

# Proposed Spark-Ignition Marine Watercraft Evaporative Emission Control Requirements

Sacramento, CA  
February 19, 2015



# Overview

## Section 1: Background

Section 2: Emissions Control

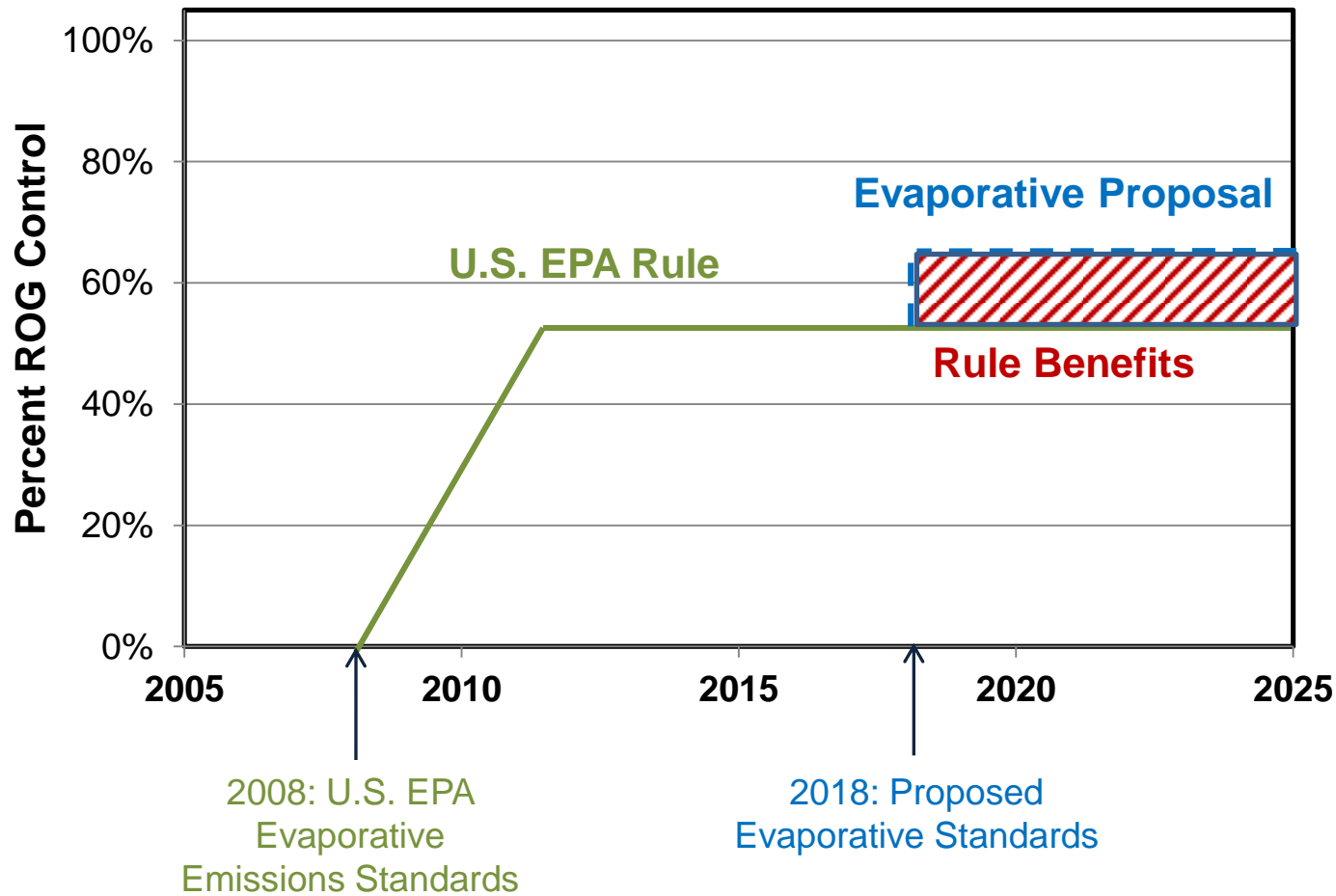
Section 3: Regulatory Proposal

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**



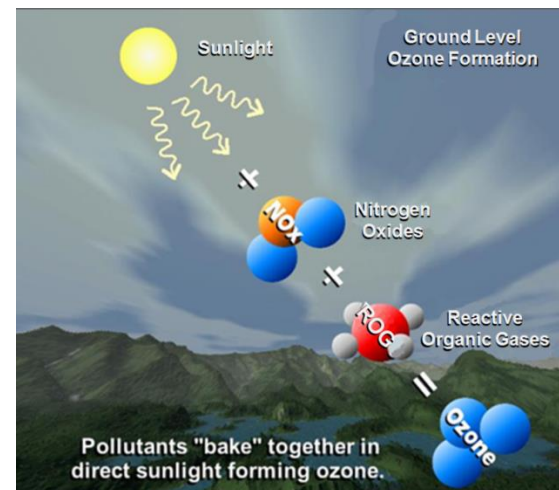
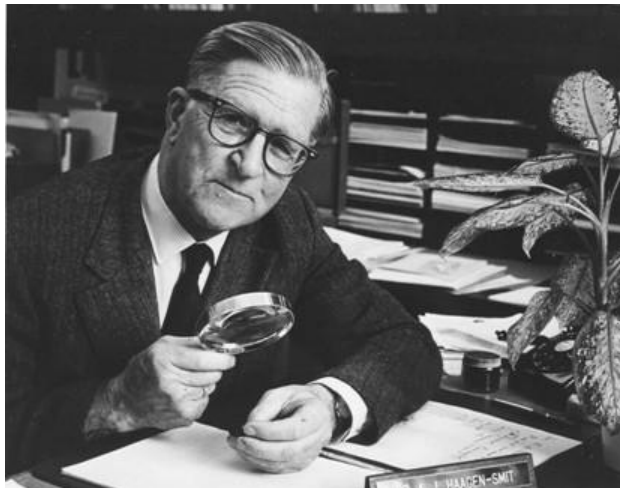
**Inboard/Sterndrive**



