

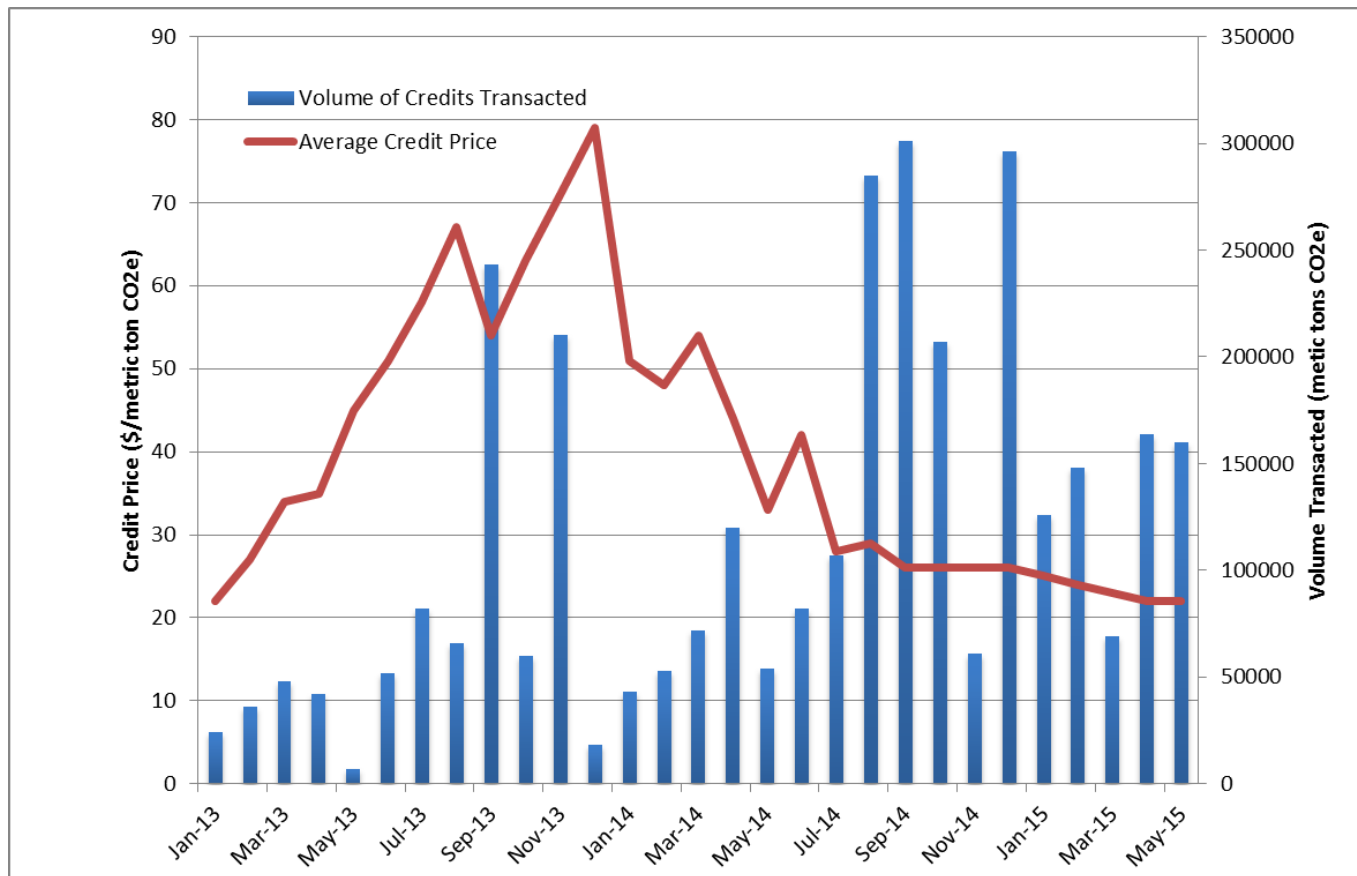
# Low Carbon Fuel Standard Update

Prepared for the Petroleum Market  
