

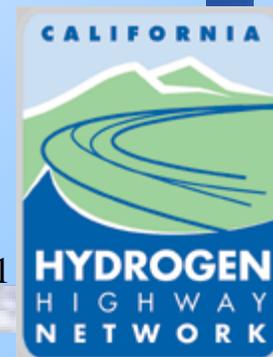
SENATE BILL 1505

ENVIRONMENTAL STANDARDS FOR HYDROGEN PRODUCTION

WORKSHOP

Sacramento: November 14, 2007

Sierra Board Hearing Room



Workshop Agenda

Part One

- Bill Review
- Applicability
- Reporting Requirements

Part Two

- Baseline Gasoline Emissions
- Hydrogen Production Emissions
- Production Scenarios

Part Three

- Renewables
- Other Concerns
- Timeline
- Next Steps



Part One

- Bill Review
- Applicability
- Reporting

Senate Bill 1505 Overview

- Directs ARB to develop a regulation for hydrogen used as a transportation fuel
- Emission reductions required relative to gasoline:
 - 50% reduction of NO_x and ROG (WTT),
 - 30% reduction of greenhouse gas (GHG) (WTW),
 - No increase in toxic air contaminants WTT
- Additional requirement
 - 33.3% renewable hydrogen

Applicability and Reporting

- Applies to dispensers of hydrogen within the state
 - Retail fueling stations
 - Non-retail fueling stations
 - Fleets (e.g. Bus fleets, Utility fleets)
 - Small demonstrations or research stations
 - Off-road fleets (e.g. Forklifts)
- Reporting
 - Fueling station owner will be the responsible party
 - If a company owns multiple stations, they must report for each station;
 - Option: one aggregate report per company

Reporting Information

(Post-Adoption)

All stations

1. Method & amount of hydrogen dispensed (kg)

State co-funded and all stations post-threshold

1. Renewable requirement and how requirement was met (kWh or kilograms of H₂)
2. Emissions of
 - NO_x plus ROG (WTT) (g/mmBtu)
 - GHG (WTW) (g/mi)
 - TAC (WTT) (g/mmBtu)

Environmental Requirements Implementation

- Stations awarded state funding after adoption of regulation
- Post threshold
 - New stations constructed after adoption of regulation
 - Stations built before adoption of regulation that upgrade, increase capacity, or change technology after adoption of regulation



Reporting Information

When to report?

- Quarterly basis
- Will begin 6 months after adoption of regulation
- Post-threshold reporting would begin 1 year after it is reached

How to report?

- Electronic on-line
- Downloadable form, either electronic or hard mail submission
- Goal: 1-2 page reporting form

Part Two

- Emissions Assumptions
- Baseline Gasoline Emissions
- Hydrogen Production Emissions
- Production Scenarios



Emissions Assumptions

- Marginal emissions assumptions from AB1007 report
 - Additional petroleum demand met through importing finished product
 - All electric power from NG combined cycle plants with BACT, NOx and VOC offsets, and in compliance with RPS
 - CA compliant fuel delivery vehicles
 - All NG imported from outside California

