Information Solicitation to Inform Implementation of the Dairy and Livestock Provisions of Senate Bill 1383

I. Background and Purpose

The California Air Resources Board (CARB or Board) seeks feedback to inform its work to implement Senate Bill (SB) 1383 (Lara, Statutes of 2016, Chapter 395) and respond to Board direction in *Resolution 24-14* (Resolution). The Resolution directs the Executive Officer to prepare a plan for initiating, developing, proposing, and implementing a livestock methane regulation under Health and Safety Code section 39730.7 (from SB 1383), including a timeline for rule development to begin in 2025 and Board consideration by 2028 to allow for potential regulatory implementation starting in 2030.

SB 1383 establishes short-lived climate pollutant (SLCP) reduction targets and directed CARB to approve and begin implementing the *Short-Lived Climate Pollutant Reduction Strategy* to achieve these targets. Specifically, the law sets a 2030 methane emissions reduction target for the dairy and livestock sector of 40 percent below 2013 levels (2030 target),[1] or a reduction of 9 million metric tons carbon dioxide equivalent ($MMTCO_2e$).[2] The law calls for several specific efforts including requiring CARB to work with stakeholders to identify and address technical, market, regulatory, and other challenges and barriers to dairy and livestock methane emissions reduction project development.

Since the enactment of SB 1383, CARB has collaborated with other agencies—principally including the California Department of Food and Agriculture (CDFA)—academic institutions, stakeholders, and the public to develop and administer programs and other initiatives to support and track progress towards the 2030 target. For example:

- CARB and CDFA implement multiple programs to accelerate the adoption of methane-reducing practices. These include CARB's *Cap-and-Invest* Program and *Low Carbon Fuel Standard*, and CDFA's *Dairy Digester Research and Development Program*, *Alternative Manure Management Program*, and *Dairy Plus Program*.
- Throughout 2017-18, CARB helped establish the *Dairy and Livestock Greenhouse Gas Emissions Working Group* to identify barriers to implementing methane reduction projects, prioritize research topics, and develop policy recommendations.
- Since 2016, CARB and CDFA have funded and conducted extensive research, including literature reviews, measurement campaigns, and model development to

[1] Health & Saf. Code § 39730.5.
[2] *Analysis of Progress toward Achieving the 2030 Dairy and Livestock Sector Methane Emissions Target* (March 2022).

better understand and characterize livestock sector emissions and assess the benefits, effectiveness, feasibility, and potential unintended impacts of various methane reduction strategies. These include CDFA's two research programs evaluating enteric and manure methane reduction strategies: the *Livestock Enteric Methane Emissions Reduction Research Program* (LEMER-RP) and the *California Livestock Methane Measurement, Mitigation, and Thriving Environments Research Program* (CLIM3ATE-RP).

- In 2022, CARB released the *Analysis of Progress Toward Achieving the 2030 Dairy and Livestock Sector Methane Emissions Target* (2022 Analysis) followed by a public workshop on *Methane, Dairies and Livestock, and Renewable Natural Gas in California*.
- More recently, in August 2024, CARB hosted a *Dairy Sector Workshop* and released the *California Dairy and Livestock Database* (CADD) to consolidate and improve access to facility-level data, and CDFA convened *Enteric Methane Focus Groups* to gather stakeholder input on how to effectively promote enteric methane emissions reductions.

As a result of these and other agency and stakeholder efforts, coupled with statewide declines in animal populations, the California dairy and livestock sector is expected to achieve as much as 5 $MMTCO_2e$ in annual methane emissions reductions by 2030.[3] This projected progress means that the sector must reduce annual methane emissions by at least an additional 4 $MMTCO_2e$ and maintain that reduction to achieve the 2030 target.

To inform a plan to develop a livestock methane regulation under Health and Safety Code section 39730.7 to achieve the methane emissions reductions directed by SB 1383, this solicitation seeks stakeholder input on the questions below. The feedback period will be open for 60 days, with comments due no later than March 30, 2026. In responding to the questions, please reference the question number related to the response. Respondents may also provide additional information relevant to inform staff's work to implement the statute. All responses received will be made publicly available.

Submit Comments: *https://ww2.arb.ca.gov/public-comments/information-solicitation-inform-dairy-and-livestock-sb1383*

Comment Deadline: March 30, 2026

[3] Estimate provided in CARB and CDFA's May 2024 response (*Response to Petition*, page 5) to California Climate Action's March 2024 petition for rulemaking (*2024 Livestock Methane Petition*).