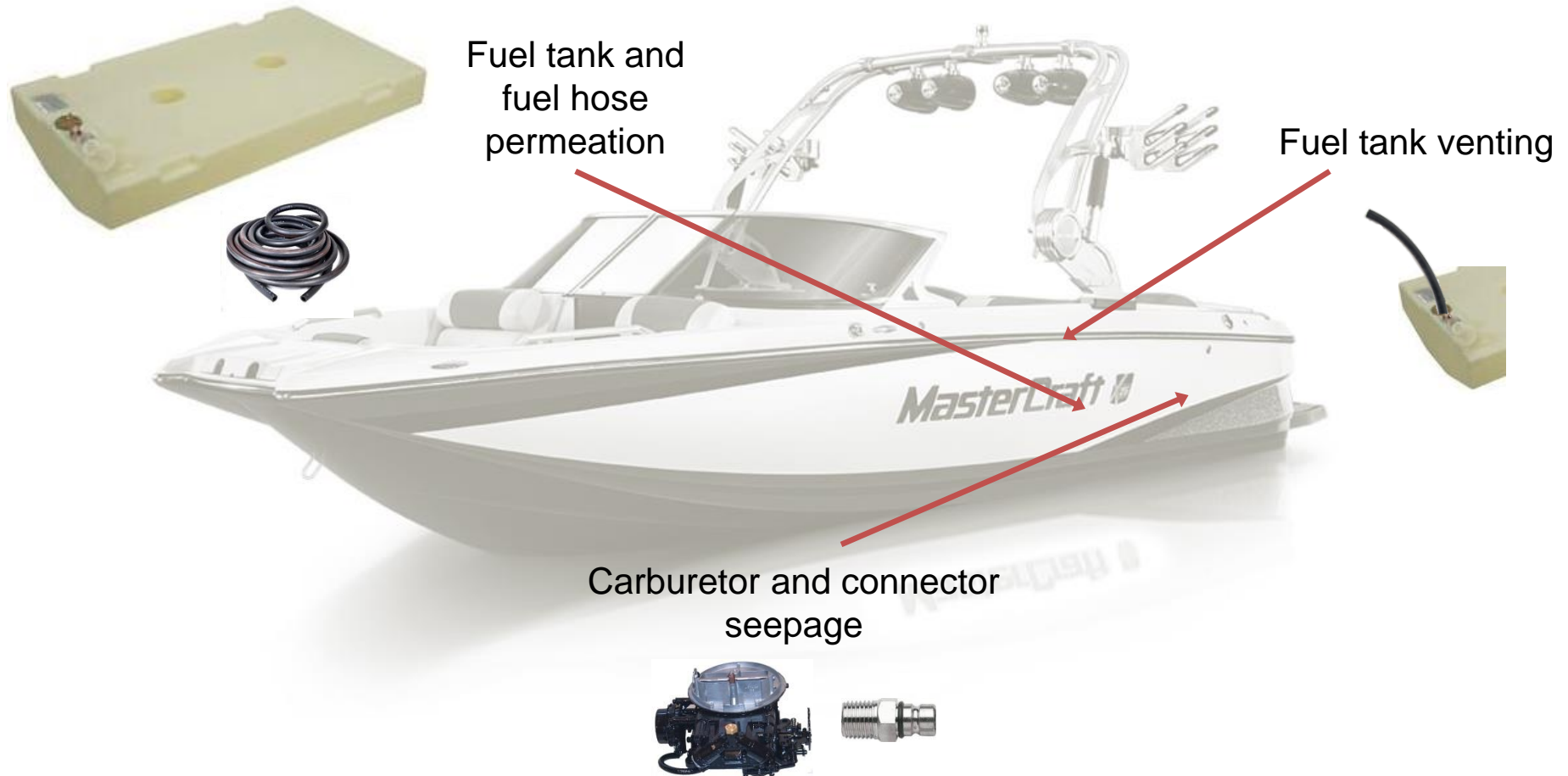
**Jet Drive**

# 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

