

Proposed Spark-Ignition Marine Watercraft Evaporative Emission Control Requirements

Sacramento, CA
February 19, 2015



Overview

Section 1: Background

Section 2: Emissions Control

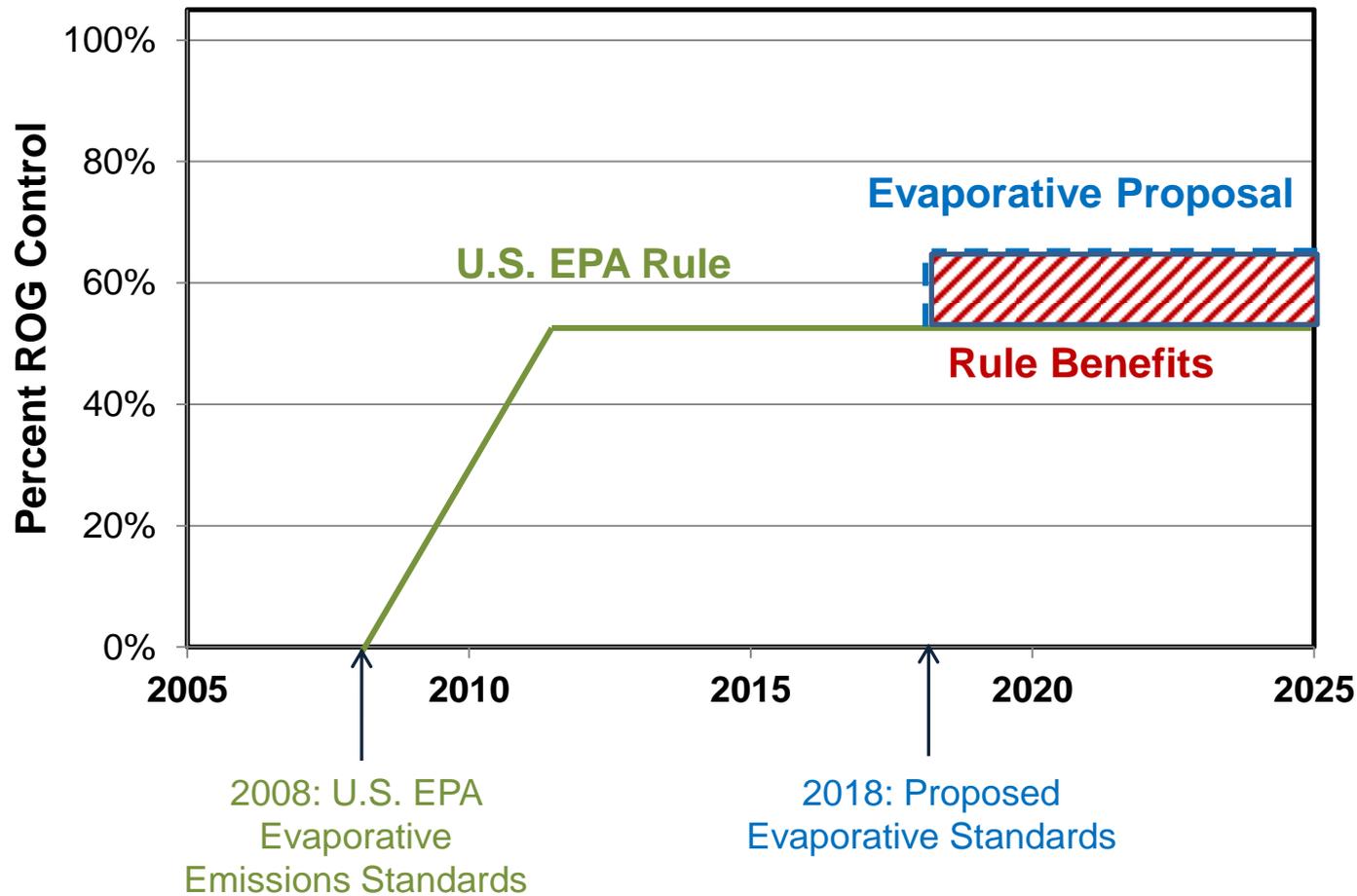
Section 3: Regulatory Proposal

Section 4: Staff Recommendation

Goals of Proposed Regulation

- Harmonize with federal regulations, where possible
- Obtain additional reductions to meet California's unique air quality needs