II. Feedback Questions

A. Evaluating Methane Emissions Data

Staff are seeking information about data sources and data gaps on greenhouse gas emissions from California's dairy and livestock sector to better inform methane emissions estimates, the *AB 32 Greenhouse Gas Emissions Inventory* (GHG Inventory), and whether mandatory reporting regulations or other requirements may be appropriate.

The GHG Inventory relies on two primary types of inputs: emissions factors and activity factors. Emissions factors are based on robust scientific data, and multiple studies have shown that the values used to calculate emissions from the livestock sector accurately reflect real emissions measurements. Activity factors are data such as populations (number of each livestock type), management practices (e.g., how manure is treated), and animal characteristics that affect the amount of methane they generate (e.g., animal age, size, and diet). The GHG Inventory uses reliable data verified by CARB-accredited third parties to quantify certain activity factors (e.g., the number of dairy cows with manure managed in anaerobic digester systems). However, this data is only available for the subset of facilities that voluntarily participate in CARB's programs. Some activity factors rely on regional or statewide estimates that are not updated every year, including federal data sources. All parameters used to calculate annual emissions are available in the *GHG Inventory Documentation Index*.

Improving and expanding data collection and reporting supports statewide efforts to reduce environmental impacts from the dairy and livestock sector. For example, the State Water Resources Control Board is proposing a *Draft Dairy Order* that would require a whole-farm nitrogen accounting approach, tracking activity factors and management practices such as manure excretion, exports, and application, as part of its effort to improve nitrogen management at dairies.

The questions in this section solicit feedback on how the State might build on existing methods and reporting to improve tracking of progress toward the 2030 target.

1) What animal characteristic data (e.g., herd size, breed, age, diet, excretion rate) are most critical for accurate methane estimation?
2) What manure management data (e.g., deposition, collection, separation, treatment) are most important to better understand and quantify emissions and the effectiveness of emissions reduction strategies?
3) Are there gaps in regional or facility-level data availability that hinder accurate tracking of progress in reducing methane emissions?
4) Are there facility-level data sources that CARB could use to further inform methane abatement strategies, emissions modeling, or future regulatory designs?

5) Were dairy and livestock operations required to report information to CARB, what types of data should be reported and at what level of detail and frequency?
6) What role can technologies play in facilitating data collection (e.g., radio frequency identification (RFID) tags, manure flow and storage sensors, remote sensing)?
7) Are there examples of organizations (e.g., cooperatives or other supply chain points, non-profits or private companies) that collect or aggregate facility-level data for reporting purposes?
8) Are there existing programs or mechanisms for reporting in a way that is efficient and accessible for operators that could serve as suitable models?
9) What factors should CARB consider in evaluating whether a data source is appropriate to use to calculate annual emissions under the GHG Inventory?
10) Is the facility-level herd size data in the *California Dairy and Livestock Database* (CADD) sufficiently comprehensive and reliable for use in the GHG Inventory?
11) Should CARB incorporate the most recent parameters from the U.S. Environmental Protection Agency (U.S. EPA) Cattle Enteric Fermentation Model data[4] (and any future updates) to calculations of dairy and livestock enteric methane emissions in the GHG Inventory?
12) Should CARB utilize the most recent U.S. EPA manure distribution data by waste management system[5] (and any future updates) to calculations of dairy and livestock manure emissions in the GHG Inventory?
13) Should CARB incorporate the most recent U.S. EPA emission factors, including those for cattle diet characterization, typical animal mass, milk production, and nitrogen excretion rates,[6] to calculations of dairy and livestock manure emissions in the GHG Inventory?

B. Methane Mitigation Strategies

SB 1383 directs CARB to work with stakeholders to "identify and address technical, market, regulatory, and other challenges and barriers to the development of dairy methane

[4] *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2022 – Annexes*. See *Step 2: Characterize U.S. Cattle Population Diets,* Tables A-140, A-141, and *Step 3: Estimate CH4 Emissions from Cattle*, Tables A-142 and A-144.
[5] *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2022 – Annexes*. See *Step 3: Waste Management System Usage Data,* Tables A-159 and A-160.
[6] *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2022 – Annexes*. See *Annex Section 3.11. Methodology for Estimating CH4 and N2O Emissions from Manure Management*, Tables A-156, A-157, A-158, A-162, A-163, A-164, and A-165.

emissions reduction projects."[7] Since the enactment of SB 1383, agencies and stakeholders have made considerable efforts to reduce methane. The State's efforts include regulations and incentive programs to provide financial support, research to better understand dairy and livestock emissions sources, and additional efforts to identify methane emissions reduction strategies.