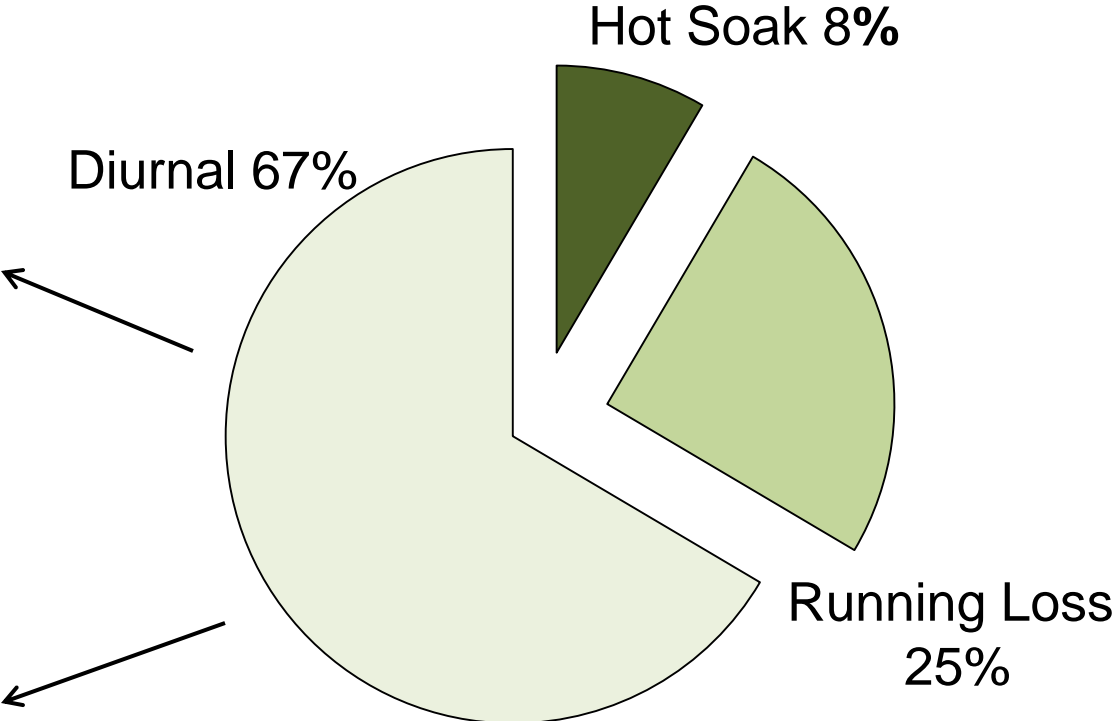
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# Diurnal Control

