October 30, 2015

Ryan McCarthy
Science & Technology Policy Advisor
California Air Resources Board
1001 "I" St. Sacramento, CA, 95814
California Air Resources Board

Re: Environmental Defense Fund Comments on the Draft Short Lived Climate Pollutants Reduction Strategy

Dear Mr. McCarthy,

Thank you for accepting these comments submitted by Environmental Defense Fund ("EDF") on the California Air Resources Board ("CARB") proposal to emissions of short-lived climate pollutants ("SLCPs"). We appreciate this practical approach to addressing the impacts of climate change by developing near-term solutions for reducing this class of potent climate pollutants while continuing to address all GHG emissions in the long term. To realize the goals of the Global Warming Solutions Act of 2006 ("AB 32"), we must address both short-lived climate pollutants, as well as long term pollutants like carbon dioxide.

Similar to our comment letter on the earlier draft of the plan (see attached letter dated June 11, 2015), EDF is commenting on multiple sections of the draft strategy. In this letter, we address sections in turn by pollutant and emitting sector, starting with more general comments on SLCP's and science.

I. The science on SLCPs is clear – near-term reductions are necessary to avert climate change

As noted in CARB's document, SLCPs such as methane, black carbon and fluorinated gasses are powerful climate forcers. Even though they remain in the atmosphere for a shorter amount of time than carbon dioxide, data from the Intergovernmental Panel on Climate Change ("IPCC") suggests that approximately 25% of the manmade global warming experienced today is caused by methane emissions alone. Accordingly, reducing the emissions of short-lived climate pollutants has never been more important as the deleterious effects of climate change are becoming increasingly evident across our state, and our nation's landscape.

As explained in the SLCP concept paper, reducing SLCPs is essential to slowing the rate of warming in the near-term, considerably reducing temperatures during our lifetimes. In addition, reducing the emissions of pollutants like methane, such as from oil and gas operations and biological systems, can also result in numerous co-benefits in the areas of public, economic and ecosystem health. Accordingly, we agree with and support the strategy's continued focus on prioritizing actions with diverse and numerous benefits both inside and out of the state.

In addition, we continue to support the consideration of the Global Warming Potential (GWP) of short-lived climate pollutants on both a 20-year and 100-year scale. While we agree that GWP20 is critical in demonstrating the near-term benefits of reducing SLCPs, and that GWP100 is an ineffective indicator of

near-term climate change, opting to only use a 20-year time integral ignores climate impacts after 20 years and inherently trades away the long-term for the near-term. Because it is urgent that we reduce emissions of BOTH short- and long-lived climate pollutants (LLCPs) in order to slow warming rate and limit maximum warming, it is important to quantify emissions for both timescales. Further, because CO2-equivalence is by nature a comparison of a pollutant to CO2, reporting CO2eq using only a 20-year time horizon skews the climate benefits relative to that by CO2 (inflating them), because the benefits are actually over different timescales. (i.e. while the benefits of the SLCP reduction will be relatively soon, LLCP reduction will have benefits for centuries of which the SLCPs will not.) We therefore recommend presenting emissions using both GWP20 and GWP100 in order to be transparent with the underlying climate tradeoff; an explanation of the importance of SLCP mitigation alongside that of LLCP, as both are urgent, is also an ideal addition

II. Methane emissions from the energy sector

The SLCP strategy to reduce methane emissions from the oil and gas sector is primarily comprised of two ongoing regulatory proceedings: a CARB regulation on oil and gas production, processing and storage; and the second, effectively implementing SB 1371 at the California Public Utilities Commission ("CPUC"). Though these proceedings are ongoing, CARB assumes that they will achieve at 40-45 percent reduction in methane emissions from the oil and gas systems. While these regulations are very important to cutting methane pollution, more is needed.

A. A single unifying methane goal would be helpful for moving the state, and other jurisdictions towards reduced methane emissions

Although CARB proposes individual regulations (discussed below) that are projected / assumed to reduce methane by 40%, this is much different than setting a statewide goal of 40% methane reductions and ensuring the state will take necessary actions to meet it. A unified goal can have a powerful impact on the North American effort by clearly articulating that California has a goal for methane reductions. Such a goal would explicitly cover both new and existing sources, and in this case includes local distribution. As other jurisdictions look to California for action, this goal would bolster the state's credibility for action, and potentially have a positive impact on other jurisdictions who may be looking for guidance on setting targets.

