

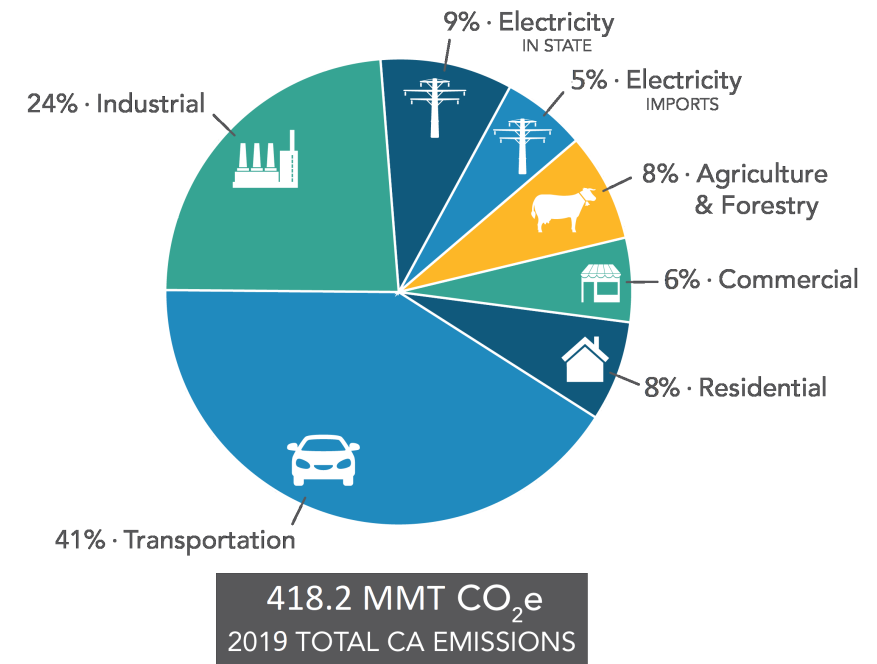
Session 9: Overview of Low Carbon Fuel Standard & Dairy/Swine Manure Fuel Pathways