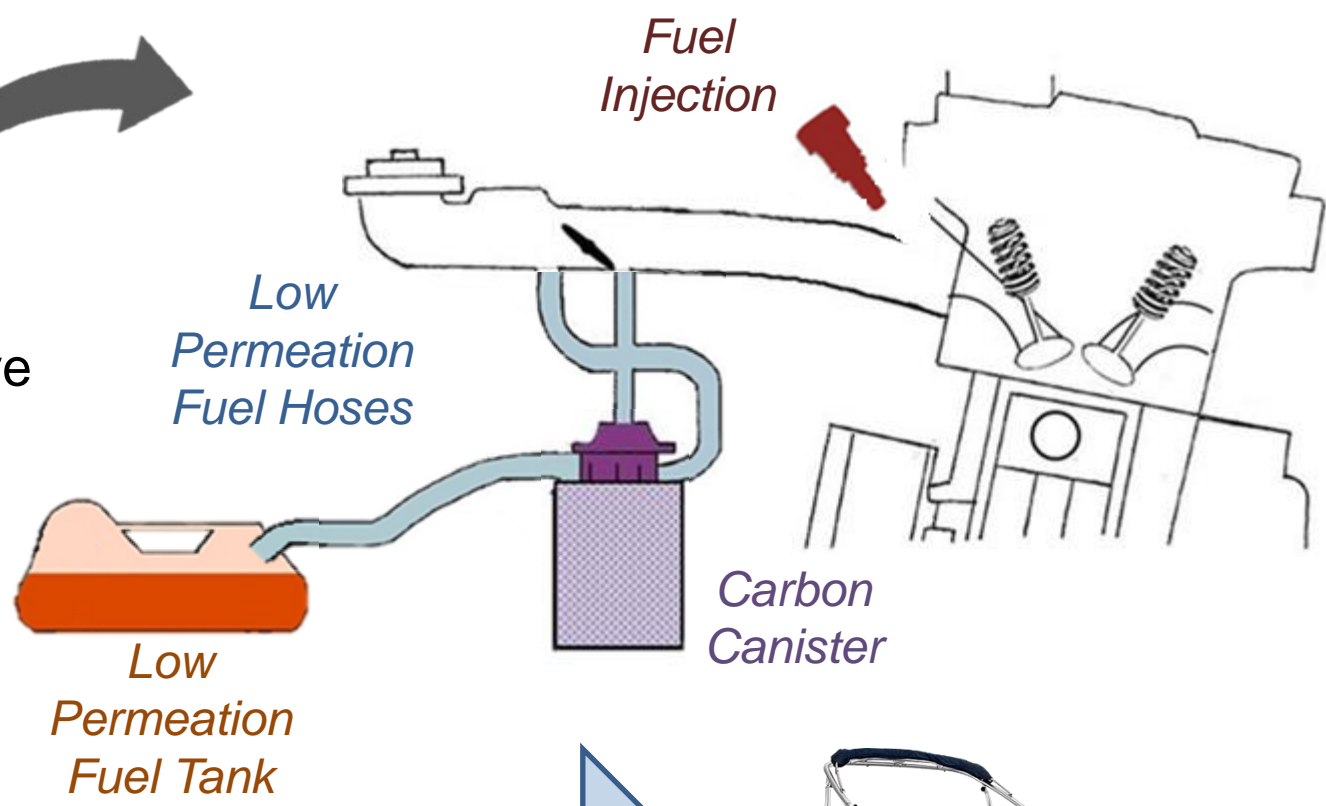


ROG Emissions

# Technology Transfer



On-Road Evaporative Emissions Control Technology



Transferred to spark-ignition marine watercraft



# Watercraft Technology Testing at ARB