Watercraft Regulatory History



Types of Watercraft



Outboard



Personal Watercraft



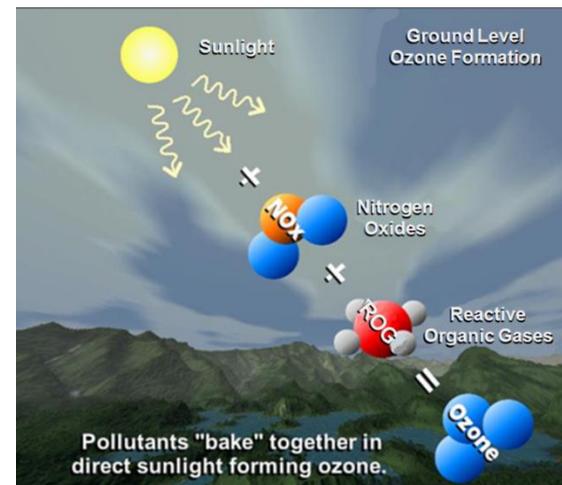
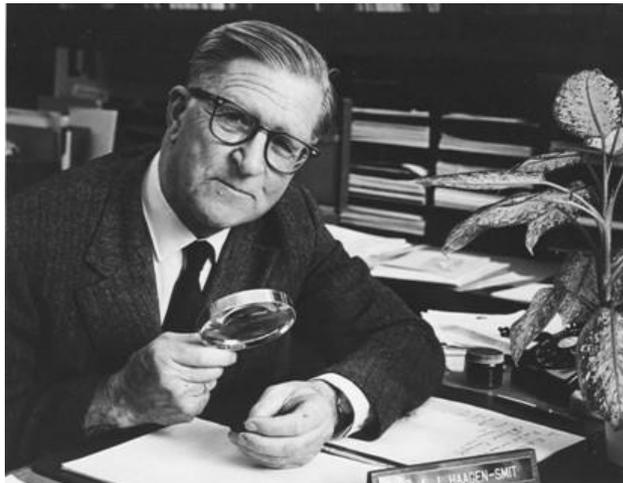
Inboard/Sterndrive