B. CARB regulation on oil and gas production, processing and storage.

At present, CARB is in the process of developing a second draft of its regulation for oil and gas production, processing, and storage. However, for CARB to achieve the goal of 40-45% reduction in methane emissions from oil and gas production, processing, and storage as laid out in the SLCP draft strategy, the rule should require all feasible and cost effective approaches to reducing methane emissions. CARB should take this opportunity to continue its leadership in reducing air pollution, and implement a strong rule – with particular focus on controlling pollution from both new and existing facilities, and requiring frequent and comprehensive inspections of oil and gas facilities.

Significant scientific research has been devoted to the issue of methane leaks from oil and gas operations, and it is clear that many leaks tend to be unforeseen and unpredictable, with a large portion of emissions coming from a small amount of facilities. Accordingly, inspections must be comprehensive and regular – with quarterly inspections using state-of-the-art leak detection equipment. Four other

major oil and gas producing states (Colorado, Pennsylvania, Ohio and Wyoming) have already required operators to conduct quarterly inspections – California should not lag behind.

These other states also provide flexibility in the technology used to detect leaks, for example allowing operators to use IR cameras (optical imaging) and/or Method 21. IR cameras provide the benefit of being able to survey the facility from a safe vantage point, not putting inspectors in harm's way by requiring them to climb on top of a tank to check a hatch. A conservative estimate also suggests that that state-of-the-art technology can facilitate the inspection of a facility in twice the time of Method 21, potentially boosting environmental outcomes. Again, California should not lag behind by ignoring the massive benefits that faster and cheaper leak detection regimes can entail.

C. CPUC implementation of SB 1371 and incorporation of methane leak reduction into investor owned utility rate applications

EDF is a party to the rulemaking (R. 15-01-008) implementing SB 1371, as well as the ongoing general rate cases for all three investor owned gas utilities (SoCalGas, SDG&E and PG&E). As part of these efforts, EDF is currently working with CARB, the CPUC and utility staff to develop and implement new requirements that achieve the methane reduction goals set out in the law.

As stated in the SLCP paper, SB 1371 directs the Commission to adopt rules and procedures that provide for the maximum technologically feasible and cost-effective avoidance, reduction t repair of leaks and leaking components. At the same time, CARB staff participate to conduct analysis of collected utility emissions data, develop quantification protocols, and identify mitigation strategies. Furthermore, utility staff propose new methods to find and fix methane leaks, while using money received from ratepayers in a manner that is just and reasonable.

Like the forthcoming CARB oil and gas regulation, for California to achieve the 40 to 45% reductions in methane emissions, the CPUC and CARB processes in the SB 1371 rulemaking and utility rate cases must put in place strong rules to reduce emissions and change the business as usual, with regard to methane. Not only is it important to develop new and accurate emissions factors to determine total GHG emissions, but California must also look towards a future when some emissions factors become obsolete and direct measure methane measurement with categorization based on general size distributions (small, medium and large) is the new norm. This huge technological advancement will allow utilities to prioritize leaks more efficiently and fix the largest leaks first, prompting the reduction of emissions and increasing safety. Such a transition is especially relevant since utilities in California currently receive about $ 4 billion every year to operate the statewide distribution system and must continuously look for and apply the best technology to improve the safety of the system as a whole.

To ensure that California achieves the goal of minimizing natural gas leaks from the CPUC regulated utilities, those utilities must also be required to use the maximum technologically advanced equipment and strategies for addressing leaks. EDF urges CARB to help the Commission develop a dynamic list of appropriate technology that is available for regulated utilities use in leak detection and repair, or set a standard that requires use of the best available and most current technology. For example, mobile mounted methane analyzers can identify methane concentrations in the atmosphere on a parts per billion basis, while the handheld devices currently in use by some utilities can only identify methane concentrations above 6 parts per million. Ensuring that leaks are actually detected is essential to understanding the extent of methane emissions in California.

III. Methane emissions from the agricultural sector

A. Dairies and dairy digesters

EDF supports CARB's goal to reduce methane emissions by supporting the development of anaerobic digesters and finally breaking the log jam that has allowed for a significant amount of uncovered biological waste from dairies to exist throughout the state. Furthermore, setting ambitious "targets for existing dairies to reduce methane emissions from dairy manure management by 20 percent in 2020, 50 percent in 2025, and 75 percent in 2030," establishes important goals by which to track and facilitate progress.