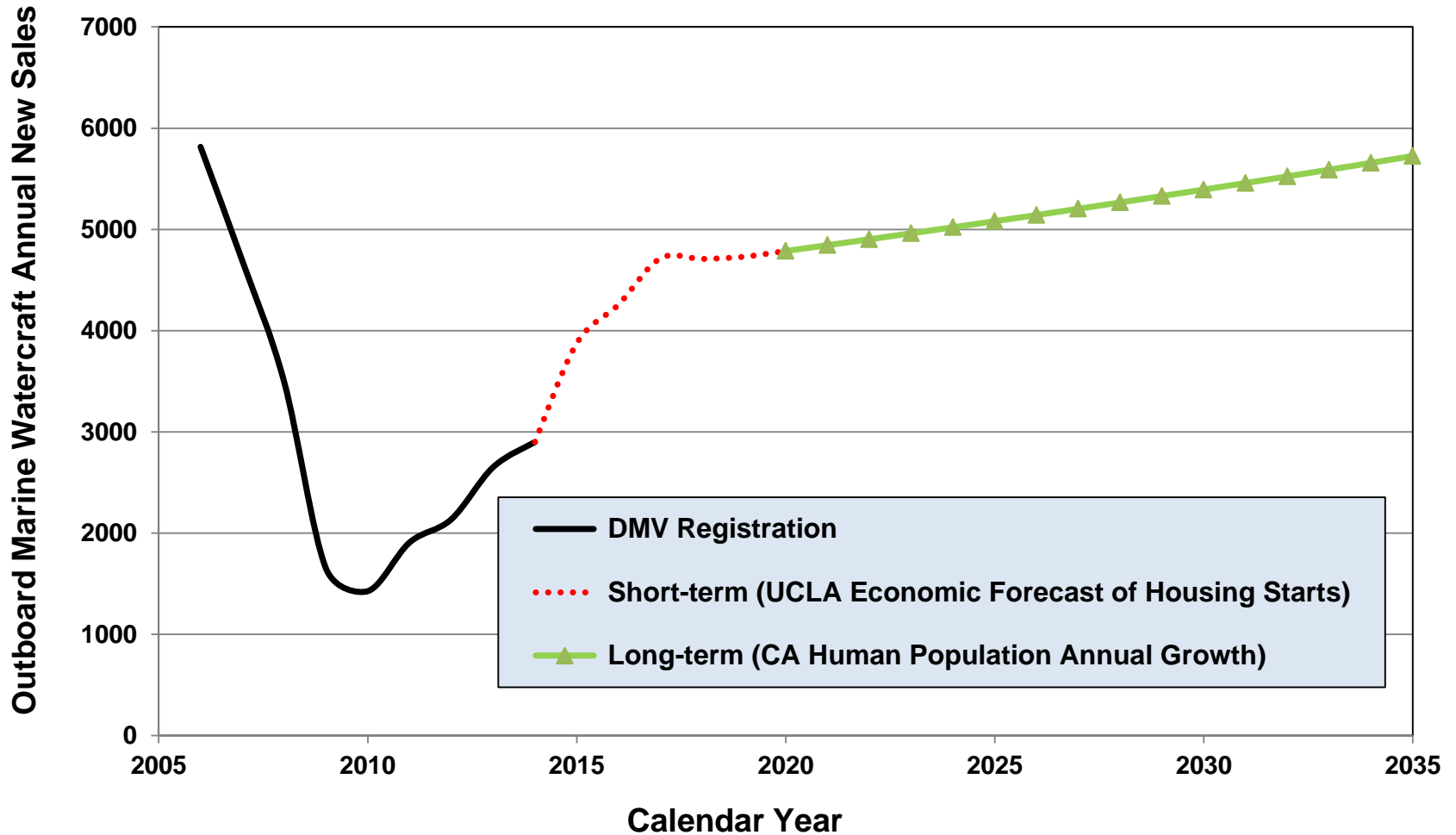
- Watercraft tested with and without evaporative emissions controls
- SHED tests performed in-house at ARB labs
  - Tested 32 representative watercraft
  - Develop emission factors



