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Technology Merit Review

Additional submitted attachment is included below.

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From: Dan Goodwin <dan@oberonfuels.com>
Sent: Wednesday, September 23, 2015 4:18 PM
To: Energy - Docket Optical System
Subject: 15-MISC-04 ARFVTP Technology Merit Review Biofuel and Biomethane Project Success

CEC Team,

Thank you so much for hosting this workshop. It was invaluable for the commentary and discussion on what represents a winning application and also for some of the broader discussion around Government's role in supporting technology.

I have a few comments for your consideration:

1. Much was discussed about Government needing to support technology only when private funding is already in existence as a way of vetting the company's health and the validity of the technology. In other words, it was intimated that if a company already had funding, either internally or through venture capital, set aside for a project, then that project had obviously been analyzed by experts and should be considered low risk by the CEC.

Would encourage the CEC to reject that line of thinking, or at least investigate the suggestion to separate funding opportunities into two categories – one, existing technologies (funded) that CEC supports and would like to encourage growth in technology or infrastructure; two, innovative, potentially ground-breaking research that may not have received venture funding due to it's level of risk and the new-ness of the technology.

2. Consider Government's role in supporting technology that is trying to cross the "Valley of Death." Capital funding is difficult to obtain in immature markets, especially in something as conservative as energy, and venture funding may not support valuable technology if it projects a long payback of 7-10 years. Arun Majumdar, former head of ARPA-E and former VP of Energy at Google said this recently: *"The role of the government is in the area of research. If we are to change course in our energy ecosystem—whether it is transportation fuel or electricity generation, and whether it's for energy security, the economy, or the environment—that shift has to rely on innovation. Innovation comes from long-term research in science and engineering, which has to come from the government. These days, we can't count on industry to support risky research ventures that might only produce revenue in the 15-20 year time frame.... There are multiple valleys of death. I'll discuss a few of them. The first valley of death is demonstrating proof of concept. If someone has an idea, and if they try it out in the lab and they can get it to work—that's proof of concept. Proof of concept is necessary but not sufficient. ARPA-E funded proof of concept research. Then comes proof of integrated systems. That's when you take your technology, which has demonstrated proof of concept, and put it into prototypes that enable people to see how it can serve a useful purpose. It's the next step beyond the "idea" stage, where you justify funding further research. After the proof of system has happened, then the industry needs to determine that they can develop a product or business around the technology. Then, you face the challenge of access to capital, and the various valleys of death that relate to achieving scale in manufacturing the product. In fact, there are other valleys of death as well. But in the early stages, that need for capital to build manufacturing capacity and scale is the biggest concern. And frankly, the venture capital market has withdrawn from energy in terms of new investments."*

3. Finally, it was mentioned during the discussions, but to reiterate the point. The State of CA should not be in the business of picking technology winners. The perception - and it may only be a perception, but we know how those become realities – is that the State has committed to electric vehicles and hydrogen at the expense of other technologies. It appears that tailpipe emissions have become the only priority by which a vehicle technology will be judged. The assembled biofuels experts at your panel were in violent agreement that the State should, instead of picking technologies, set broad carbon-based goals. Those goals should encompass the carbon consumed throughout the lifecycle – production, transportation, dispensing, and

combustion (so-called well-to-wheel). If the goal is GHG reduction, in addition to SLCP and other air pollutants, then that should be the criteria used to judge applications and award support.

I hope these comments are useful. I do appreciate the chance to submit them.

I look forward to future conferences and symposiums. I echo the entire group's kudos given not only to Tim Olson and Commissioner Scott, but to the entire CEC team who is working very, very hard to do the right things for this State.

Thank you,

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