MARCH 29, 2022



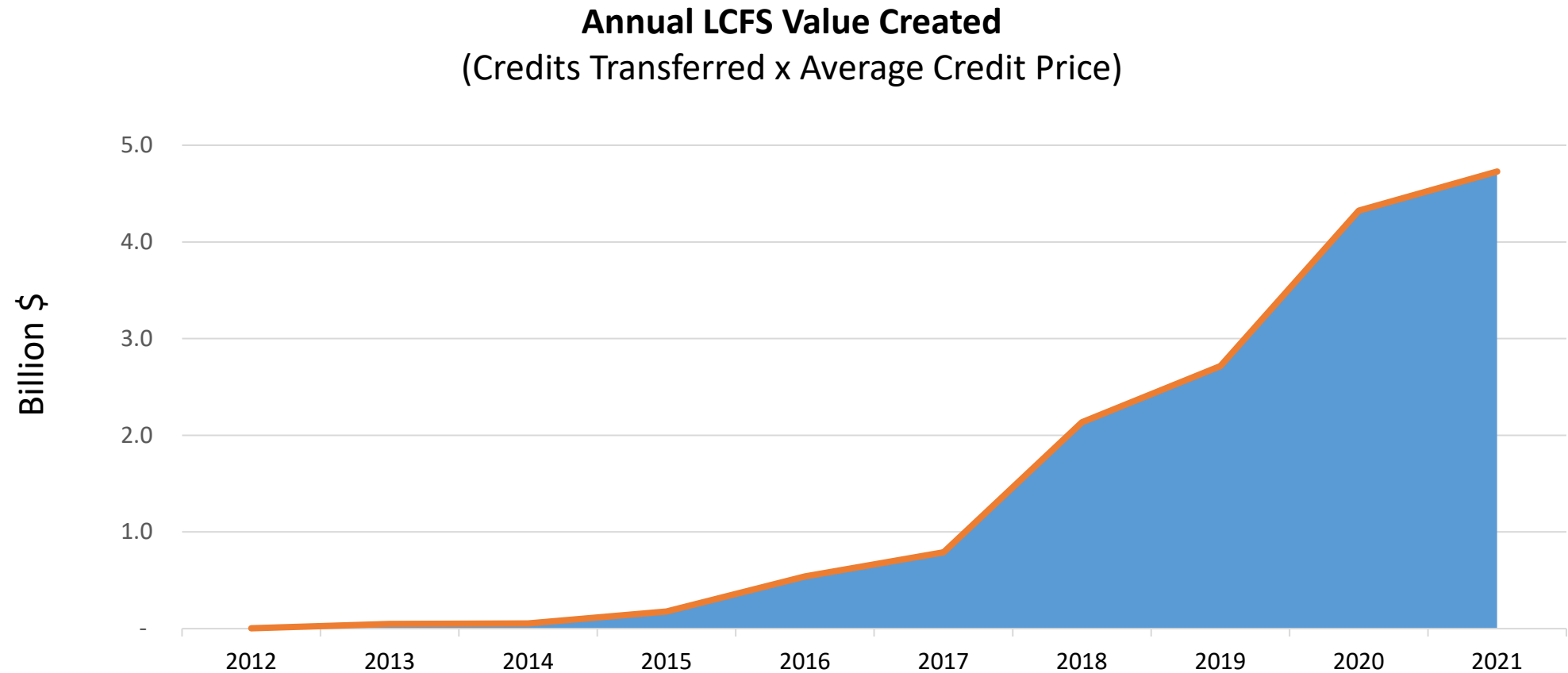
Low Carbon Fuel Standard (LCFS) History

- California's primary program to promote alternative fuel use
- **Goal:** Reduce carbon intensity (CI) of transportation fuels and diversify the fuel mix
- **Key Milestones:**
 - Early action measure under AB 32
 - Original adoption in 2009
 - First compliance year in 2011
 - Re-adopted in 2015 to address legal challenge
 - Strengthened in 2018 and 2019
- **Expected benefits:**
 - Reduce greenhouse gases (GHG)
 - Transform and diversify fuel pool
 - Reduce petroleum dependency
 - Reduce emissions of criteria pollutants and toxics