# 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

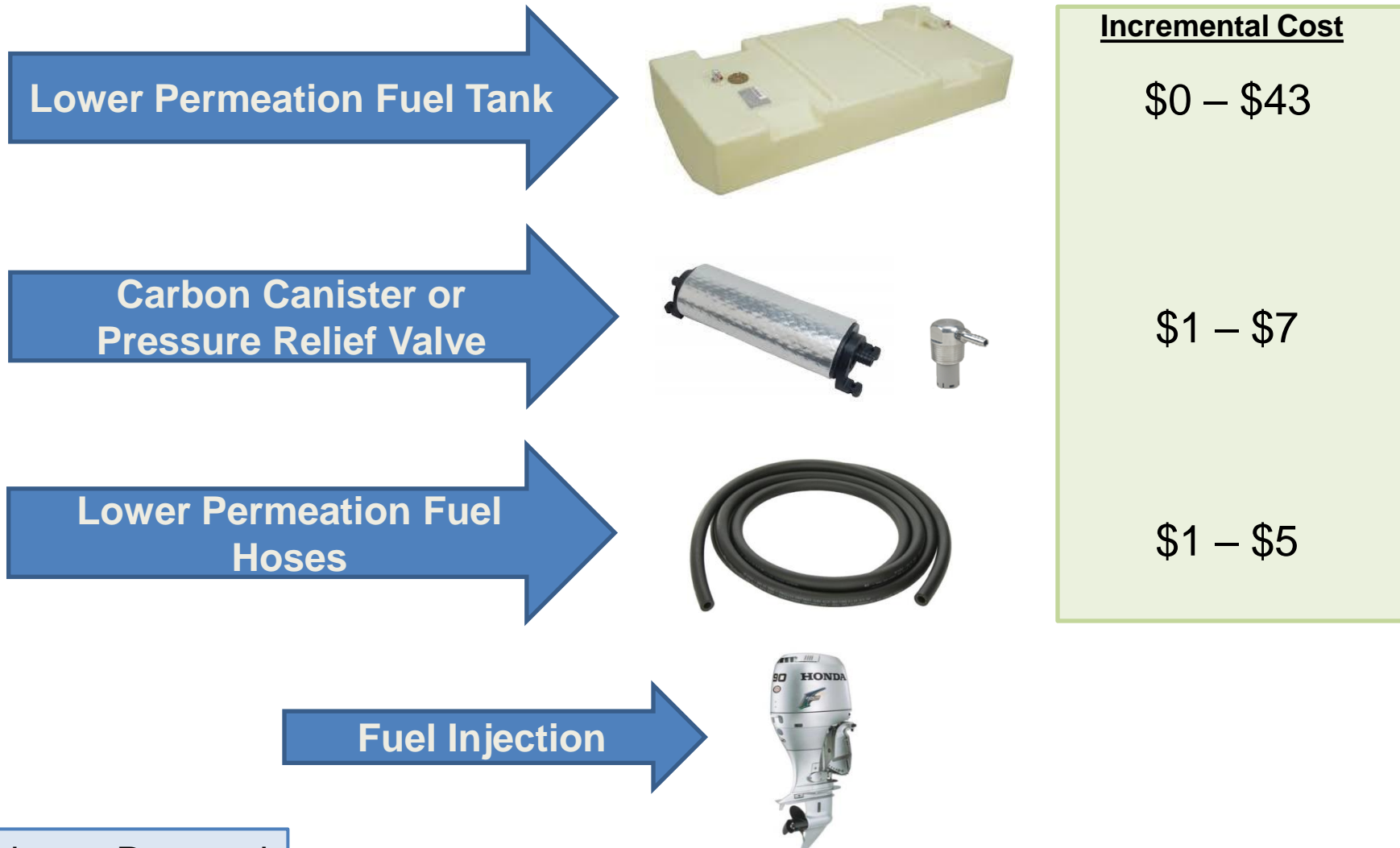
	<b>MY2018</b>	<b>MY2020</b>
≤ 30 kW Watercraft	Harmonized with U.S. EPA	
> 30 kW Trailerable/ Nontrailerable Watercraft	New fuel hose, fuel tank, venting, and fuel injection requirements	More stringent fuel hose requirements*

\*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

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

<sup>1</sup> As an alternative, fuel tanks can be certified to 2.5 grams/m<sup>2</sup>/day at 40°C

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

- Applicable to marine watercraft  $\leq 26$  ft. in length and  $\leq 8.5$  ft.in width

Trailerable Boats					
Model Year Effective Date	Fuel Hose Permeation (grams ROG/m <sup>2</sup> /day)	Fuel Tank Permeation (grams ROG/m <sup>2</sup> /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 <sup>1</sup>	0.70	0.25	65% reduction from uncontrolled HC emissions	0.4
Test Procedure	TP-1504 or SAE J1737	TP-1504 <sup>2</sup>	TP-1503		TP-1502

