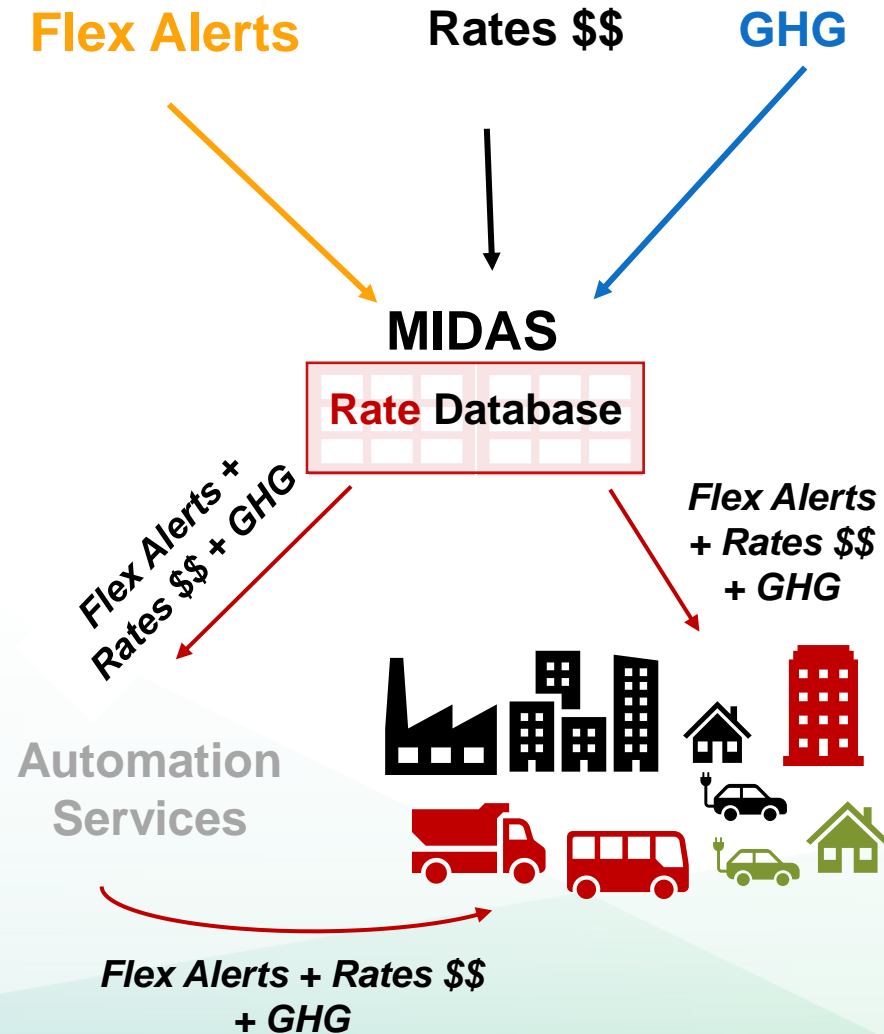
Win | Win Policy Objectives for CA





MIDAS Data Flows

- MIDAS Database available at <http://midasapi.energy.ca.gov>
- Provides access to all time-varying rates from included utilities and CCAs
- Includes Greenhouse Gas and Flex Alert signals
- Utilities upload and maintain all time-dependent rates





Pool Controls as first device

Flexible demand standards for Pool Controls are feasible and cost-effective

Phase 1	Phase 2	Phase 3
Pool Controls	Battery Energy Storage Systems (BESS)	Electric Clothes Dryers
Electric Storage Water Heaters	Low-Voltage Thermostats	Dishwashers
Electric Vehicle Supply Equipment (EVSE)		



Overview: Pool Controls



Equipment in Separate Enclosures



Equipment in Single Enclosure

Source: Hayward Industries Inc., and Pentair



Requirements for Pool Controls

Pool controls shall include:



- **Optimized Default Schedule**



- **Wireless Connectivity**



- **Consumer Consent Protections**



- **Cybersecurity Protections**



Effective Date

The flexible demand appliance standards regulations for pool controls

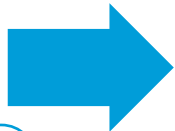
- Adoption: October 18, 2023
- Effective date: September 29, 2025