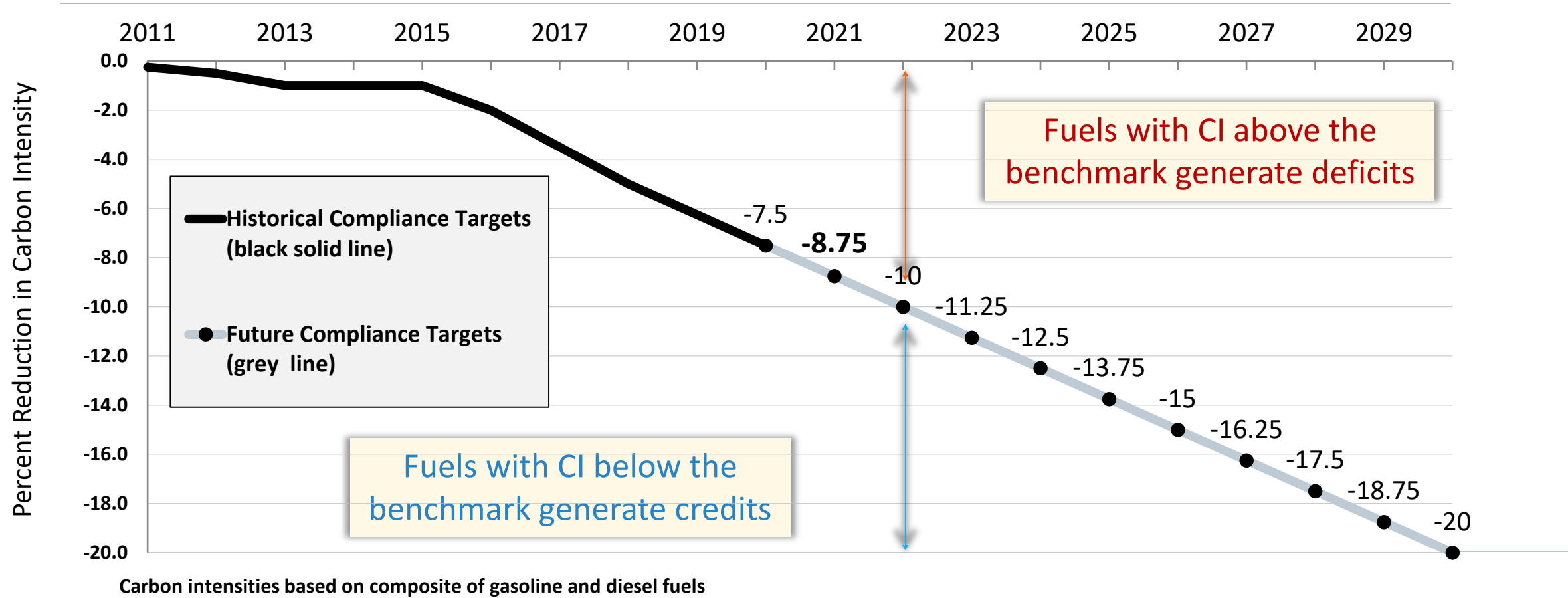
Source: 2021 Edition, California Greenhouse Gas Emission Inventory: 2000-2019