<sup>1</sup> Must be performed at 40°C

<sup>2</sup> As an alternative, fuel tanks can be certified to 1.4 grams/m<sup>2</sup>/day at 40°C

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

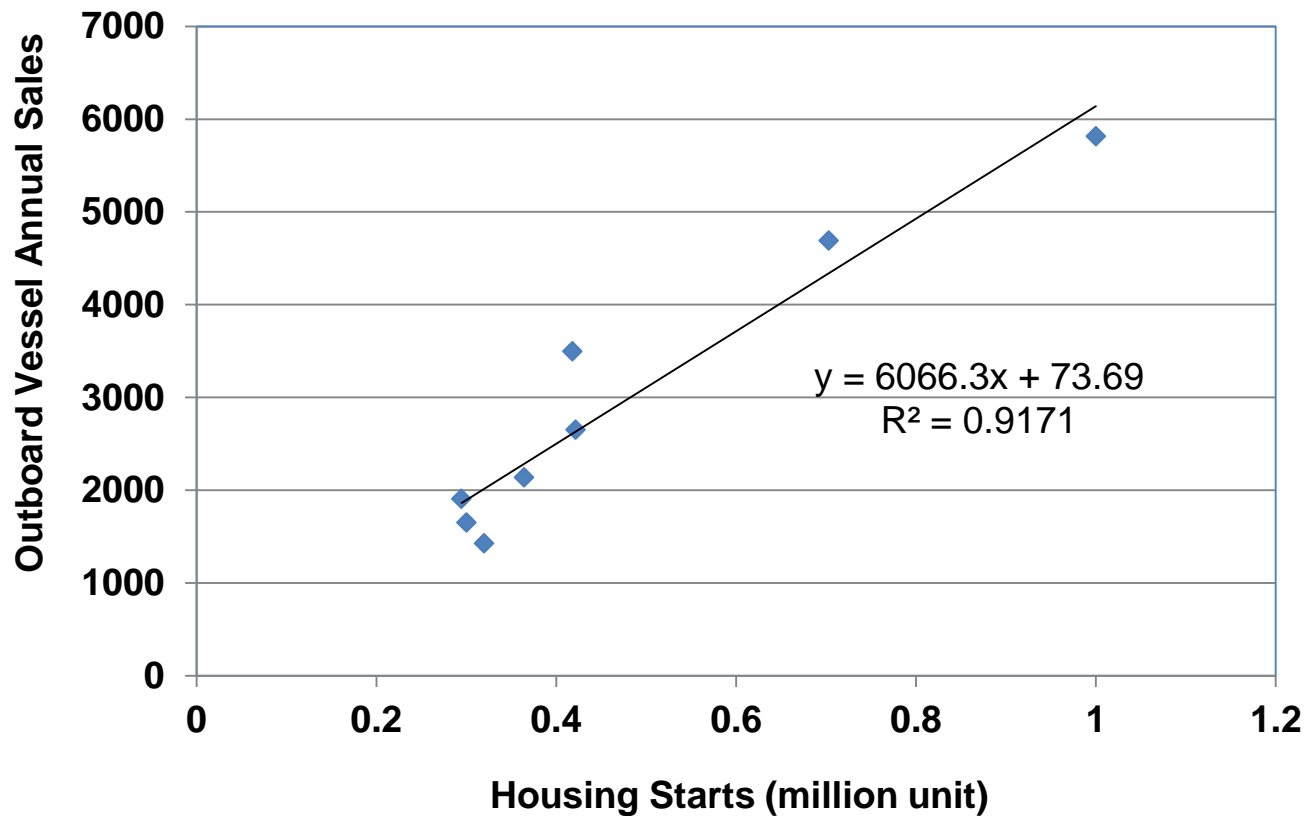
- Applicable to marine watercraft > 26 ft. in length or > 8.5 ft. in width

Non-Trailerable Boats				
Model Year Effective Date	Fuel Hose Permeation (grams ROG/m <sup>2</sup> /day)	Fuel Tank Permeation (grams ROG/m <sup>2</sup> /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 <sup>1</sup>	0.70	0.16	0.4
Test Procedure	TP-1504 or SAE J1737	TP-1504 <sup>2</sup>	TP-1503	TP-1502