Flexible Demand Appliance Standards Research & Development Process

Research

- Existing flexible demand technologies



Evaluate

- Scheduling features



Develop

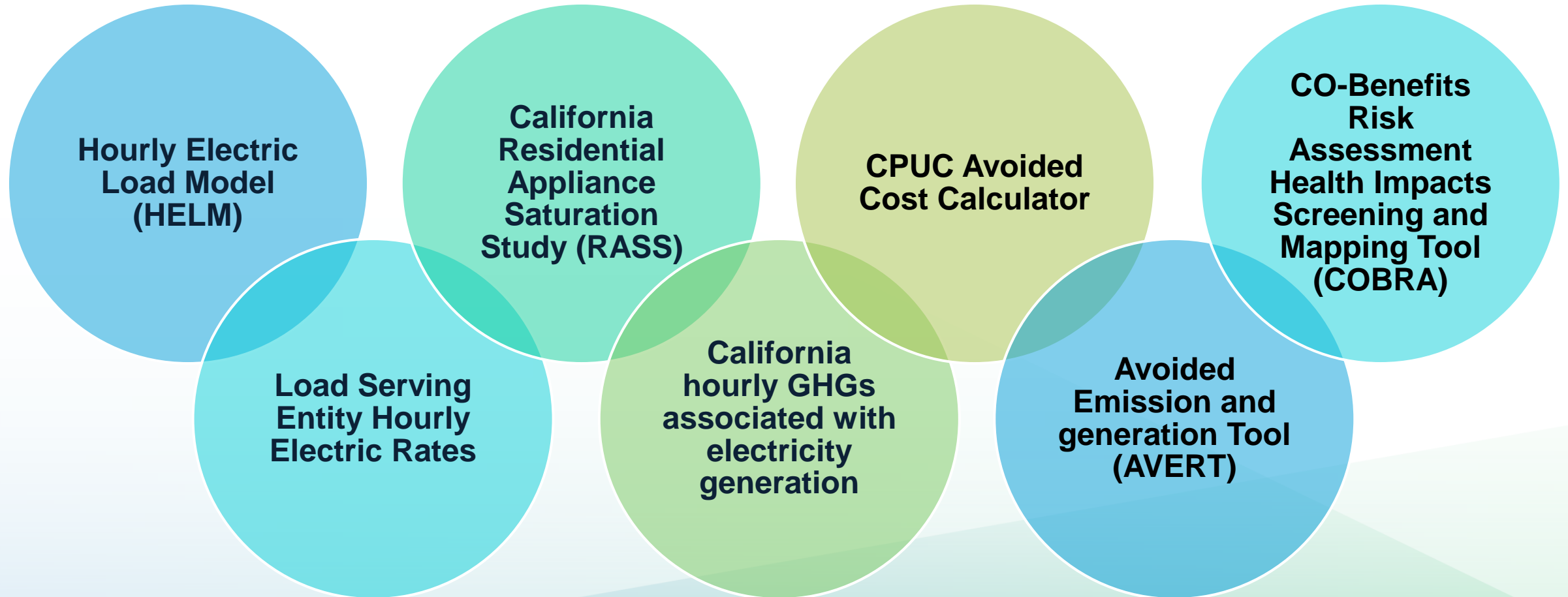
- Analysis tools





Flexible Demand Appliance Standards Research & Development Process

Hourly Data Sources and Tools





GHG Variability by Day and Season

Marginal Greenhouse Gas Emission Intensity (MTCO₂e/MWh)

