

# Low Carbon Fuel Standard Smart Charging Pathway



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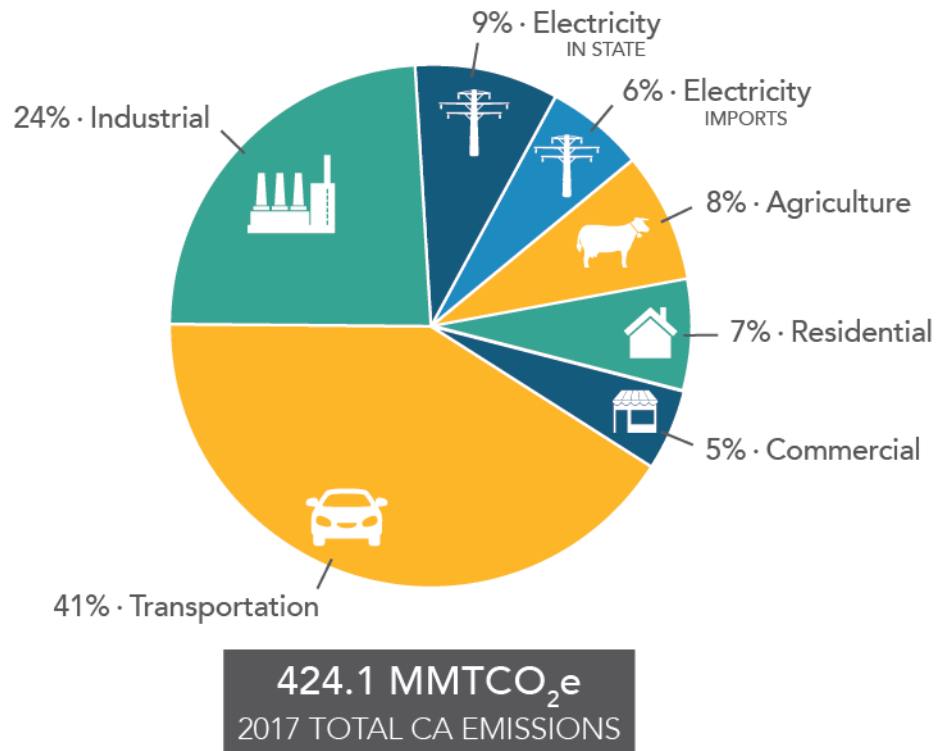
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**United Nations Economic Commission for Europe**

# Low Carbon Fuel Standard (LCFS)

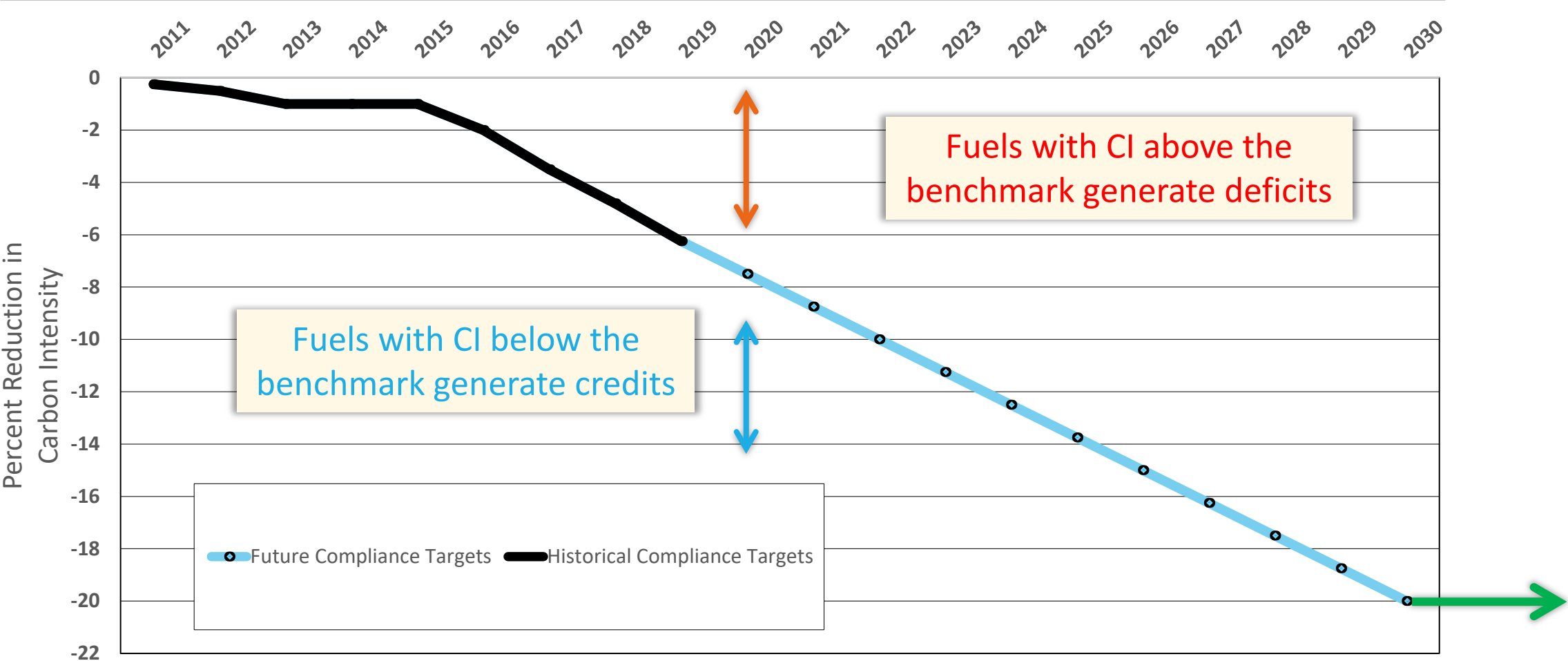
California's primary program to promote alternative fuel use in the transportation sector