Meeting new pollution reduction goals will take significant focus and resources from the agency to reduce digester cost barriers. The state currently has 12 digesters and meeting the 2020 goal is estimated to require as many as 80 additional digesters. At a current cost of approximately $10 million each, a total investment of $800 million is warranted, for which three key strategies should be employed to meet this initial goal – incentive funding, energy and offset contracts, and grid interconnection.

The dairy digester industry in California is still in its infancy. Digester projects are expensive, relative to other renewable energy projects, and in California they are even more expensive as a result of NO_x requirements of the San Joaquin Valley Air Pollution Control District and groundwater protection requirements of Regional Water Quality Control Boards. To bring these costs down and make projects economically viable, incentive funding is necessary to develop the next generation of digesters, along with energy sales agreements and GHG credits (discussed below). We are currently at a point where developers are coming up the learning curve and field level experiences are starting to speed the creation while decreasing the cost of the next generation of digesters. Unfortunately though, between the end of 2013 and mid-2015, no digesters were built in the state; and only four digesters were built prior to the end of 2013 using stimulus funds under the American Recovery and Reinvestment Act of 2009. From January to July 2015, CDFA announced the funding of an additional seven projects. Without additional funding, digesters will not get built at the scale CARB seeks. To meet the goals set out by the state, this funding will need clear requirements and guidelines that, once met, developers can access. Allocating the funds through RFPs will make digester development more difficult and unlikely for the state to meet its targets.

Even with incentive funding at the $100 million per year suggested by CDFA and put forward in the Draft Strategy, digester projects need access to long term energy and offset contracts to cover both the additional development costs as well as the ongoing operation and maintenance costs. For electricity generation, EDF supports the rapid implementation of SB1122 through the CPUC, which is critical to the development and expansion of dairy digesters. Furthermore, we support the continued use of the Compliance Offset Protocol for Livestock Methane capture until the state reaches its goal of reducing methane emissions from dairy manure management by 50 percent. This offset protocol has been the final push to get the most recent California digesters over the finish line.

The final piece in getting dairy digesters developed is the challenge of interconnection – of which there are multiple challenges. For electricity interconnection, complex bureaucracies and project lead time have resulted in several digesters having to wait more than a year in the utilities queue to be reviewed. This delay is an impediment to the small businesses creating digesters.

For dairies looking to inject their methane into the natural gas pipeline, the gas quality requirements and stacked charges appear to be generally unachievable. For example, AB1900 requires that dairy biogas must be upgraded to a BTU value of 990 BTU/SCF before it can be placed in the natural gas pipeline – and since dairy biogas has a natural maximum limit of approximately 1000 BTU/SCF, achieving 990 requires extraordinary and expensive processing costs.

Finally, as new digesters are developed, they need to be constructed in a manner to avoid methane leaks. Recent evidence from scientific institutions like CalTech and NASA have documented methane leakage of digesters at several points. We recommend CARB develop standards to reduce methane leaks at construction and a monitoring program to periodically check leaks throughout operation.

B. Compost

EDF supports CARB's approach to "use compost in innovative ways to support the development of healthy soils." To that end, EDF supported and oversaw the development an offset protocol with the American Carbon Registry entitled "Greenhouse Gas Emission Reductions from Compost Additions to Grazed Grasslands." This protocol provides the structure to increase soil carbon sequestration through the application of compost to grazed grasslands. This practice has been proven through research by UC Berkeley on multiple Mediterranean grasslands throughout the state. To be adopted more broadly throughout the state, additional research is needed, specifically in arid and semi-arid climates.

C. Enteric emissions

1. Adopting new metrics to achieve enteric emission reductions

We agree with CARB that it is of utmost importance to reduce methane emissions from enteric fermentation. However, we would like to emphasize that it is important that total methane reduction is the result of increased production efficiency that achieves reduced methane emission intensity – expressed as the amount of enteric methane produced per unit of product. This would be in accordance with other protocols[i,ii] and voluntary GHG registries[iii], which measure emissions reductions per unit product, such as fat corrected milk. We recommend that reductions are expressed over energy corrected milk or total energy produced as milk or meat.