Hours	Winter			Spring			Summer			Fall		
Outside Default Schedule 12 am to 8:59 am	0.37	0.35	0.34	0.26	0.14	0.12	0.15	0.32	0.35	0.36	0.37	0.35
	0.37	0.36	0.34	0.25	0.16	0.13	0.17	0.32	0.37	0.37	0.37	0.36
	0.38	0.36	0.34	0.26	0.16	0.15	0.19	0.33	0.38	0.38	0.38	0.36
	0.38	0.36	0.34	0.26	0.17	0.16	0.21	0.33	0.38	0.38	0.38	0.36
	0.37	0.36	0.34	0.25	0.17	0.16	0.21	0.33	0.37	0.37	0.37	0.36
	0.37	0.35	0.34	0.24	0.14	0.14	0.20	0.33	0.37	0.36	0.36	0.35
	0.35	0.33	0.32	0.24	0.16	0.12	0.13	0.30	0.35	0.36	0.35	0.34
	0.34	0.32	0.28	0.12	0.05	0.04	0.04	0.12	0.15	0.27	0.28	0.31
Default Schedule 9am to 3pm	0.22	0.20	0.10	0.04	0.03	0.03	0.03	0.05	0.06	0.07	0.07	0.10
	0.08	0.08	0.05	0.03	0.03	0.03	0.03	0.05	0.05	0.05	0.05	0.05
	0.07	0.06	0.04	0.03	0.03	0.03	0.03	0.05	0.05	0.05	0.04	0.05
	0.07	0.06	0.04	0.03	0.03	0.03	0.03	0.05	0.05	0.05	0.04	0.05
	0.07	0.06	0.04	0.03	0.03	0.03	0.03	0.05	0.05	0.06	0.05	0.05
	0.08	0.07	0.04	0.03	0.03	0.03	0.04	0.06	0.07	0.08	0.06	0.06
Outside Default Schedule 3:01pm to 12 am	0.29	0.23	0.06	0.04	0.04	0.04	0.04	0.09	0.12	0.21	0.20	0.23
	0.34	0.33	0.28	0.14	0.05	0.05	0.05	0.11	0.18	0.27	0.30	0.32
	0.32	0.31	0.30	0.20	0.09	0.08	0.08	0.16	0.23	0.28	0.30	0.31
	0.31	0.30	0.28	0.19	0.13	0.09	0.13	0.24	0.30	0.31	0.29	0.30
	0.31	0.29	0.26	0.18	0.13	0.13	0.18	0.28	0.31	0.31	0.29	0.30
	0.32	0.30	0.27	0.17	0.13	0.12	0.18	0.29	0.31	0.32	0.31	0.31
	0.33	0.31	0.29	0.18	0.11	0.09	0.15	0.28	0.32	0.33	0.33	0.32
	0.34	0.33	0.31	0.21	0.11	0.09	0.14	0.30	0.33	0.35	0.35	0.34
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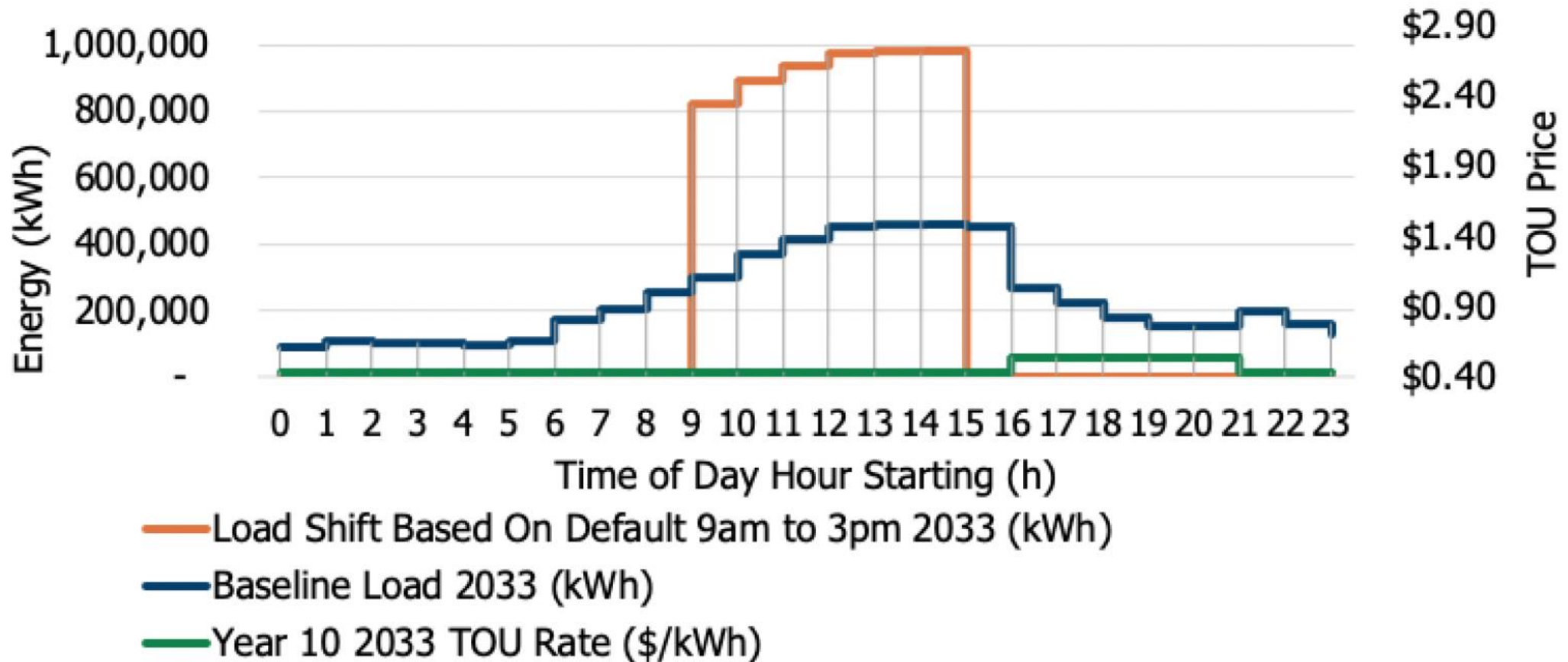
Move Electric Energy Use to times of peak solar production and lowest emissions (green fill)