<sup>1</sup> Must be performed at 40°C

<sup>2</sup> As an alternative, fuel tanks can be certified to 1.4 grams/m<sup>2</sup>/day at 40°C

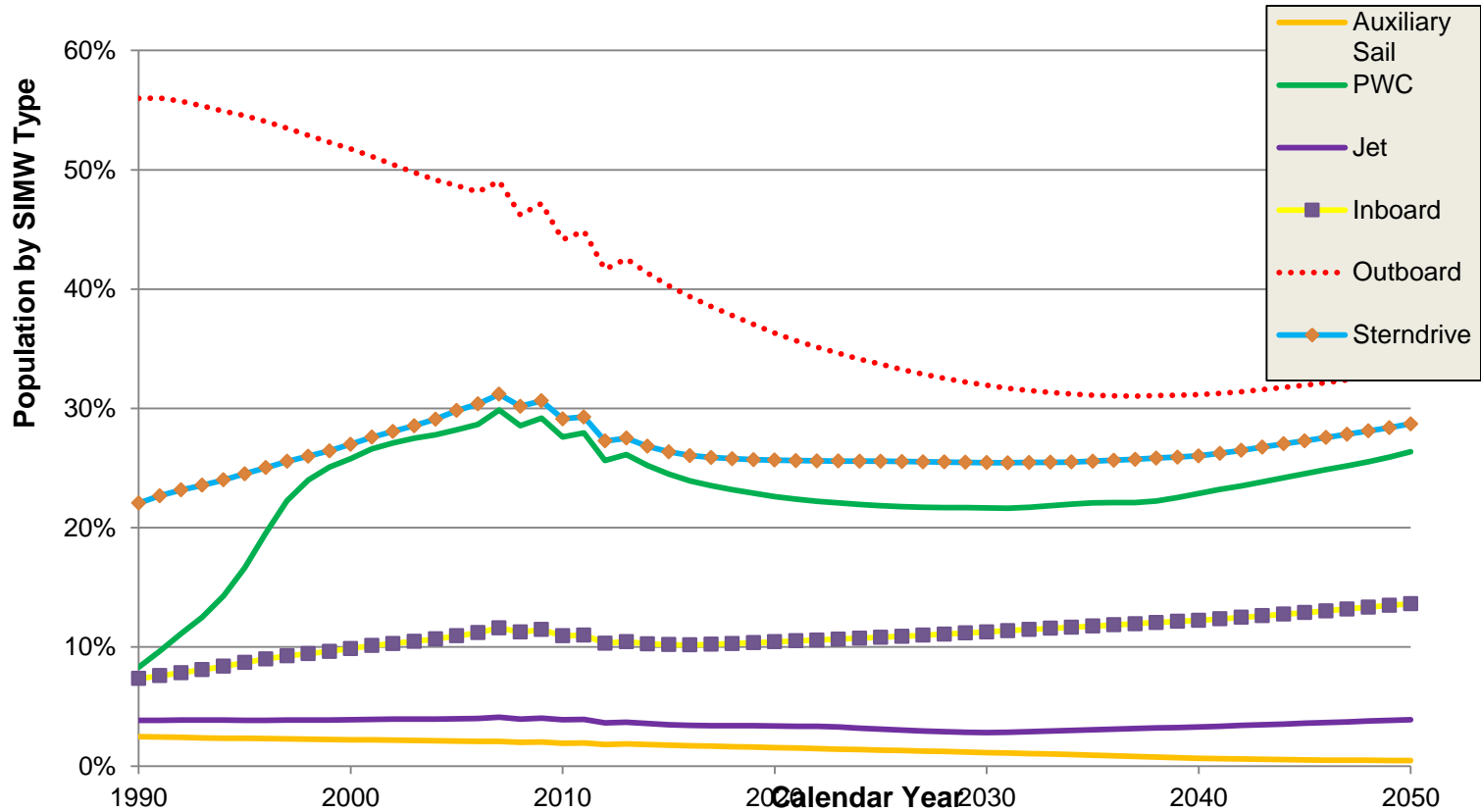
# Outboard Annual Sales and Nationwide Housing Starts



Data: 2014 UCLA Economic Forecast

# SIMW Population %

## SIMW Population



# SIMW Population