LCFS Promotes Low Carbon Fuels and GHG Benefits

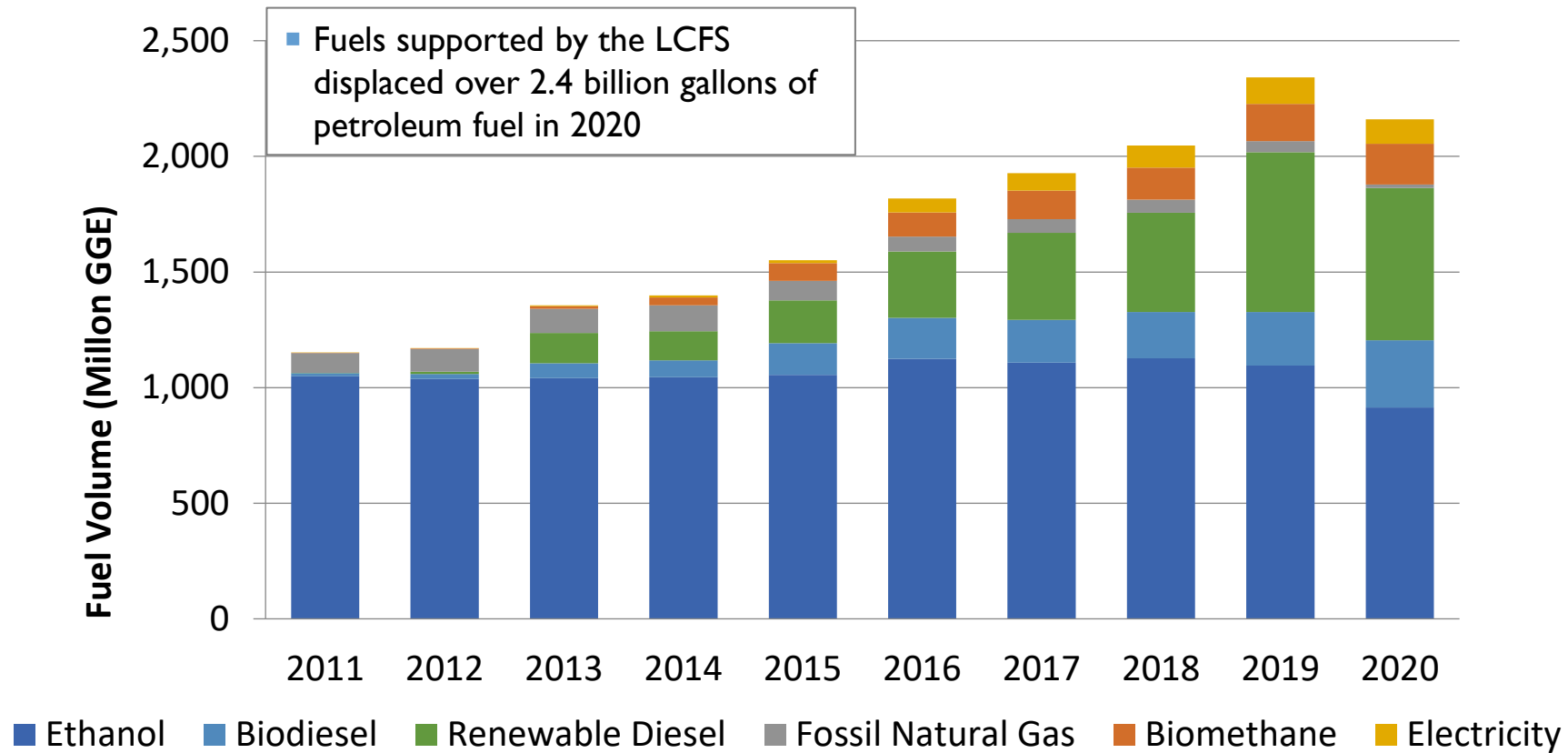


Source: LCFS Credit Transfers Activity Reports, 2012-2021

How LCFS Works – Credit and Deficit Generation



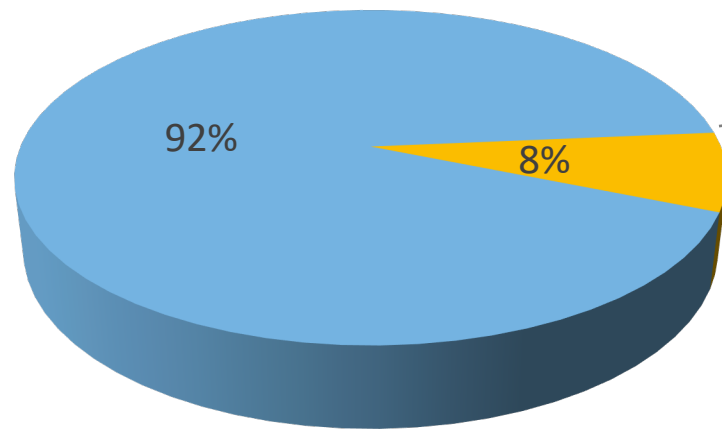
LCFS is Transforming the Fuel Pool



Biomethane from Dairy and Swine Manure (DSM)

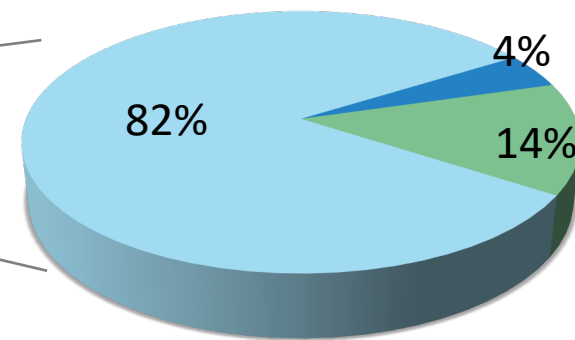
- In 2020, biomethane from all feedstock types consisted 8% of the total alternative fuel volumes, of which 14% came from dairy and swine manure. In other words, approximately 1% of the total alternative fuels reported in 2020 was biomethane from dairy and swine manure.