Pool Electrical Load Shaping

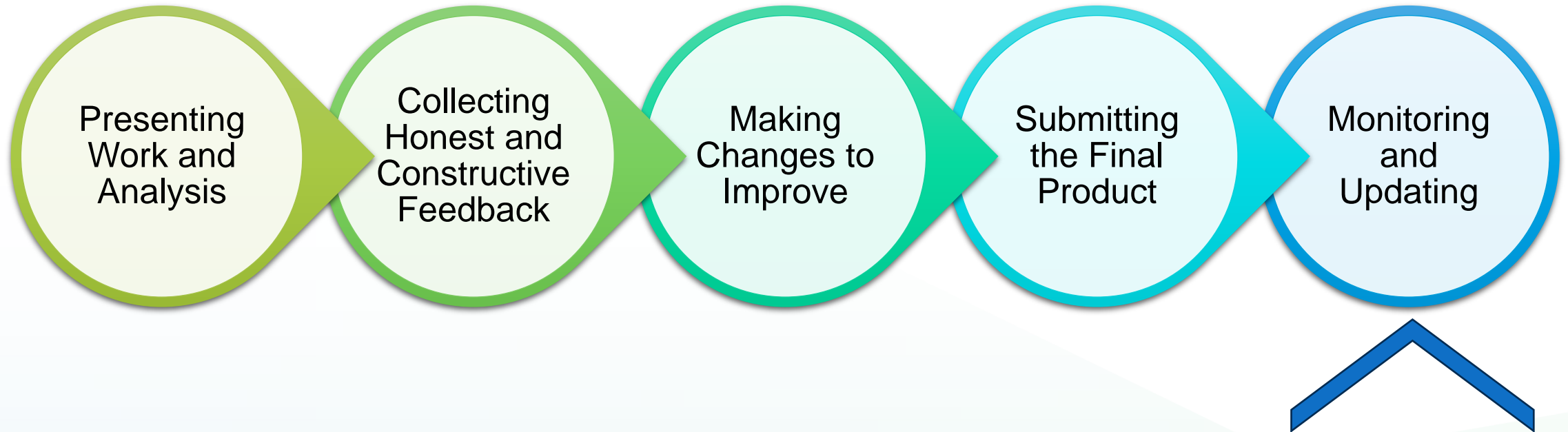
Forecasted Daily Load Shift with Default Schedule



