DATE: November 21, 2014
TO: California Energy Commission Commissioners and Staff
FROM: John Boesel, President and CEO

Re: Docket No. 14-ALT-01 - 2015-2016 Investment Plan Update

CALSTART appreciates the opportunity to provide comments on the FY15-16 Investment Plan for the Alternative and Renewable Fuel and Vehicle Technology Program. Energy Commission funding is extremely important in helping California achieve its near- and long-term clean energy, climate, and air quality goals. The large influx of cap and trade revenues at the Air Resources Board does not change this fact, as the capital investment needs to meet California's clean transportation goals exceed the available cap and trade funds. We believe the Energy Commission funds are particularly important in areas such as biofuels, alternative fuel infrastructure, manufacturing, and earlier stage technology development and demonstration for medium and heavy duty vehicles. The Energy Commission has a strong track record in these investment areas, and they have not been a part of ARB's portfolio to date.

We generally support the allocations laid out in the draft plan. Our goal with today's written testimony is to underscore the points made by CALSTART Policy Director Jamie Hall in the November 12th Advisory Committee meeting on the subject of medium and heavy duty vehicle technology investments.

CALSTART has been very active in identifying needs and opportunities in the medium and heavy duty vehicle sector. The CEC-funded CalHEAT Research Center laid out a roadmap for meeting long term emissions reduction targets for the truck sector.[1] We also looked specifically at what it would take to commercialize zero emission drayage trucks in the I-710 region around the ports of LA and Long Beach.[2] Our work shows that dramatic reductions in emissions from trucks, buses, and off-road equipment are possible. However, getting there will require a combination of strong policy and smart, targeted investment.

It is important to note that, **particularly for medium and heavy duty vehicles, we need a portfolio of technology solutions. There is no silver bullet.** Zero emission technologies will be increasingly important and we support investment in these technologies. However, we **do not see battery electric or fuel cell options meeting all of the needs of the medium- and heavy-duty sector.** Looking out to 2035, we still believe that nearly 75% of trucks will be advanced internal combustion engines, ideally running on low carbon fuels. Even in 2050, we believe that 30-40% of trucks will be advanced engines running on low carbon liquid and gaseous fuels. Dramatic emissions reductions are possible across the board, provided low-carbon liquid and gaseous fuels are available for vehicles that need them.

[1] California Hybrid, Efficient, and Advanced Truck Research Center Research and Market Transformation Roadmap for Medium- and Heavy-Duty Trucks. http://www.calstart.org/Libraries/CalHEAT_2013_Documents_Presentations/CalHEAT_Roadmap_Final_Draft_Rev_7.sflb.ashx

[2] http://www.calstart.org/Libraries/I-710_Project/I-710_Project_Zero-Emission_Truck_Commercialization_Study_Final_Report.sflb.ashx

As discussed at the advisory committee meeting, the Energy Commission has an important role to play in improving technologies, bringing down costs, and bringing solutions to market. ARB's investments can then help with the commercialization process. This applies not only to hybrid and zero emission options, but also to advanced engines and enabling technologies such as waste heat recovery and electrified accessories.

Specific programmatic recommendations are outlined below.