- Reduce carbon intensity of transportation fuels
- Transform and diversify fuel pool
- Reduce petroleum dependency
- Reduce emissions of criteria pollutants and toxics

Transportation sector accounts for ~50% of State's GHG inventory when industrial emissions from refining and oil production are included

# Aggressive Targets Through 2030 (And Beyond)



# Credit calculation Formula

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Carbon intensities are calculated for gCO<sub>2</sub>e/MJ basis

Full Credit Value:

$$Credits(MT) = (EER \times CI_{standard}^{Fuel} - CI_{reported}) \times Electricity \times 10^{-6}$$

Incremental Credits (for residential crediting only):

$$Credits(MT) = (CI_{grid\ average} - CI_{reported}) \times Electricity \times 10^{-6}$$

# Electric Transportation Categories Eligible for LCFS Crediting

## Residential Electric Vehicle (EV) Charging

## Non-Residential Electric Transportation

### Residential EV Charging *(Base Credits)*

- Only Electric Distribution Utilities (EDU) are eligible
- Based on  $\Delta$  between California Grid Avg. Electricity CI and Gasoline Benchmark for the year

### Residential EV Charging *(Incremental Credits)*

- Entity eligible to generate credit based on hierarchy
  1. Load Serving Entity (LSE)
  2. Automaker
  3. Others
- Based on  $\Delta$  between California Grid Avg. Electricity CI and low-CI electricity

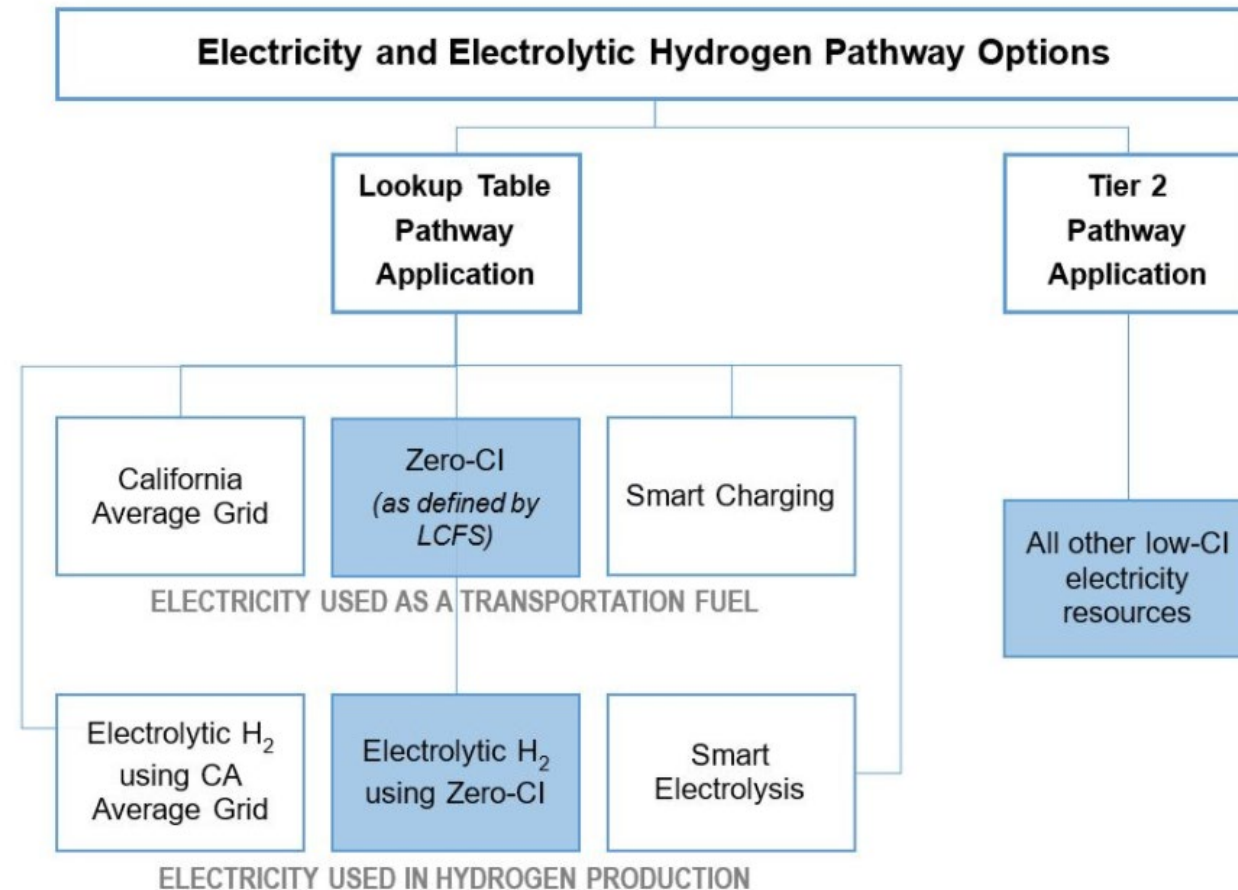
### On-Road Transportation *(Includes light and heavy-duty EV charging)*