RNG vs Total Alternative Fuels, 2020



■ RNG ■ Total Alternative Fuel

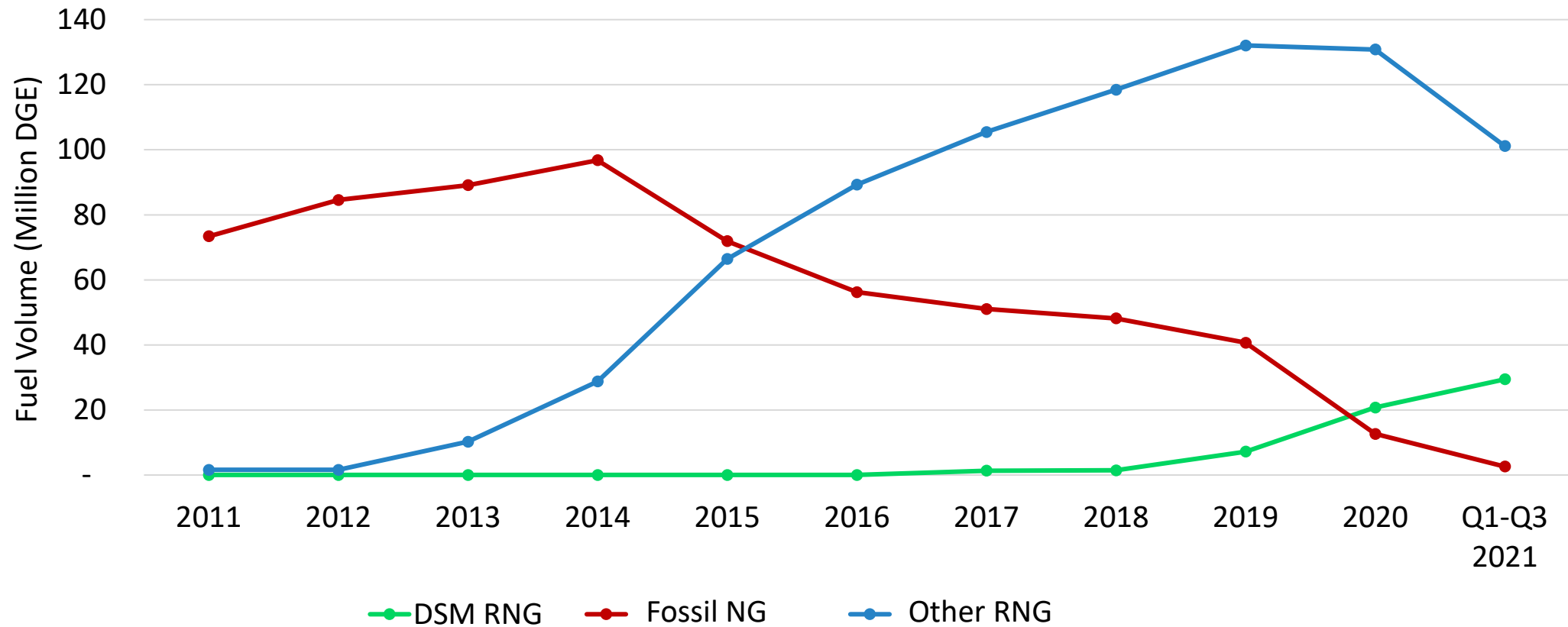
RNG by Feedstock, 2020