- We **support the $20 million allocation for medium and heavy duty demonstrations and scale up**. These investments are making a real difference, with several successful truck, bus, and off-road projects already showing impressive results. Under the first round of CEC investments in this space, a number of CALSTART projects proved to be particularly successful. Caterpillar Inc. was able to demonstrate a hybrid excavator that reduces fuel consumption by up to 40 percent. Based on the success of that program, Caterpillar Inc. is now selling the hybrid excavator as a product. The San Joaquin Regional Transit District was able to procure its first ever zero emission buses. Based on the results of that program, the transit property is now planning to rapidly expand its zero emission bus fleet.
    - The CEC should refrain from being overly prescriptive when it comes to determining what level of prototype or demonstration should be supported. The previous solicitation detailed a number of requirements and restricted the number of vehicle demonstrations that would qualify. Manufacturers and suppliers have an array of needs and the CEC should be willing to consider funding a project whether a previous prototype has been built or not. Concurrently, if there is a demonstrated and clear benefit to do a final test of a late generation prototype, the CEC also should be willing to consider such a concept.
    - Unlike the first solicitation, the CEC should not limit projects to certain regions in the state. The applicant should be able to build and test the vehicle in any part of the state.
    - The CEC should review the DARPA and FTA consortia model to determine how to leverage the expertise and resources of non-profit organizations as a way of fully utilizing state funding and resources. Taking full advantage of this capability may require the CEC to examine and modify its own regulations and requirements.
- We **recommend that CEC maintain its broad focus on buses and off-road vehicles in addition to trucks**. There have been several successful projects to date in this area and there is a compelling need to do more. The bus industry remains a critical proving ground for all heavy-duty vehicles and critical advanced bus RD&D should be supported by this program. Relative to non-road vehicles and equipment, see note above about Caterpillar success story.
- We **recommend that CEC and ARB continue to use CalHEAT and I-710 reports** to guide funding decisions in the truck sector. These reports lay out technology pathways and needed investments. CEC and ARB investments to date have

addressed some of these needs, but gaps remain. We recommend increased focus on the following areas:

- **Earlier stage investments:** We recommend that CEC look at earlier stage investments in technology development. The first medium and heavy duty demonstration solicitation focused on an important, but narrow, sliver of the commercialization process that comes after the development of a successful prototype. These demonstrations are important, but earlier stage investments in technology development and prototypes are also needed, and are a good fit for public funding.
- **Long haul solutions:** A greater focus on long haul over-the-road technologies is needed. The CalHEAT report details driveline improvements that can benefit this sector. Many of these solutions will require liquid or gaseous fuels, which will continue to play an important role in this sector for years to come.
- **Enabling technologies:** The CalHEAT report details investments in enabling technologies, such as waste heat recovery, storage tanks, and electrified accessories that can "unlock" substantial emission reductions, even if these technologies on their own do not have a meaningful impact. An earlier-stage focus could allow for development of these crucial technologies. The CEC should also consider technologies such as mild hybridization or start/stop, especially as they can be applied to existing medium- and heavy-duty natural gas buses. Yutong, the largest bus manufacturer in China currently uses ultracapacitors made by San Diego based Maxwell Technologies. These diesel ultracap buses cut fuel consumption and emissions by 15-20 percent. Applying similar technology to the existing fleet of natural gas buses in California could have a similar benefit.

- We **do not support in concept the idea of combining manufacturing funding with demonstration funding.** The combination of these two program areas suggests that it is only advanced medium- and heavy-duty vehicle companies that would apply for manufacturing assistance. In practice, there is a wide array of clean transportation companies that might want to seek state assistance in building manufacturing facilities in California. We do appreciate the idea of being able to submit one proposal for both a technology advancement project and manufacturing support. If there was a way to do that, and have the manufacturing funds be used to support component developers and light-duty vehicle manufacturers, that should be considered.

- We **recommend doubling the funding for Emerging Opportunities**. There are a number of federal and regional funding opportunities that emerge each year and the CEC should have the resources to support entities that are headquartered in California to apply for and secure those funds. Among others, the CEC should consider providing funding for entities with expertise and experience to help provide technical assistance and support to pursue CEC funding and develop and implement commercialization plans.

- We **recommend leveraging existing clean vehicle programs to provide the natural gas vehicle incentives.** The California Air Resources Board already

operates two very efficient vehicle incentive programs, one for light-duty vehicles and one for medium- and heavy-duty vehicles. Consumers, fleets, and dealers know how to access those funds and they work well with very little overhead expenses.

- We **recommend that at least $600,000 of the $18 million in EV charging infrastructure be set aside for statewide coordination and support to advance workplace charging and multi-unit dwelling (MUD) charging.** CEC investment in EV infrastructure has supported the growth of the EV industry in California and is one of the reasons why California is such a leader in that space. The CEC has provided significant funding over the past three years for regional EV readiness planning. There is a significant opportunity with both workplace and MUD charging to facilitate, on a statewide basis, learnings, utilization of best practices, and greater awareness. The education gain from one region can be very helpful and supported through a strong and robust statewide efforts related to both workplace and MUD charging.