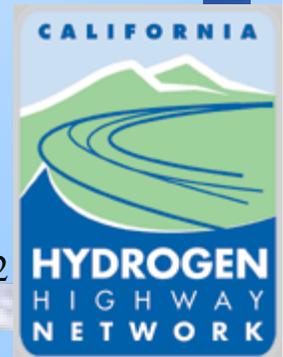
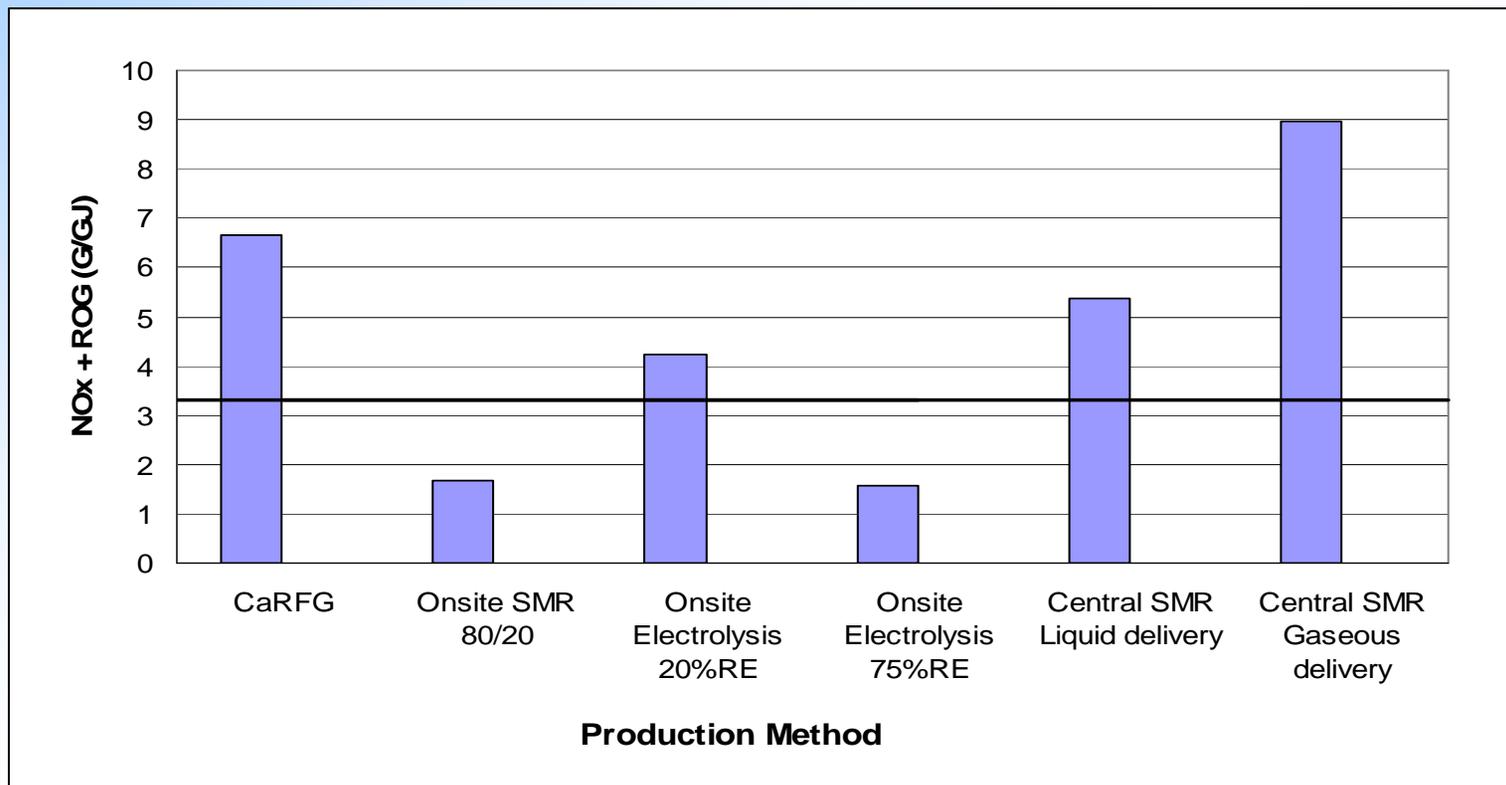
Gasoline GHG Emissions

- (WTW) GHG emissions reported in grams per mile (g/mi)
- Average New Gasoline vehicle emissions:
 - From Pavely (AB1493) regulation
 - Total derived from 50/50 split of PC/LDT1 and LDT2