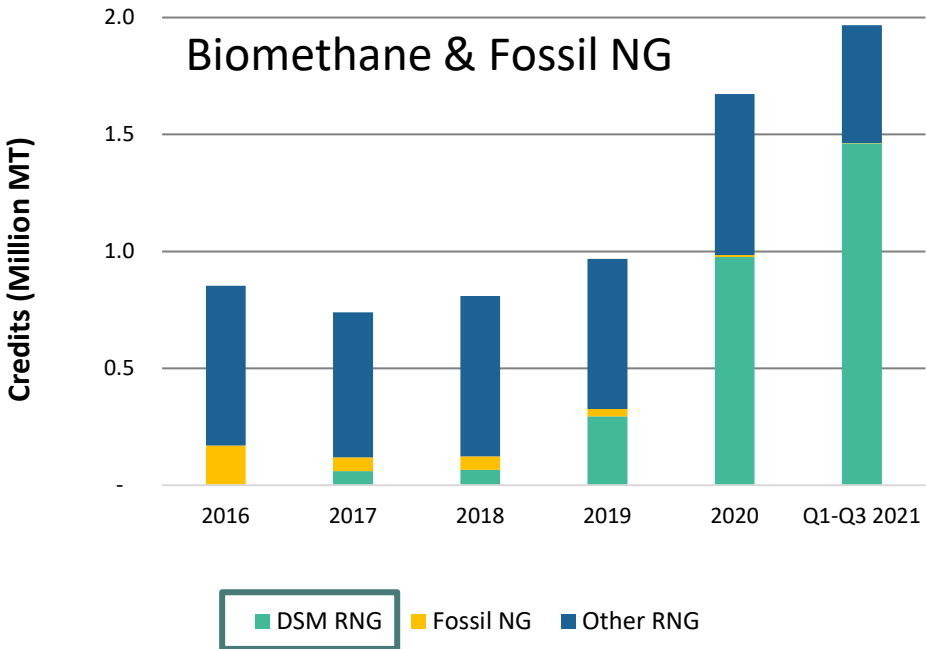
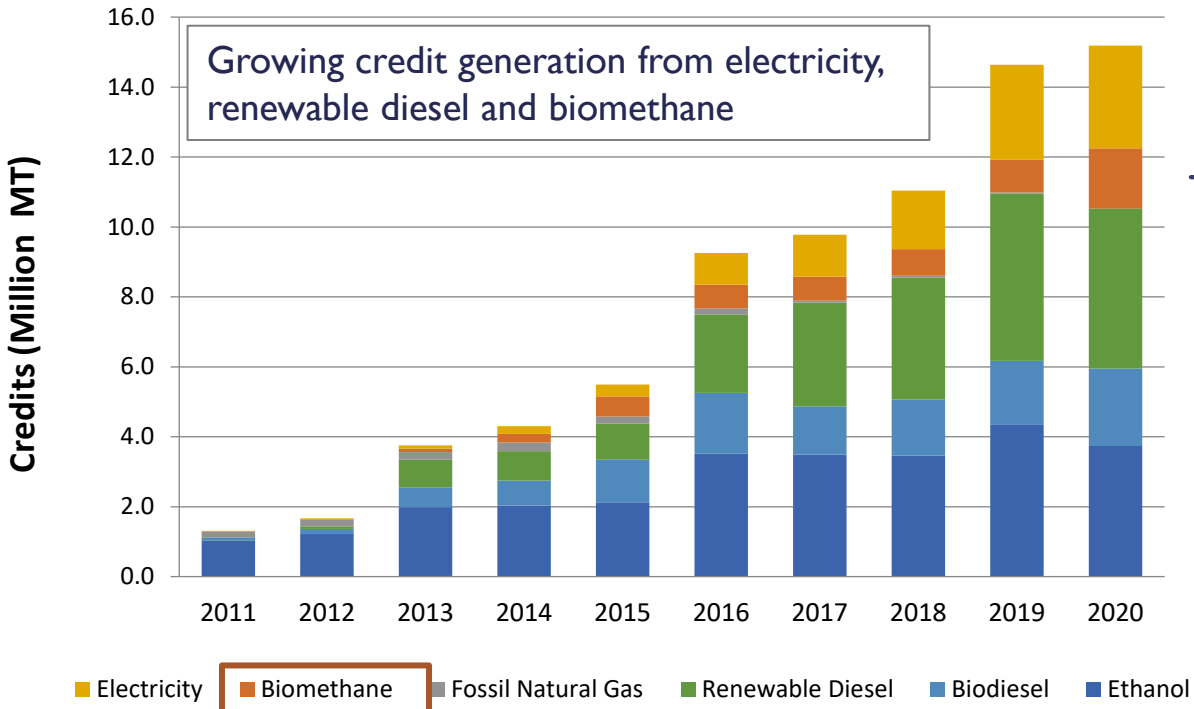
■ Landfill Gas ■ Wastewater/Organic Wastes ■ DSM