Setting a goal of reducing total methane emissions from enteric fermentation can lead to reduced emissions in California but not necessarily a reduction in carbon footprint of milk. Accordingly, it is important to reduce methane emissions per unit of product to lower the carbon footprint of milk in the future. For example reducing the number of cows without increasing milk production per cow will result in reduced total emissions, but not reduced carbon footprint of milk. If in-state milk production is not able to meet the demand of milk in California it could result in increasing milk import from production systems outside of California resulting in GHG leakage. As Californian milk production is very efficient, it is likely that imported milk will have a greater carbon footprint compared with milk produced in California. Consequently, the described scenario would reduce emissions in California but increase net emissions globally. Therefore, we believe CARB should expand the goal in the SLCP plan for reducing enteric methane emissions to include a second goal to reduce emissions per unit of product, i.e. emission intensity. This would be in addition to maintaining the current goal of reduced total emissions while resulting in reduced enteric emissions by producing milk with a lower carbon footprint.

In addition, if CARB aims to reduce global emissions, we recommend that the goal should solely be to reduce emissions per unit of product, which would allow the Californian dairy industry to continue growing and export milk to areas that produce milk less efficiently (with a greater carbon footprint).

2. Strategies to reduce enteric emissions of methane

We agree with CARB that options exist to reduce enteric emissions, though more research is needed to evaluate the viability of these strategies in California, including their associated costs and benefits. Based on the emerging science in this area, two key strategies have been identified with the greatest potential to reduce emissions from enteric methane: 1) changes to nutrition and 2) changes to animal management (e.g. reducing the number of replacement heifers by increasing cow longevity). At this point in time, it appears that breeding animals for lower methane production and gut microbial interventions is not a well-developed strategies, though it may become more favorable in the future.

Therefore, we recommend that the CARB support research studies to understand short-, medium-, and long- term effects on methane mitigation from enteric fermentation. Furthermore, the results should be used to provide tools to farmers (i.e. marginal abatement cost curves and carbon calculators) that will allow them to implement methane reduction strategies, which meet the reduction targets set by CARB. Furthermore, we believe that financial support should be provided to farmers, if meeting methane reduction target goals substantially increases milk production costs.

3. Inventories

We also agree with CARB that future research is needed to collect more California-specific data to construct more precise inventories of enteric and manure methane emissions. We recommend studies that reconcile bottom up and top down inventories[iv,v,vi]. This would not only result in more precise baseline emission estimates, but also potentially provide us with tools that can be used in the future to assess California's progress towards its mitigation goals and help to detect possible leaks.

4. Costs

We estimate that the costs for conducting the proposed research on strategies to reduce enteric methane emissions and the proposed research on inventories will be between 2-5 million dollars for short- and medium-term research and between 3-10 million for the long-term research and that this research is a prime candidate for investment from the Greenhouse Gas Reduction Fund.

Thank you for your consideration of these comments. Please feel free to reach out for any follow-up questions.

Sincerely,

Robert Parkhurst
Agriculture Greenhouse Gas Markets Director

Claudia Arndt
Postdoctoral Fellow

Timothy O'Connor
Director, California Climate Initiative

[i] Government of Alberta. 2010. Quantification protocol for emission reductions from dairy cattle. Version 1.0. Edmonton, Alberta.

[ii] Clean Development Mechanism. 2014. Small-scale methodology. Strategic feed supplementation in smallholder dairy sector to increase productivity. Version 1.0

[iii] American Carbon Registry. 2013. American Carbon Registry Quantification Methodology for Reduced Carbon Intensity of Fed Cattle. Winrock International, Little Rock, Arkansas.

[iv] Hristov, A. N., Johnson, K. A. and Kebreab, E. 2014. Livestock methane emissions in the United States. Proc Natl Acad Sci U S A, 111**,** E1320.

[v] Miller, S. M., Michalak, A. M. and Wofsy, S. C. 2014. Reply to Hristov et al.: Linking methane emissions inventories with atmospheric observations. Proceedings of the National Academy of Sciences, 111**,** E1321-E1321.

[vi] Miller, S. M., Wofsy, S. C., Michalak, A. M., Kort, E. A., Andrews, A. E., Biraud, S. C., Dlugokencky, E. J., Eluszkiewicz, J., Fischer, M. L., Janssens-Maenhout, G., Miller, B. R., Miller, J. B., Montzka, S. A., Nehrkorn, T. and Sweeney, C. 2013. Anthropogenic emissions of methane in the United States. Proceedings of the National Academy of Sciences of the United States of America, 110**,** 20018-20022.