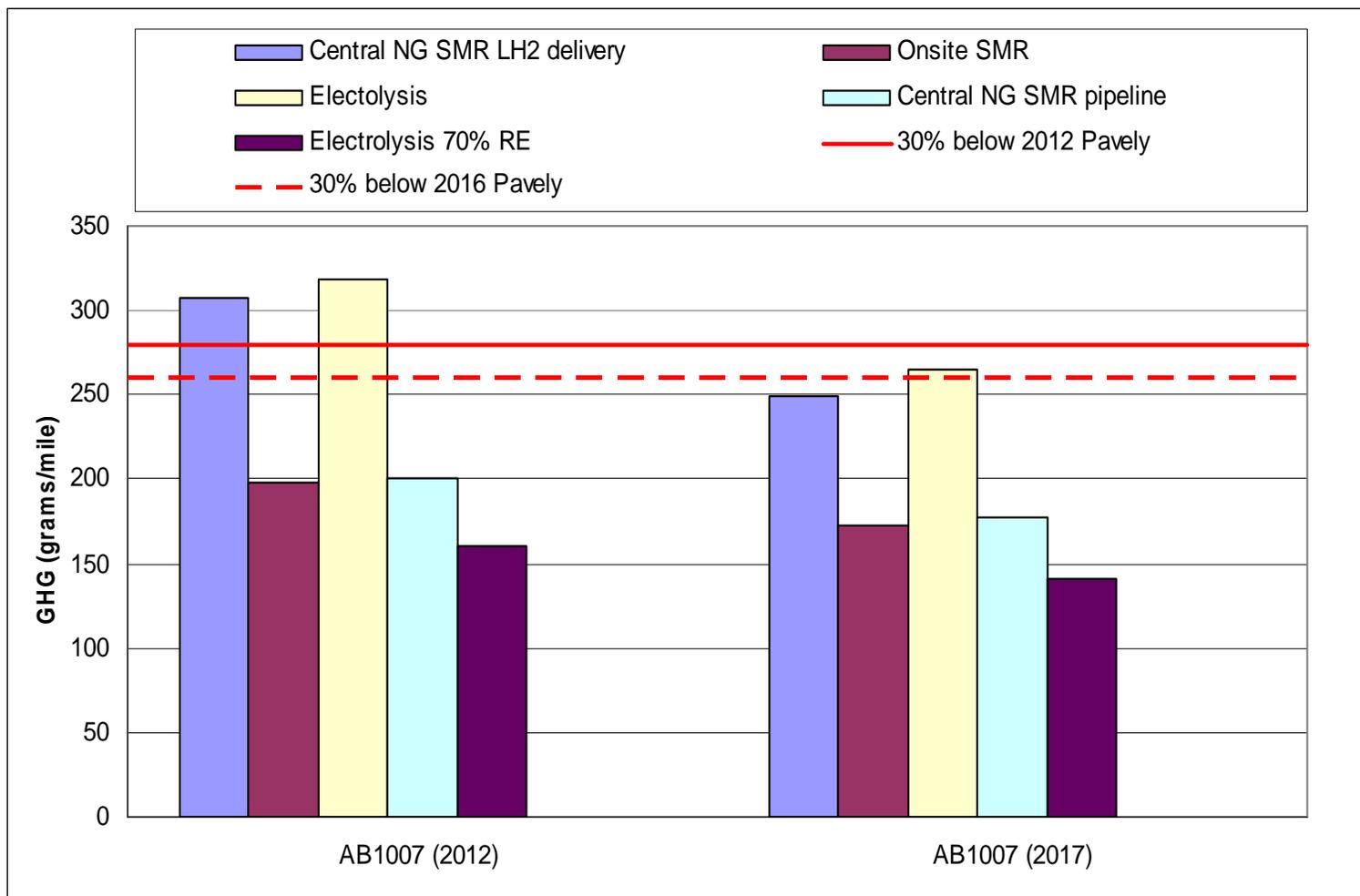
Year	PC/LDT1	LDT2	AVE	UPSTREAM	TOTAL	Total with 30% reduction
2009	323	439	381	102.7	484	339
2010	301	420	361	102.7	464	325
2011	267	390	329	102.7	432	302
2012	233	361	297	102.7	400	280
2013	227	355	291	102.7	394	276
2014	222	350	286	102.7	389	272
2015	213	341	277	102.7	380	266
2016	205	332	269	102.7	372	260

WTT Hydrogen NOx + ROG Emissions

California Blueprint Plan Analysis - Fuel Cycle Emissions Factors (g/GJ fuel)



Hydrogen GHG Emissions



Part Two: Baseline Assumptions

Gasoline Toxic Air Contaminants Emissions

- “Relevant TACs” include:
 - Acetaldehyde
 - Benzene
 - 1,3-butadiene
 - Formaldehyde
 - Diesel particulate matter
- Will compare gasoline baseline to hydrogen pathway using total relevant TACs normalized to formaldehyde

Renewable Effect on Emissions

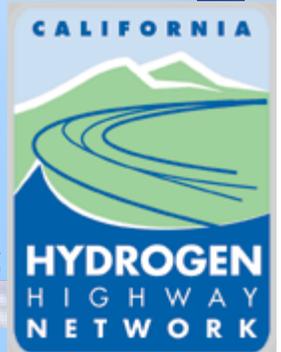
	WTW GHG (g/mi)		Urban WTT NOx + ROG (g/mmBtu)	
	Marginal Grid	33% Renewable*	Marginal Grid	33% Renewable
Central SMR LH2 Delivery	327	275	4.9	4
Central SMR GH2 Delivery	234	194	8.2	6
Onsite SMR	222	172	6.7	5.2
Onsite Electrolysis	410	241	3.8	2.2

Based on California specific GREET model

*33% is met using solar

Part Two: Baseline Assumptions

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Emissions Assumptions Concerns

- ✓ GHG emissions based on FCV fleet
- ✓ GHG emissions for blends will include hydrogen portion only
- ✓ NO_x, ROG and TAC emissions can be met at station or by supplier within air basin
- ✓ Different types of renewable energy will affect emissions