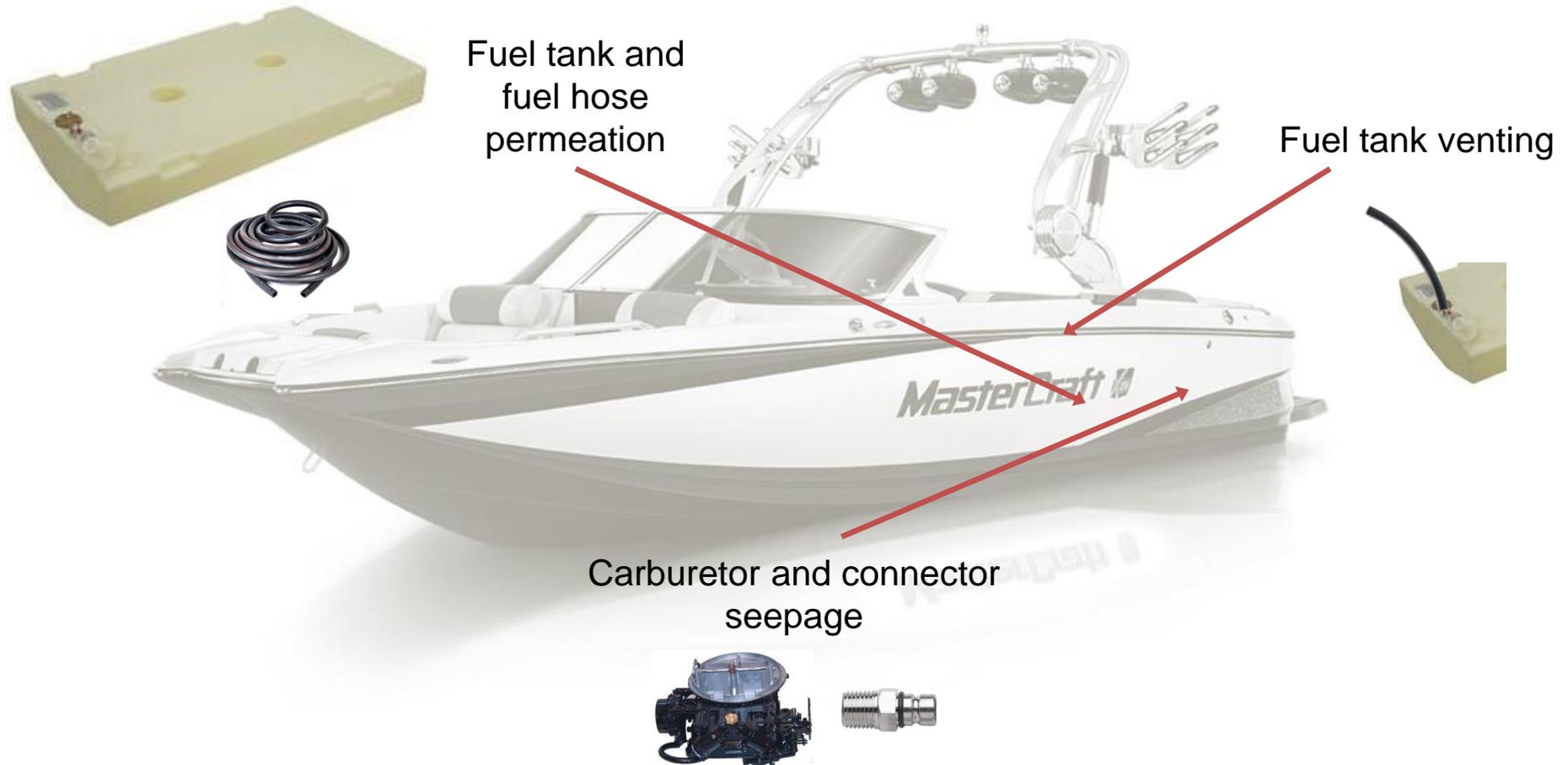
Jet Drive

Need for Emission Reductions

- Reactive Organic Gases (ROG)
 - Ozone precursor
 - Reductions needed
 - Toxic Air Contaminant (Benzene)
- Proposed measure meets 2007 SIP commitment
- Reduces near source exposure to benzene



Evaporative Emission Sources from Watercraft



Evaporative Emission Processes



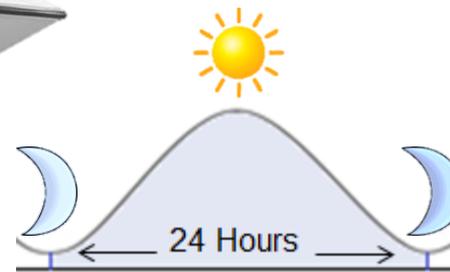
Running Loss
Operating



Hot Soak
Immediately After Operation



Diurnal
Storage



Overview

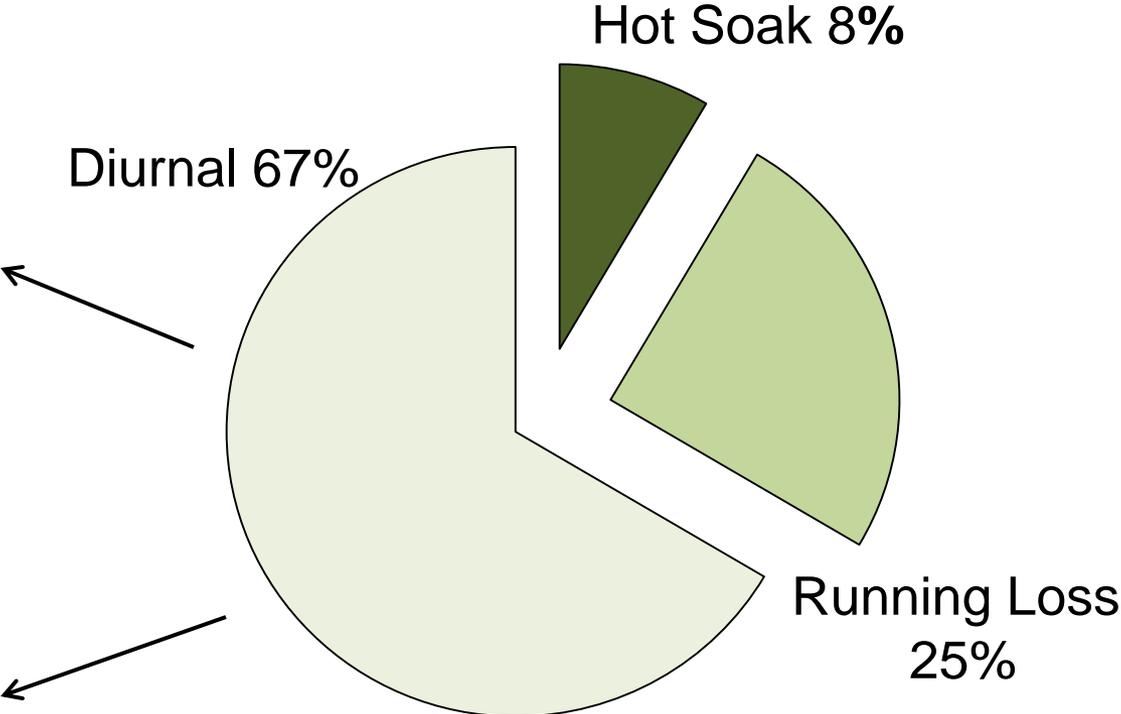
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Diurnal Control