Advisory Committee  
June 30, 2015

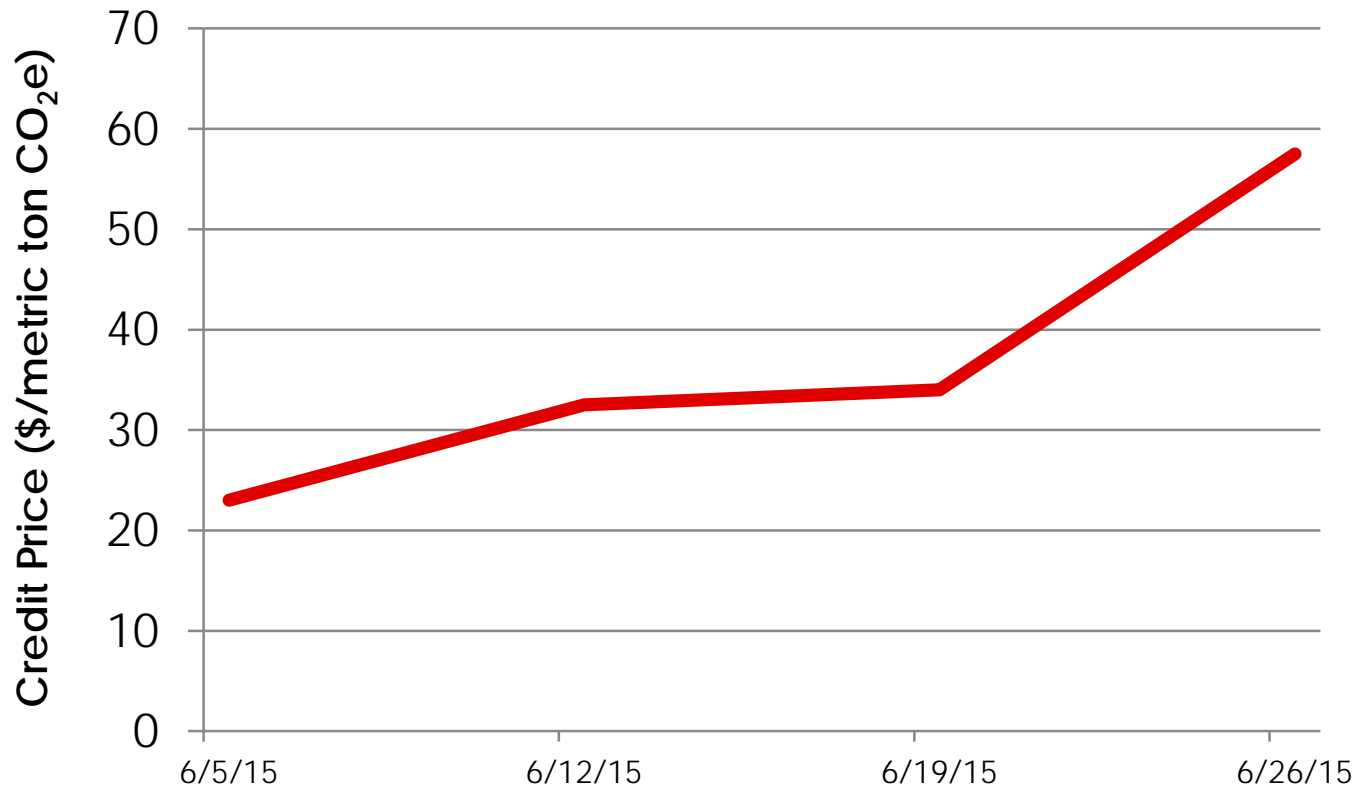
**Sam Wade, Chief**  
Transportation Fuels Branch