Source: California Energy Commission



Flexible Demand Appliance Standards Steps





Benefits to Californians

- Avoid GHG emissions



17 million mature trees

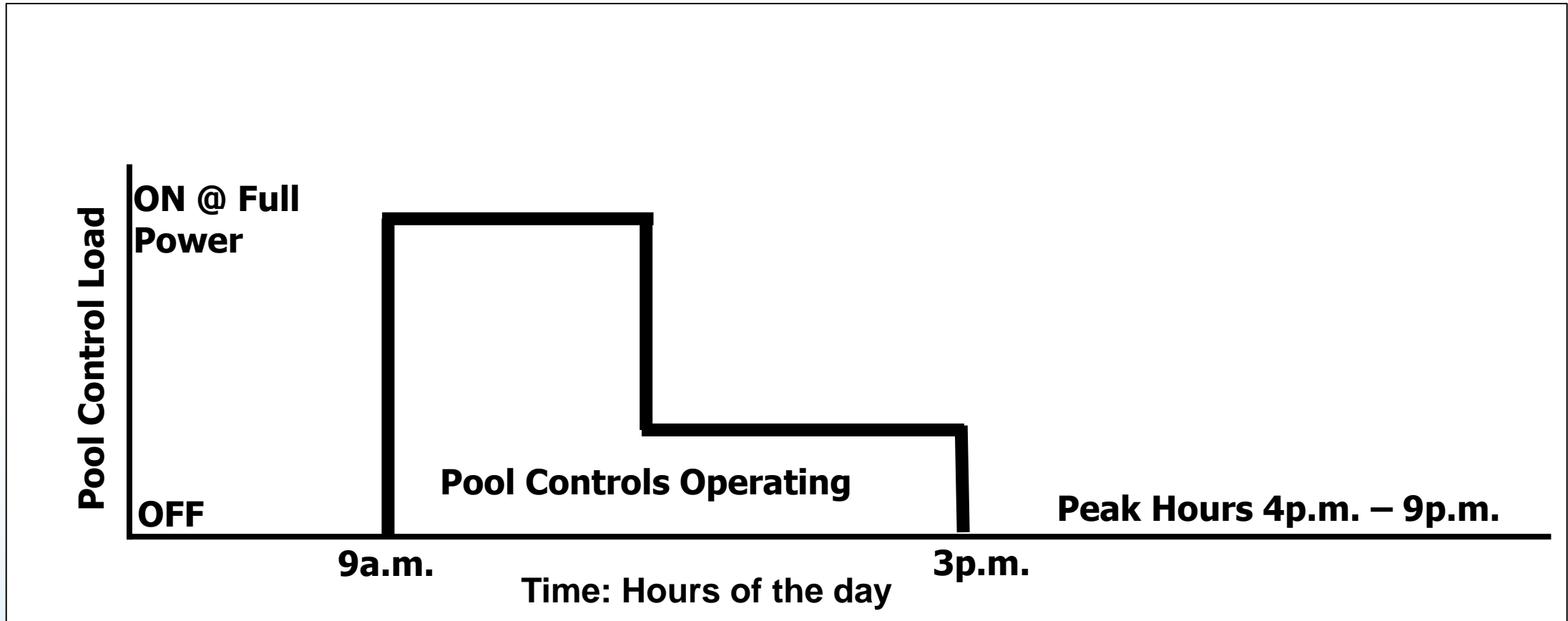


85,000 internal combustion engines



Benefits to Californians

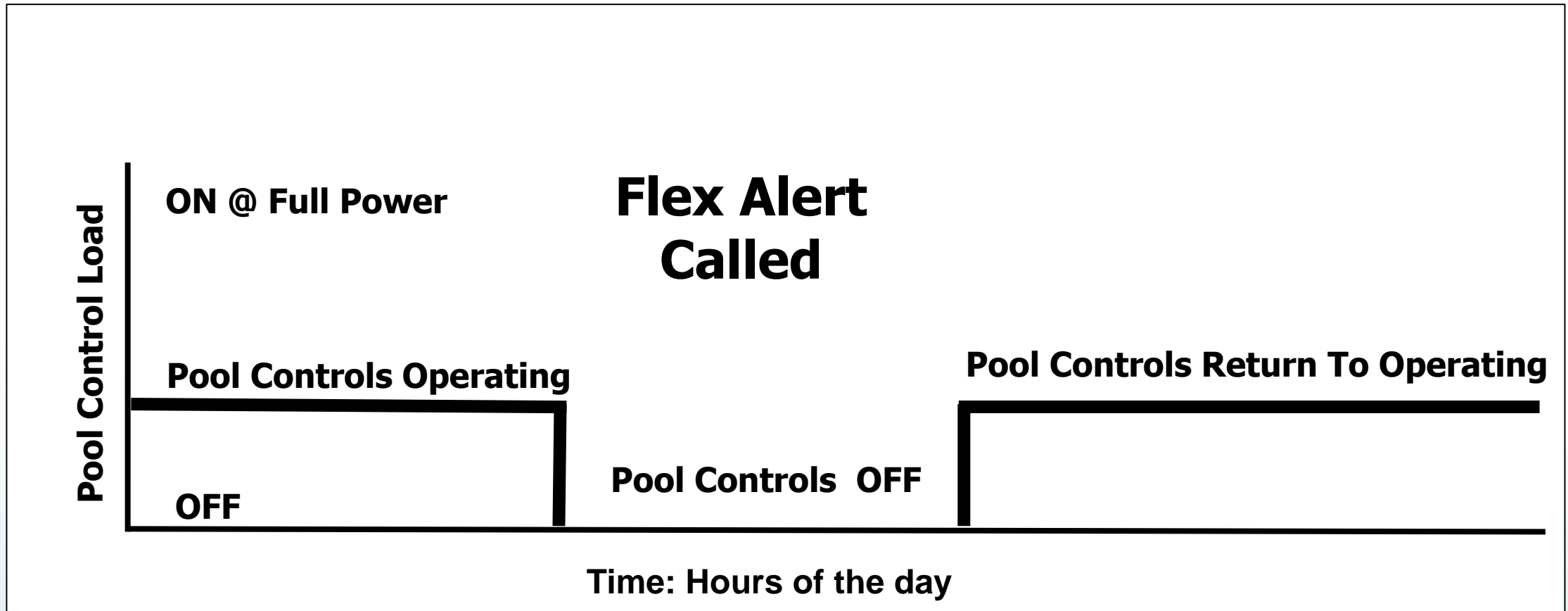
- Daily load shift potential





Benefits to Californians

- Grid reliability & resilience





Benefits to Californians

- Electricity bill savings



Annual Electricity Bill Savings	Payback Period	Lifetime savings (10 years)
\$100	Less than 12 months	\$1,131



Thank you




CEC Flexible Demand Appliance Standards

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California Energy Commission > Proceedings > Active Proceedings > Flexible Demand Appliances



Flexible Demand Appliances

Senate Bill 49 authorizes the California Energy Commission to adopt standards for appliances to facilitate the deployment of flexible demand technologies. The standards shall reduce greenhouse gas emissions by scheduling, shifting or curtailing appliance operations with consumer consent. The standards shall be feasible and cost-effective.

RELATED LINKS

- Load Flexibility
- Load Management Standards

CONTACT

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flexdemandstandards@energy.ca.gov

The California Energy Commission will implement [Senate Bill 49](#) (Skinner, Chapter 697, Statutes of 2019) considering a list of priorities and factors outlined in alignment of energy demand and supply, and maintain grid



Thank You

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Upcoming Webinars

EPA Tools to Support States: Quantifying Emissions Reductions and the Health and Economic Co-Benefits of Clean Energy Policies (8/27)

State CES implementation and analysis: How state policy design affects clean energy deployment and emissions reductions (9/6)

Batteries 101, Part 4: Municipal Considerations for Battery Energy Storage in Massachusetts (9/12)

An Introduction to Solar+Storage (9/19)

Massachusetts' Accelerating Clean Transportation (ACT) School Bus Program (9/24)

Emerging Public Health Needs for Climate Smart Technology in Connecticut Affordable Housing (10/1)

Read more and register at
www.cesa.org/webinars