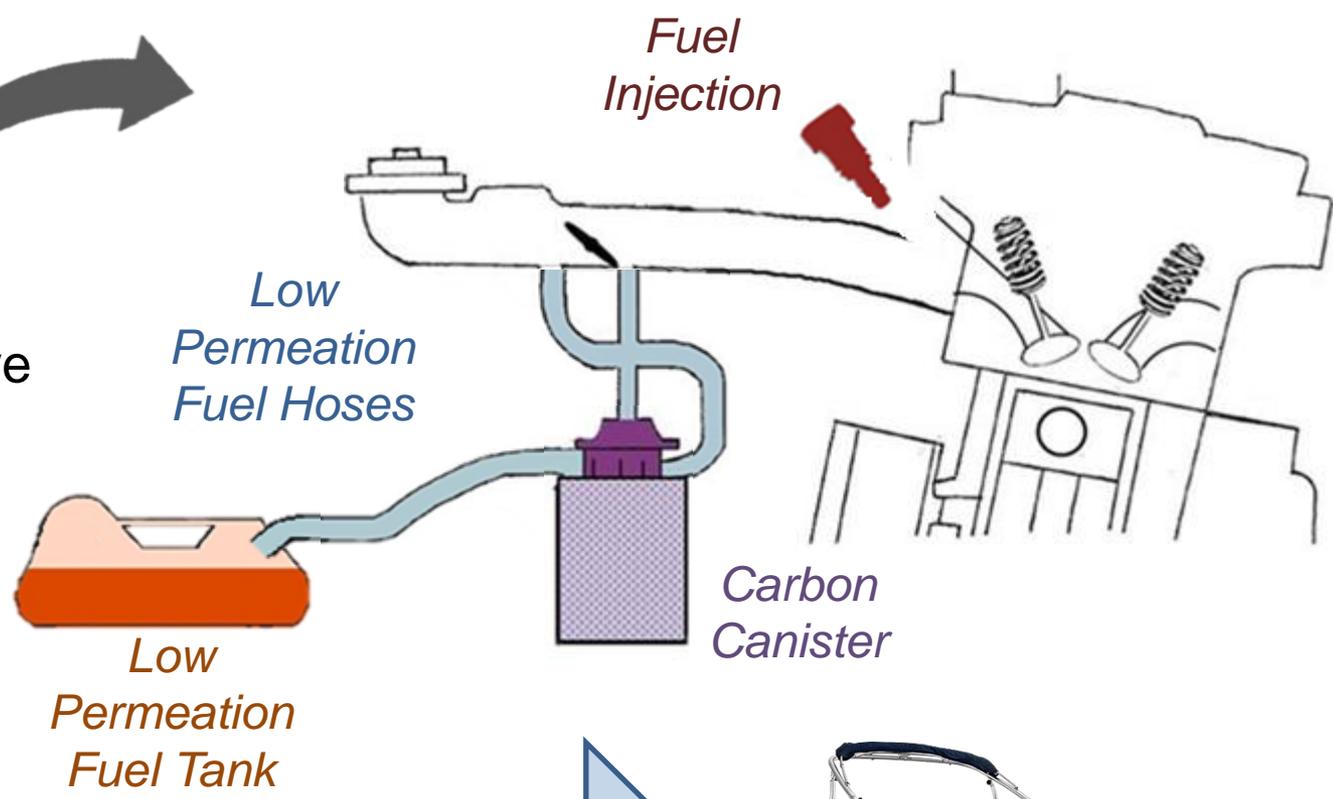


ROG Emissions

Technology Transfer



On-Road Evaporative Emissions Control Technology



Transferred to spark-ignition marine watercraft



Watercraft Technology Testing at ARB

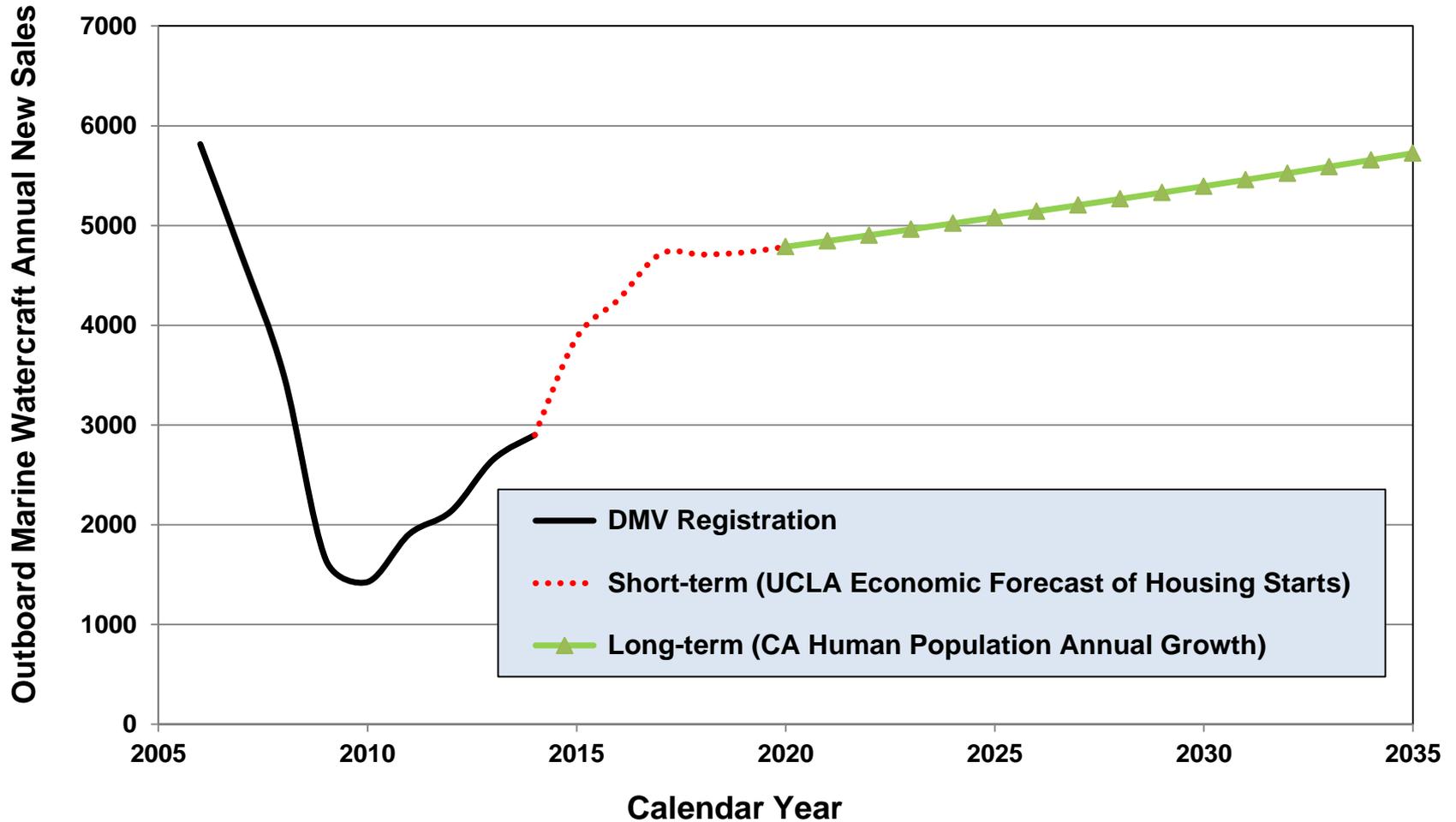
- Watercraft tested with and without evaporative emissions controls
- SHED tests performed in-house at ARB labs
 - Tested 32 representative watercraft
 - Develop emission factors



Inventory Development

- Comprehensive Update
 - During recession marine watercraft sales declined by 90%
 - New evaporative emissions factors
 - Updated usage and storage based on surveys
- Updated forecast reflects recession and estimated recovery
 - 2006-2013 DMV registration data
 - Short-term sales track UCLA economic forecast
 - Long-term sales based on population growth

ARB Outboard Inventory Sales Forecast



Emissions Benefits

- Emissions benefits will gradually increase due to long ownership periods
- Evaporative proposal would reduce ROG from watercraft by one ton per day

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Proposed Evaporative Emission Regulation