In response to SB 1383, CARB, in collaboration with CDFA, the California Public Utilities Commission, and the California Energy Commission, convened the *Dairy and Livestock Greenhouse Gas Emissions Working Group* and three subgroups focused on: discussing barriers and solutions related to non-digester projects, digester projects, and research needs. Throughout 2017-18, the Working Group and its subgroups held 31 meetings to facilitate discussions among government, industry, academia, the environmental justice community, and the public. In November 2018, the subgroups presented final recommendations on overcoming barriers to methane reduction projects and a research prospectus identifying potential research needs to the convening agencies. These findings have informed extensive and ongoing research efforts across agencies—including literature reviews, measurement campaigns, and model development to better understand emissions and emissions reduction strategies—on the effectiveness of alternative manure management strategies, downstream emissions from anaerobic digestion, enteric fermentation, emissions characterization, and emissions model development.[8]

CARB's 2022 Analysis integrated lessons learned through the Working Group and associated research efforts, and evaluated progress made toward overcoming barriers. CARB's 2022 Workshop on *Methane, Dairies and Livestock, and Renewable Natural Gas in California* built on this analysis to engage a wide variety of stakeholder perspectives on topics related to the State's incentive programs and progress toward the State's statutory targets.

The questions in this section build on lessons learned and progress achieved to date to solicit feedback on how the State might leverage that experience to drive additional progress toward the 2030 target.

14) Given the requirements to deploy cost-effective and technologically feasible mitigation strategies, are there specific methane emissions sources or mitigation strategies that CARB should be prioritizing for the dairy and livestock sector that are not currently deployed?

15) For any specific mitigation strategies that CARB should prioritize, what are the potential emission benefits and potential costs?

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[7] Health & Saf. Code § 39730.7, subd. (b)(2)(A).

[8] For more information on the Dairy and Livestock Greenhouse Gas Emissions Working Group or its Subgroups, including final findings and recommendations or public engagement, visit *https://ww2.arb.ca.gov/our-work/programs/dairy-and-livestock-wg*.

16) What completed or ongoing research into emerging or existing methane emissions reduction strategies should CARB be tracking or evaluating?
17) What factors should CARB consider in evaluating whether an emerging technology or management practice is a viable methane emissions reduction option (e.g., effectiveness, availability, cost, market adoption rates, others)?
18) Which existing outreach and engagement efforts by state or local agencies have been most effective in garnering collaboration and participation from community, industry, and other public stakeholders?
19) How can interagency coordination between CARB and other State, local, and federal agencies be leveraged to support industry stakeholders in adopting new practices and implementing mitigation strategies?
20) What other strategies or approaches can agencies leverage, including existing data, tools, platforms, partnerships, etc., to achieve the State climate goals?

C. Regulatory Considerations to Comply with the Statutory Requirements of SB 1383

SB 1383 directs CARB, in consultation with CDFA, to adopt methane emissions reduction regulations that are technologically feasible, economically feasible, cost effective, include provisions to minimize and mitigate potential leakage to other states or countries, and include an evaluation of the achievements made by incentive-based programs.[9]

The questions in this section solicit feedback on strategies to evaluate these prerequisite statutory requirements and other considerations in development of methane emissions reduction regulations.

21) What objectives should CARB consider in developing methane reduction regulations pursuant to SB 1383?
22) How should CARB prioritize potential additional environmental and socioeconomic co-benefits in developing a dairy and livestock sector methane regulation pursuant to SB 1383?
23) In addition to the declining total annual statewide methane emissions from the dairy and livestock sector, what metrics are most representative of greenhouse gas improvement at a facility level (e.g., methane intensity per gallon of milk, per head of cattle, absolute reductions from each facility)?
24) What types of regulatory mechanisms (e.g., prescriptive requirements on individual dairies, or performance-based requirements that could apply either individually or

[9] Health & Saf. Code § 39730.7, subd. (b).

sector-wide) could CARB consider to ensure that the dairy and livestock sector achieves the 2030 target?

25) Which entities within the livestock sector should CARB consider requirements for (e.g., individual dairy and livestock facilities, cooperatives, processors)?
26) Should CARB consider regulatory applicability thresholds or exemptions, and if so, under what conditions?
27) What methods might CARB use to evaluate the risk of economic leakage and out-of-state production shifts?
28) In addition to existing grants and incentive programs, what strategies might CARB consider to minimize or mitigate the potential for facility relocation and subsequent emissions leakage?
29) Do any emerging enteric methane reduction strategies meet the requirements described in SB 1383 (i.e., scientifically proven, cost-effective, and does not negatively impact animal productivity, animal health, public health, and are consumer accepted)?
30) Have enteric methane reduction strategies been broadly accepted by industry and consumers; why or why not?

Respondents may provide any additional information they feel is important to inform staff's work.