- Public EV Charging
- Workplace EV Charging
- EV Fleet Charging (Including Transit Fleet)

### Off-Road Transportation

- Fixed Guideways (Transit)
- Electric Forklifts
- Electric Cargo Handling Equipment (eCHE)
- Electric Transportation Refrigeration Unit (eTRU)
- Shore Power to Ocean Going Vessels at-berth (eOGV)

# There are multiple electricity pathway options



# Smart Charging pathway

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- Introduced as part of the 2018 Rulemaking process
- Only eligible for EV charging and hydrogen produced via electrolysis – Entities must demonstrate that they can report data hourly and must be on a time of use rate
- Provides differential Carbon Intensities for every hour on a quarterly basis
- Carbon Intensities are calculated on the California Public Utility Commission Avoided Cost Calculator
  - This is a model developed by the E3 consultancy group which provides marginal emissions rates for different regions of California
  - CARB staff adapted the model to develop a table of neutral carbon intensity factors for the year
  - Updated annually based upon the model and changes to California Grid Average CI
- Undersubscribed by reporting entities – currently two approved pathway holders

# Smart Charging Carbon Intensity Table

- The 2021 California Grid Carbon Intensity is 75.93 gCO<sub>2</sub>e/MJ electricity (274 gCO<sub>2</sub>e/MWh)
- These marginal rates are normalized such that if one was charging 24/7 it would equal the grid average Carbon Intensity.

Hourly Window	Q1	Q2	Q3	Q4
12:01 AM – 1:00 AM	78.62	78.98	80.59	84.58
1:01 AM – 2:00 AM	78.61	78.52	78.73	81.93
2:01 AM – 3:00 AM	78.61	77.60	78.49	80.46
3:01 AM – 4:00 AM	78.61	77.55	78.41	79.98
4:01 AM – 5:00 AM	78.74	78.64	78.35	81.02
5:01 AM – 6:00 AM	82.41	84.58	79.21	90.21
6:01 AM – 7:00 AM	101.27	98.14	88.32	111.00
7:01 AM – 8:00 AM	105.99	26.35	85.14	110.15
8:01 AM – 9:00 AM	72.59	2.19	54.57	90.74
9:01 AM – 10:00 AM	27.50	1.59	6.78	37.41
10:01 AM – 11:00 AM	27.14	2.86	11.77	30.05
11:01 AM – 12:00 PM	26.82	45.35	19.86	33.68
12:01 PM – 1:00 PM	0.00	48.20	29.32	35.06
1:01 PM – 2:00 PM	0.00	49.94	83.21	36.78
2:01 PM – 3:00 PM	26.76	53.22	90.17	56.91
3:01 PM – 4:00 PM	52.40	57.69	93.83	72.98
4:01 PM – 5:00 PM	59.81	24.01	98.63	115.78
5:01 PM – 6:00 PM	98.08	28.97	121.69	136.97
6:01 PM – 7:00 PM	128.03	85.93	134.38	140.33
7:01 PM – 8:00 PM	122.74	139.08	142.06	135.65
8:01 PM – 9:00 PM	112.20	139.48	131.15	127.94
9:01 PM – 10:00 PM	93.64	115.44	111.14	114.00
10:01 PM – 11:00 PM	81.91	87.46	94.51	100.83
11:01 PM – 12:00 AM	78.74	80.25	84.53	88.33



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# THANK YOU

If you have further questions:  
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