Part Three

- Renewables
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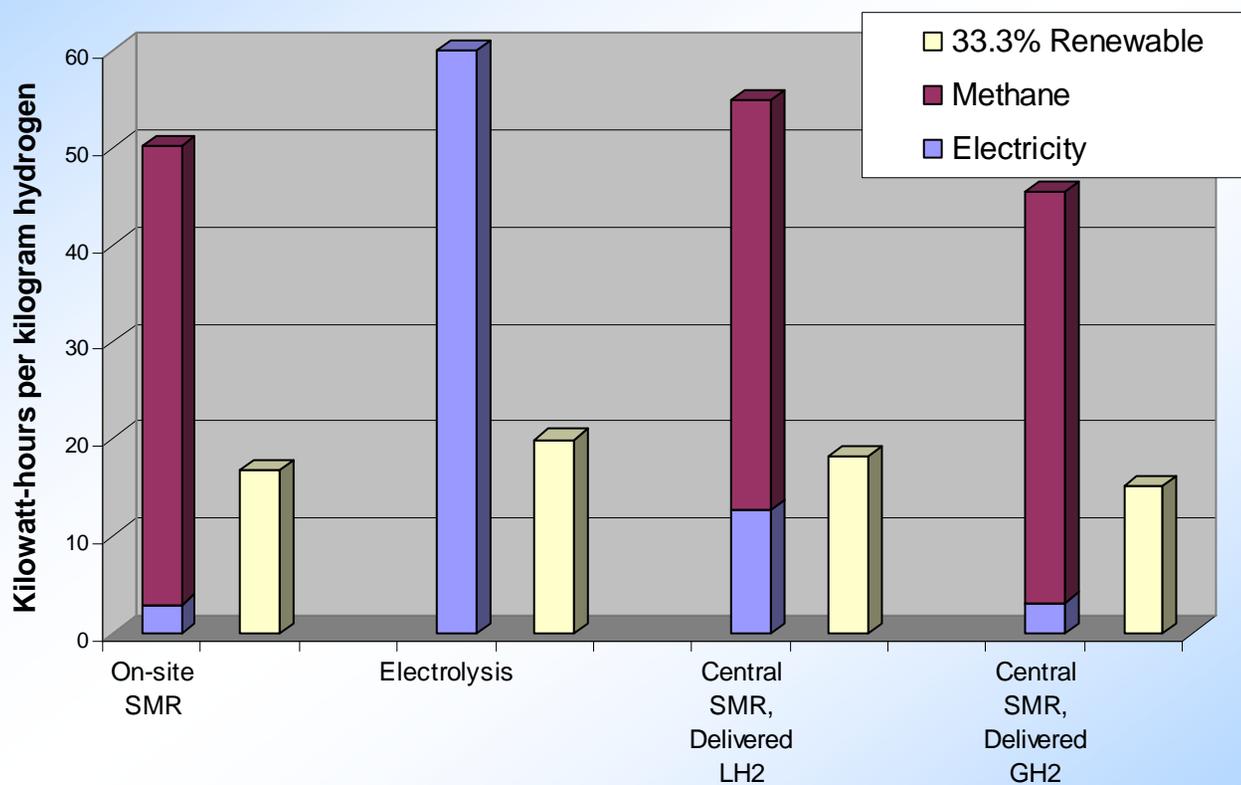
Eligible Renewable Resources

- Supports movement away from non-renewable transportation fuels
- “Eligible renewable energy resource” as defined in PUC 399.12(b)
- Cannot use renewables that have already been counted toward meeting a utilities RPS.

What is Included in the 33.3%?

- Count all energy inputs
 - feedstock (NG, digester gas, biomass, electricity)
 - production/reformation and purification
 - compression or liquefaction
 - storage and dispensing
- Convert to kWh/kg H₂ and find 33.3%, then find total (in kWh) needed based on amount dispensed
- OK to add new renewables to the grid

Hydrogen Production Energy Inputs from California Hydrogen Highway Blueprint Plan



Part Three: Renewables



Other Concerns

- ✓ Can hydrogen producers trade renewables (energy or hydrogen) among themselves?
- ✓ Tracking and assessing impact of home refuelers

Timeline



- December 2007 - January 2008
 - Develop Initial Statement of Reasons (ISOR)
- March 7, 2008
 - Release ISOR for 45 day public comment period
- April 24, 2008
 - (ISOR) presented to the Board for approval

ARB contacts

Gerhard Achtelik

Manager, ZEV Infrastructure

gachteli@arb.ca.gov

916-323-8973

Leslie Goodbody

Air Resources Engineer

lgoodbod@arb.ca.gov

916-323-2961

Ben Deal

Air Resource Engineer

bdeal@arb.ca.gov

916-322-8449

Anna Gromis

Air Resource Assistant

acgromis@arb.ca.gov

916- 323-2410

Address:

ARB/MSCD/Sustainable Transportation Technology Branch

1001 "I" Street P.O. Box 2815

Sacramento, CA 95812

Website:

<http://www.arb.ca.gov/msprog/hydprod/hydprod.htm>

