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Comments on CEC Document, Draft Solicitation Concepts, Alternative and Renewable Fuel and Vehicle Technology Program, Subject Area: Renewable Hydrogen Transportation Fuel Production Facilities and Systems

Low-cost, low-carbon hydrogen for fuel cell vehicles being the ultimate aim of the draft solicitation, the following comments are offerred to ensure that new approaches that have superior economics and which enable substantial other advantages are considered as eligible under the proposed solicitation.

1) As drafted, the solicitation appears to limit eligible feedstocks to be bio- in origin. (See first paragraph under Section 6, â€œEligible Feedstocks and Renewable Electricity Sourcesâ€ , page 5 of 18). We propose that bio- and non-bio- feedstocks, including but not limited to water or natural gas, should be allowed to compete based on a combination of the resulting carbon intensity and the cost of the hydrogen product. This would allow hybrid or other combined systems, exhibiting significant renewable attributes (such as using various feedstock(s) and energy sources) that substantially reduce greenhouse gas emissions while producing low-cost, low-carbon intensity hydrogen and possibly other products (e.g., commodity chemicals).

This is consistent with SB1505 which recognized natural gas as â€œan important part of a transitional strategy to a clean hydrogen fuel economy.

See additional related discussion in the following comment.

2) Modify Section 7A, â€œRenewable production capacityâ€ (page 6 of 18) to clarify that the requirement that â€œthe proposed project must have a nameplate capacity of at least 1000 kg/day of 100% renewable hydrogenâ€ is not meant to preclude hybrid systems that produce more than 1000 kg/day, including 1000 kg/day of 100% renewable hydrogen, but where at least some of the additional hydrogen is not 100% renewable.

For example, the solar reforming of methane, followed by water-gas shift reactors, has an idealized net chemical reaction of CH4 + 2H2O Ã CO2 + 4H2. In this case, the energy for the endothermic reforming reaction is supplied by a renewable energy source (via a parabolic dish solar concentrator) and half of the hydrogen product is derived from water and has a carbon intensity that is substantially lower than conventional methane-steam reforming followed by water-gas shift.

Alternately, the solar reforming of methane, followed by methanol synthesis, is based on an idealized net chemical reaction of CH4 + H2O Ã CH3OH + H2. In this case, carbon that is contained in the methanol product does not score against the hydrogen product in a carbon intensity calculation and the low-carbon intensity hydrogen product, again, can be argued as coming from a 100% renewable feedstock (water).

3) Modify Section 7C, â€œEquipmentâ€ (page 6 of 18) to a) not preclude proposals where the technology uses a feedstock of a renewable electricity source that is intermittent (e.g., solar) and b) allow proposers to demonstrate that their technologies are ready for commercial deployment through alternatives other than a showing of â€œcontinuous operation of at least 6 monthsâ€ .

For example, we propose that many technologies that have been established to have advanced to at least Technology Readiness Level 6 (TRL 6), based on Federal standards, are sufficiently mature that they should be candidates for use in renewable hydrogen production facilities under this solicitation. This is particularly true if the system includes modular elements â€“ such as parabolic dish solar concentrators and microchannel heat exchangers and reactors â€“ where evolution from generation to generation can be accomplished over a short time period and where improved component designs that achieve higher reliability, greater performance or more desirable economics.