California Environmental Protection Agency  
 **Air Resources Board**

# Credit Prices and Volumes – Long Term Trend



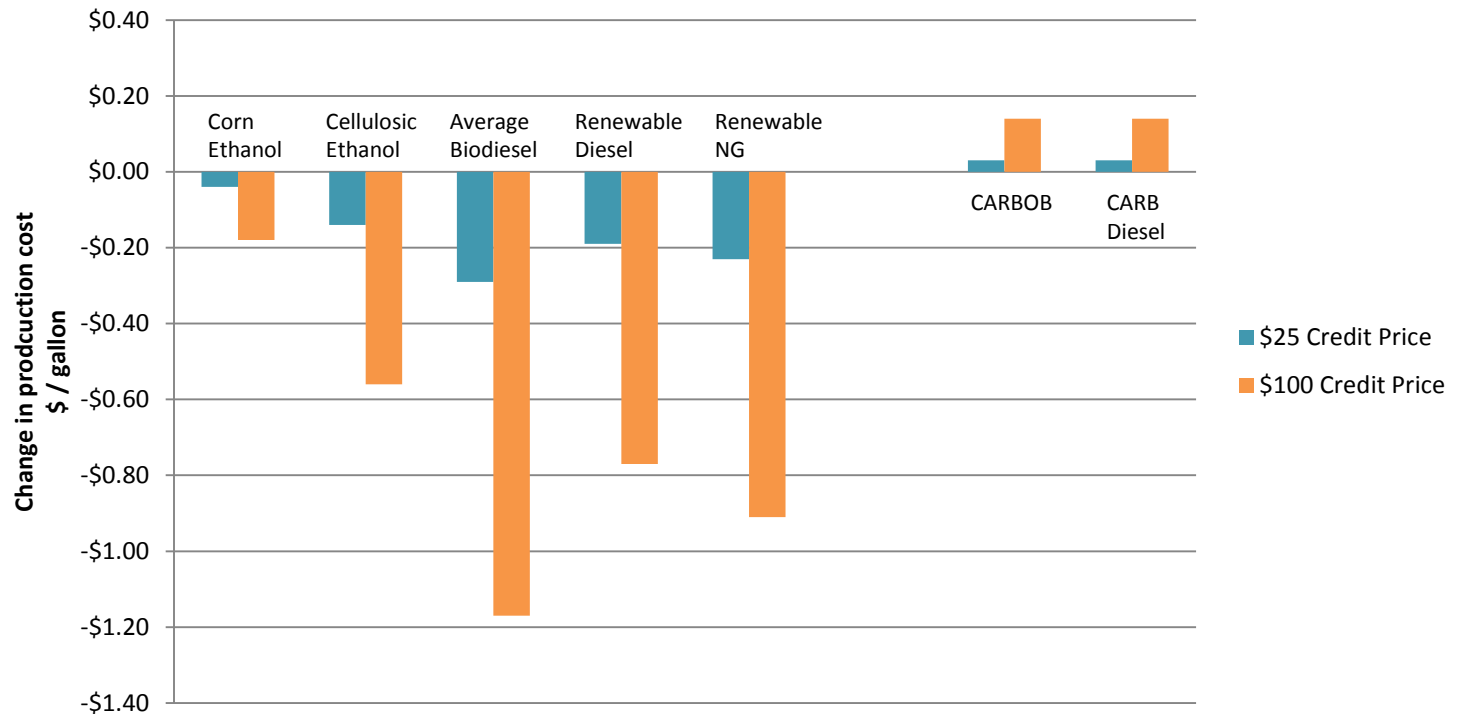
# Credit Prices – Recent Activity



# LCFS Credit Value

- LCFS credits and deficits reduce the production costs of low carbon fuels and increase the production cost of fossil fuels
- Increased/decreased production costs may or may not translate to higher or lower retail and wholesale prices for these fuels<sup>1</sup>

**Change in Production Cost due to the LCFS (2020)**



<sup>1</sup> For one description of the complexity of this issue see (Lade and Lin 2013): [http://www.its.ucdavis.edu/research/publications/publication-detail/?pub\\_id=1996](http://www.its.ucdavis.edu/research/publications/publication-detail/?pub_id=1996)

# Maximum Gasoline and Diesel Price Impacts as a Function of Credit Price

OPIS and similar publications publish \$/gallon estimates associated with current LCFS credit prices:

Credit Price	Fuel	6/26/15
\$57.50	Gasoline	\$0.0084
	Diesel	\$0.0076

As part of the documentation supporting the current rulemaking, ARB published a similar set of estimates at various credit prices for future years of carbon intensity reductions:

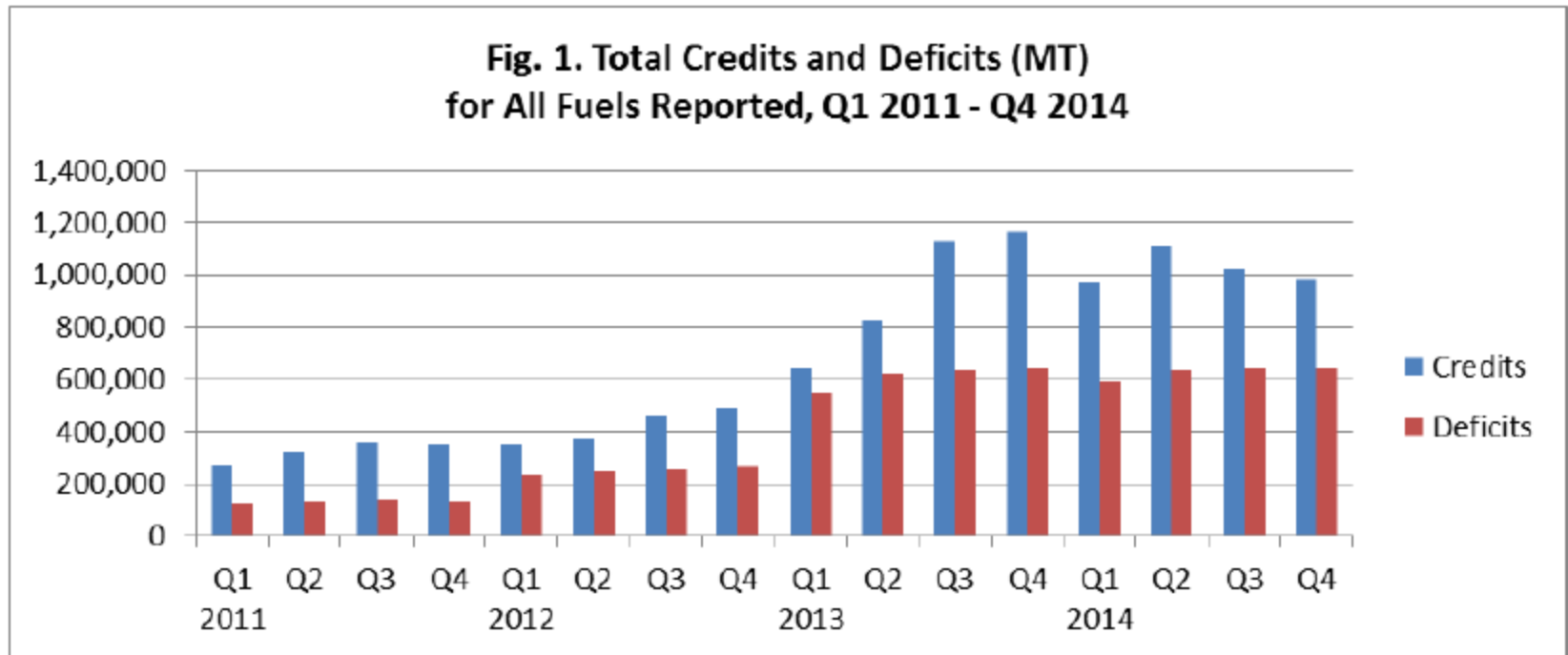
Credit Price	Fuel	2016	2017	2018	2019	2020
\$25	Gasoline	\$0.009	\$0.013	\$0.017	\$0.024	\$0.030
	Diesel	\$0.007	\$0.012	\$0.017	\$0.026	\$0.035
\$57	Gasoline	\$0.021	\$0.030	\$0.039	\$0.054	\$0.068
	Diesel	\$0.016	\$0.027	\$0.039	\$0.059	\$0.079
\$100	Gasoline	\$ 0.036	\$ 0.052	\$ 0.068	\$ 0.094	\$ 0.120
	Diesel	\$ 0.028	\$ 0.048	\$ 0.069	\$ 0.104	\$ 0.139

ARB's analysis assumes full cost pass through and doesn't account for potential changes in the marginal cost of fossil fuel production associated with low-carbon fuel substitution

Source: OPIS, ARB (see LCFS ISOR Table ES-5: <http://www.arb.ca.gov/regact/2015/lcfs2015/lcfs15isor.pdf>)