Biomethane from Dairy and Swine Manure (DSM)

Fossil NG and RNG as Transportation Fuels in California



LCFS Credit Generation



Overview of LCFS DSM Fuel Pathways

- A simplified CI calculator for DSM pathways was incorporated in the LCFS starting in January 2019 following a multi-year public rulemaking process
 - The inclusion of DSM pathways and associated calculator modifications to assess lifecycle emissions in the LCFS was developed and supported through multiple public workshops and multiple rounds of both informal and formal stakeholder feedback.
 - Following the publication of the 2018 LCFS amendments initial statement of reasons, CARB staff continued to work with stakeholders to develop the DSM pathway lifecycle modeling approach proposed to be incorporated into the LCFS during the rulemaking process, and formally responded to comments received during the 45-day and two additional 15-day comment periods in a final statement of reasons.
- The Carbon Intensity of a DSM pathway reflects the GHG reduction achieved by the digester capturing biomethane from manure management on dairy and swine farms that would ***otherwise be vented to the atmosphere*** as a result of livestock operations from those farms.

Overview of LCFS DSM Fuel Pathways

- Consistent with other LCFS fuel pathways using waste materials as feedstock, the system boundary of DSM pathways begins with manure entering the manure management system
- Consistent with all LCFS Tier 1 and Tier 2 applications, DSM pathways go through rigorous certification process and on-going LCFS compliance requirements annually:
 - Must pass CARB technical review and third-party validation to be eligible to participate in LCFS
 - Public is invited to provide application-specific comments prior to CARB certification
 - Operation (CI) and fuel transactions (volumes) are subject to annual reporting and verification
- Consistent with SB 1383, CARB ensures that eligible projects receive either compliance offset credit or LCFS credits for avoided methane for at least 10 years.

Application Review Process to Determine CI

Temporary Applications (-150 gCO₂e/MJ for DSM RNG)



- DSM applications are certified as either Temporary or Tier 2 currently
- Certified RNG CI: -135 to -532
- Certified electricity CI: -108 to -758

Tier 1 Applications (CI = life cycle specific)



Tier 2 Applications (CI = life cycle specific)



DSM Review Timeline:

~3 months*

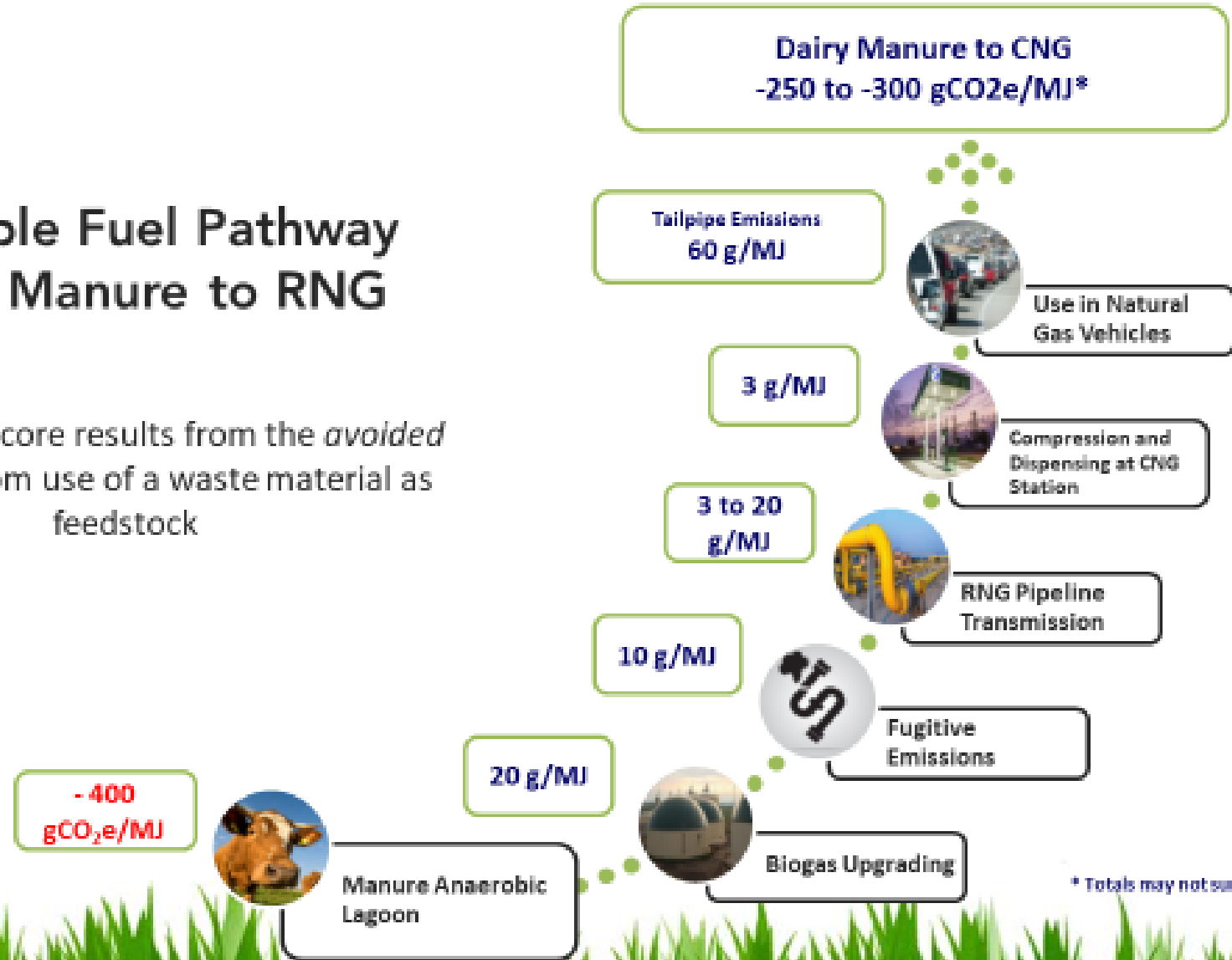
2-3 months

1-3 month*

* Dependent on applicants' responsiveness, staff resources and total number of DSM applications under review.

Example Fuel Pathway Dairy Manure to RNG

Negative CI score results from the *avoided methane* from use of a waste material as feedstock



LCFS Status & Resourceful Public Information

- 600+ pathways have been certified under the current LCFS regulation since January 1, 2019. Of these, 67 pathways are from DSM for biomethane or electricity.
 - To view all certified pathways, select “Current Fuel Pathways”
<https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities>
 - To view Tier 2 pathways posted for comments
<https://ww2.arb.ca.gov/resources/documents/lcfs-pathways-requiring-public-comments>
- LCFS has now hosted two public workshops to address upcoming LCFS regulatory updates. To receive notifications on LCFS activities, including upcoming workshops, please subscribe to the LCFS mailing list
<https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard>
- For inquiries regarding DSM pathways – please contact Rui Chen (rui.chen@arb.ca.gov), manager of the Fuel Project Evaluation Section of the LCFS program.



THANK YOU