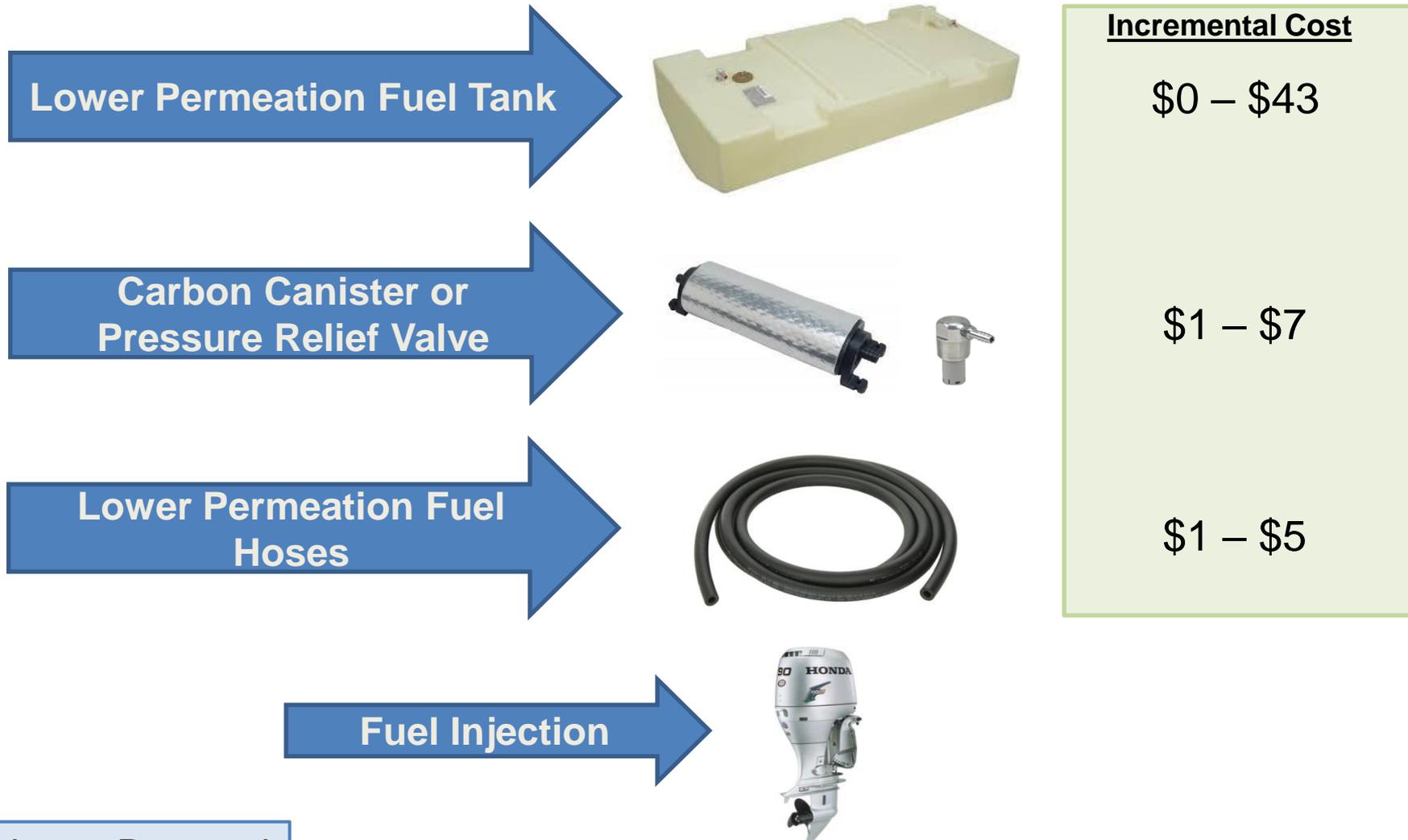
	MY2018	MY2020
≤ 30 kW Watercraft	Harmonized with U.S. EPA	
> 30 kW Trailerable/ Nontrailerable Watercraft	New fuel hose, fuel tank, venting, and fuel injection requirements	More stringent fuel hose requirements*

*Upon confirmation of commercial availability

- Harmonized test procedures
- Robust durability procedures

Anticipated ARB Control Technology

Similar to U.S. EPA controls except more stringent evaporative components



Control Component Durability

- Test procedures require robust durability procedures
- Durability procedures include exposure to:



Carbon canisters



Pressure relief valves



Ozone



Vibration



Dust

Cost-Effectiveness

- Control measure is cost-effective
- Averages less than \$5 per pound of ROG
- Based on industry reported costs
- Includes reporting costs



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Stakeholder Participation

- Received extensive input from stakeholders
- Held five workshops and participated in over 40 stakeholder meetings
- Addressed numerous stakeholder concerns
- Worked collaboratively on the regulatory proposal

ARB Responses to Stakeholder Concerns

- Harmonized with U.S. EPA test procedures
- Delayed implementation
- Reduced scope of proposal

Proposed 15-Day Change

- Staff proposes minor changes to improve clarity in the regulation
- Would provide for clarification of test procedure applicability and design requirements

Staff Recommendation

- Emissions reductions needed for air quality goals
- Rule is implemented beginning in 2018
- Controls are technologically feasible
- Proposal is cost-effective
- Staff recommends adoption with a 15-day change

Proposed Spark-Ignition Marine Watercraft (SIMW) Evaporative Emission Control Requirements

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Design-Based Standards: ≤ 30 kW (40 HP)

- All evaporative emission standards (including fuel cap, fitting, and carbon requirements) and test procedures will be harmonized with U.S. EPA

Model Year (MY) Effective Date	Fuel Hose Permeation (grams/m ² /day ROG)	Fuel Tank Permeation (grams/m ² /day ROG)	Diurnal Requirement (grams/gallon/day HC)	Fuel Injection or Equivalent (grams/hour)
2018 and later	15.0	1.5	0.4	None
Test Procedure	40 CFR §1060.515	40 CFR §1060.520 ¹	40 CFR §1060.525	None