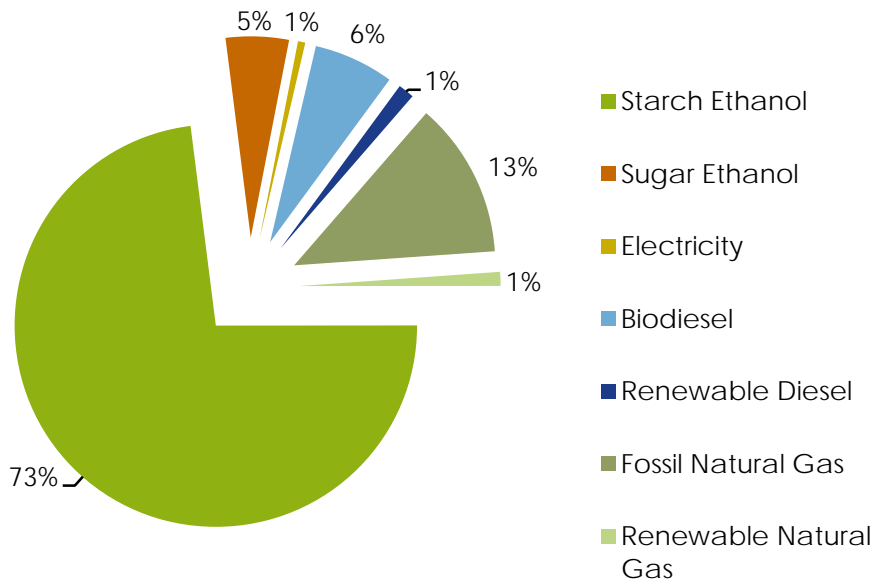
# Credit and Deficit Update

- Credit bank continues to grow

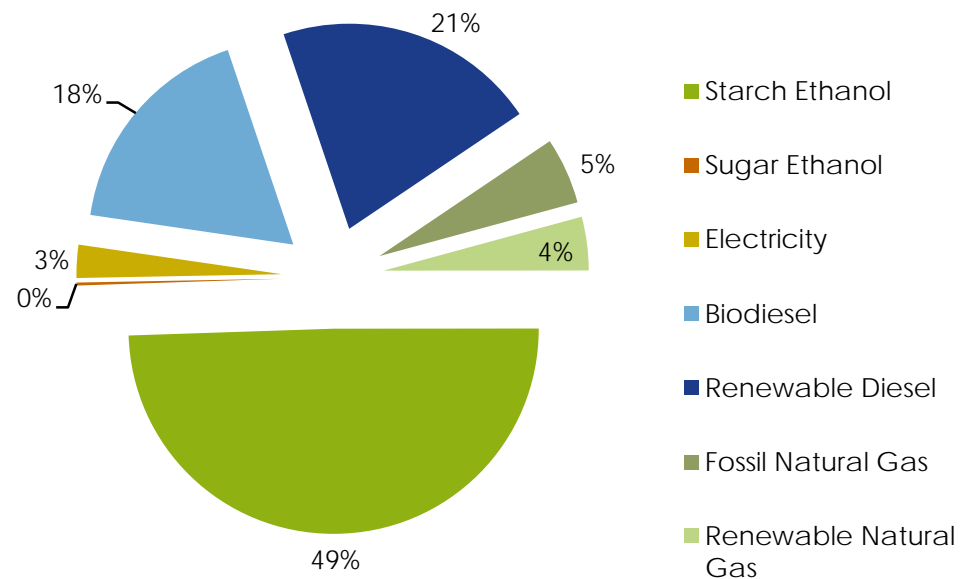


# Diversity in Source of Credits Increasing: 2011 vs. 2014

LCFS Credits 2011 - 1.3 MMT CO<sub>2</sub>e



LCFS Credits 2014 - 4.1 MMT CO<sub>2</sub>e



# Update on Proposed July 2015 Re-Adoption

As discussed at the Feb 2015 PMAC meeting, the goals of the proposed rulemaking are to:

- Address legal challenges to the program
- Clarify and enhance the regulation
- Incorporate Board's direction, stakeholder input, and lessons learned from five years of implementation
- Incorporate latest science and technical knowledge

**Board hearing on re-adoption is July 23<sup>rd</sup>**



# Changes Released Since the Last PMAC Meeting

- **1<sup>st</sup> 15-day package**
  - Finalize carbon intensities (primarily CA-GREET model adjustments)
  - Clarify refinery crediting
  - Clarify process for evaluating pathway applications (including recertification of existing legacy pathways) in 2016
  - Revise the process for electric vehicle crediting
  - Schedule program progress report for mid-2017

# Changes Released Since the Last PMAC Meeting (cont'd)

- **2<sup>nd</sup> 15-day package**
  - Clarified “provisional” pathway process for facilities that have not yet been in commercial operation for two years
  - Additional detail on the recertification process for legacy pathways, with the goal of minimizing disruption in credit generation

# Backup Slides

Additional Info

# Proposed Compliance Curve

- Retain requirement to reduce average carbon intensity 10% by 2020
- Modify interim (2016-2019) requirements to address delayed investment due to legal challenges

Year	Current Reduction Percent	Proposed Reduction Percent
2016	3.5 percent	2.0 percent
2017	5.0 percent	3.5 percent
2018	6.5 percent	5.0 percent
2019	8.0 percent	7.5 percent
2020 onwards	10.0 percent	10.0 percent

# Refinery Crediting Provisions

Split into two separate crediting sections as part of the first 15-day changes:

<b>Refinery Investment Credit</b>	<b>Renewable Hydrogen Refinery Credit</b>
<ul style="list-style-type: none"><li>• Incentivizes GHG-reduction projects at refineries (primarily through turnover of equipment)</li><li>• Limitations:<ul style="list-style-type: none"><li>• Can't be sold or transferred to another party</li><li>• Usage limited to 20% of annual deficits</li><li>• Any criteria pollutants or toxics impacts must be mitigated</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Credit if renewable hydrogen is used at a refinery used to make transportation fuels (i.e., gasoline)</li><li>• Renewable H<sub>2</sub> likely produced from renewable natural gas</li><li>• Must replace a minimum of 1% of fossil hydrogen</li><li>• Limitations:<ul style="list-style-type: none"><li>• Can't be sold or transferred to another party</li><li>• Usage limited to 10% of annual deficits</li></ul></li></ul>