¹ As an alternative, fuel tanks can be certified to 2.5 grams/m²/day at 40°C

Design-Based Standards: > 30 kW (40 HP) Trailerable

- Applicable to marine watercraft ≤ 26 ft. in length and ≤ 8.5 ft. in width

Trailerable Boats					
Model Year Effective Date	Fuel Hose Permeation (grams ROG/m ² /day)	Fuel Tank Permeation (grams ROG/m ² /day)	Diurnal Tank Venting Loss Requirement (grams HC/gallon/day)		Meet Fuel Injection Definition or Equivalent Performance Standard (grams HC/hour)
			Canister	Non-Canister	
2018 and 2019	10.0	0.70	0.25	65% reduction from uncontrolled HC emissions	0.4
2020 and later	5.0 ¹	0.70	0.25	65% reduction from uncontrolled HC emissions	0.4
Test Procedure	TP-1504 or SAE J1737	TP-1504 ²	TP-1503		TP-1502

¹ Must be performed at 40°C

² As an alternative, fuel tanks can be certified to 1.4 grams/m²/day at 40°C

Design-Based Standards: > 30 kW (40 HP) Non-Trailerable

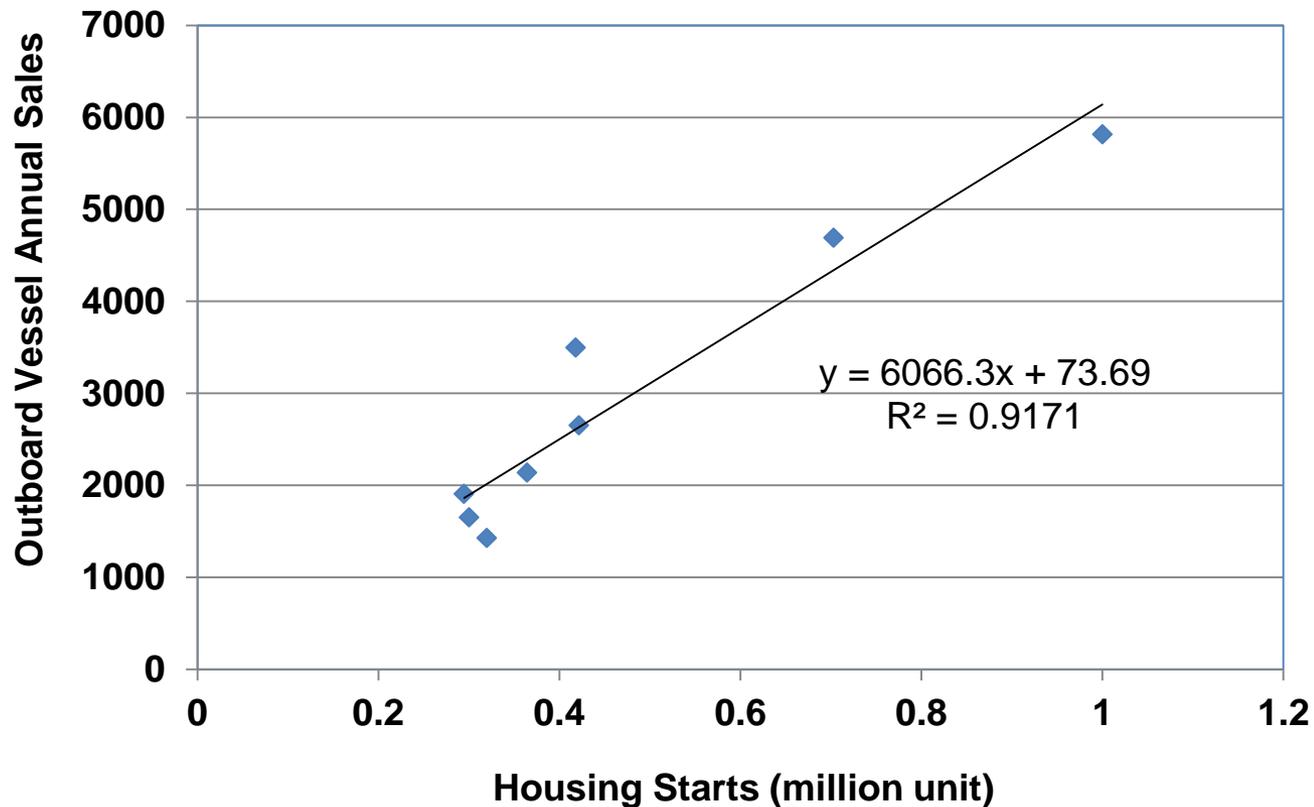
- Applicable to marine watercraft > 26 ft. in length or > 8.5 ft. in width

Non-Trailerable Boats				
Model Year Effective Date	Fuel Hose Permeation (grams ROG/m ² /day)	Fuel Tank Permeation (grams ROG/m ² /day)	Diurnal Tank Venting Loss Requirement (grams HC/gallon/day)	Meet Fuel Injection Definition or Equivalent Performance Standard (grams HC/hour)
2018 and 2019	10.0	0.70	0.16	0.4
2020 and later	5.0 ¹	0.70	0.16	0.4
Test Procedure	TP-1504 or SAE J1737	TP-1504 ²	TP-1503	TP-1502

¹ Must be performed at 40°C

² As an alternative, fuel tanks can be certified to 1.4 grams/m²/day at 40°C

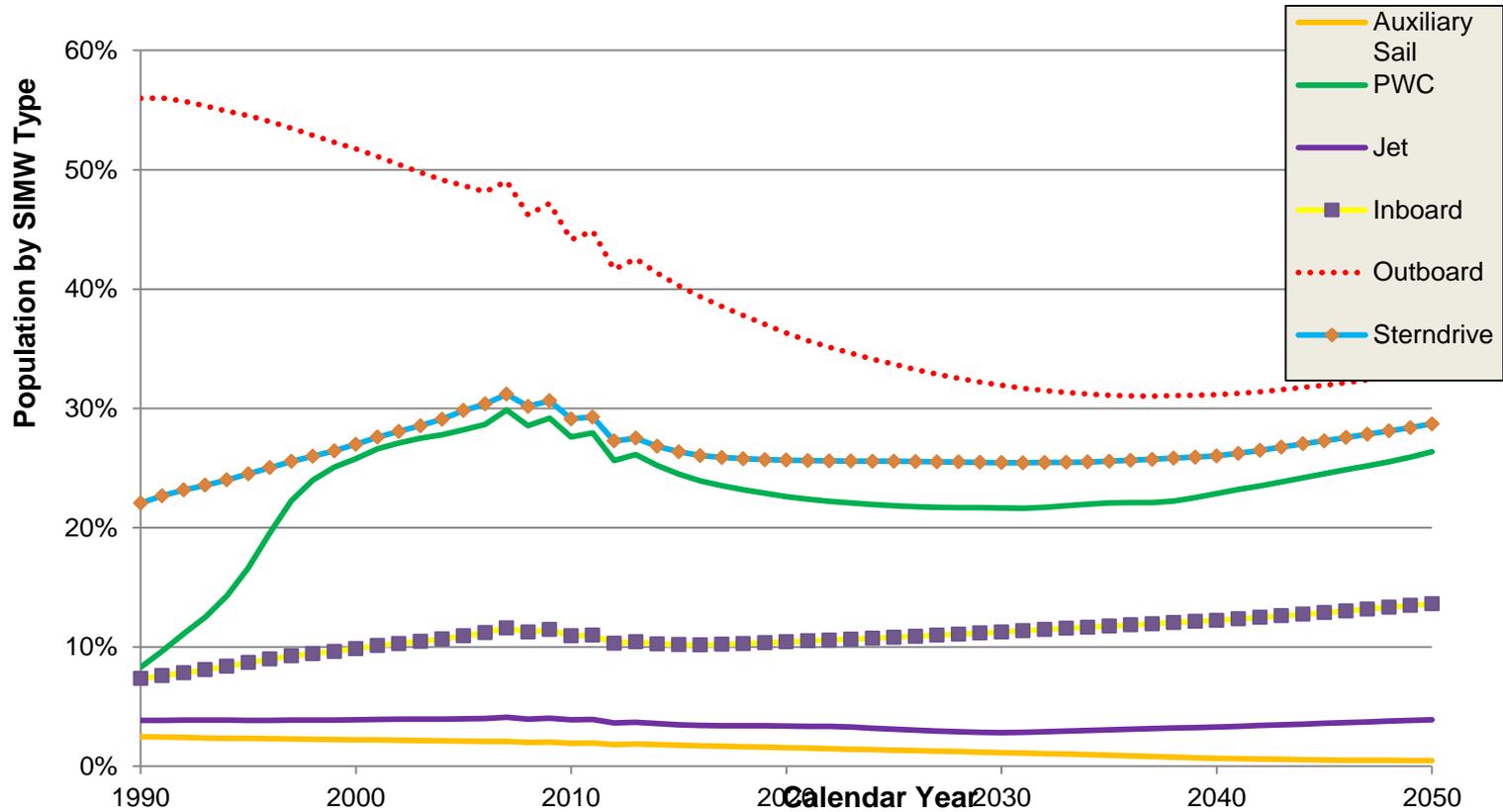
Outboard Annual Sales and Nationwide Housing Starts



Data: 2014 UCLA Economic Forecast

SIMW Population %

SIMW Population



SIMW Population

