

November 27, 2007

Steve Church  
Research Division  
California Air Resources Board  
1001 I Street  
Sacramento, California 95812

Re: ETAAC Report Discussion Draft – Released 11/15/07

Dear Steve:

Congratulations to the Committee on preparing such a comprehensive discussion draft of the ETAAC Report referenced above, and thank you for the opportunity to comment. Having been involved in similar State and Federal initiatives in recent years, I fully appreciate the Committee's efforts to solicit and include viable solutions to support the objectives of AB32 implementation.

To this end, we believe that the ETAAC Report should more fully address Combined Heat and Power (CHP) Distributed Generation (DG), including micro and small CHP for residential and small commercial building applications, as it supports the CO2 mitigation, energy efficiency, and environmental justice objectives of AB32.

Specifically, we recommend the following changes and additions:

- Section 2, Financial Sector, pages 2-13 through 2-15: Propose a multi-year moratorium on consumers paying sales tax on capital purchases of micro and small CHP, solar electric and thermal systems, small wind systems, and other qualifying technologies and products that specifically reduce CO2 and improve energy efficiency.
- Section 4, Industrial Sector, pages 4-9 and 4-10: Expand the reference to CHP to include micro and small CHP applications for residential and small commercial building applications, including DG networks to aggregate CO2 and energy efficiency benefits.
- Section 5, Energy Sector, page 5-4: We agree with the priority for CARB to place a value on carbon, and we further recommend creating a mechanism whereby individual homeowners and business operators can easily "monetize" carbon reductions. Also, on pages 5-11 through 5-15: Add "Micro/Small CHP" under a separate heading to address the significant potential that CHP has to significantly reduce CO2 emissions and improve energy efficiency for homes and small commercial buildings.
- Section 9, Appendices, Appendix IV, page 9-80, item 88: Change "fuel cell CHP systems" to "fuel cell microCHP systems;" change "CO2 down 20 percent – 50 percent" to "CO2 down 30 percent – 40 percent;" change "\$7/kw installed, 6 cents/kw-hr" to "\$9/watt installed, 5 cents/kWh;" and change "Tom" Slingerup to "Jon" Slingerup.

The following provides some additional context:

The emergence of micro and small CHP systems create significant energy efficiency and CO<sub>2</sub> mitigation opportunities related to distributed generation (DG) and demand response. California corporations like ClearEdge Power and Bloom Energy are commercializing micro and small CHP systems for previously unaddressed residential and commercial DG markets, and are currently selling these products to customers in California and elsewhere.

The commercialization of this technology is in its infancy and represents a major opportunity for California, both economically and environmentally.

For example, excluding the energy impact of small commercial buildings, California has over 12 million residential units that consume about 90,000 GWh of electricity per year, representing nearly a third of the State's total electricity consumption. Fully deployed as a standard residential energy appliance, microCHP systems could reduce home CO<sub>2</sub> emissions by an average of 28%, or 9 metric tons per home, representing a massive impact of over 100 million metric tons of CO<sub>2</sub> reduction opportunity per year in aggregate for the State.

Regarding the specific technology, ClearEdge's microCHP generating system incorporates a proprietary high-temperature fuel cell that uses hydrogen to produce ultra-clean, efficient and affordable electricity and useful thermal energy for small buildings. Thermal applications include domestic and commercial hot water, radiant space and surface heating, and pool and spa heating.

In the absence of a developed renewable hydrogen fuel infrastructure, the ClearEdge CHP system also integrates a proprietary flameless fuel processor that cleanly and efficiently converts natural gas, propane, renewable biofuel and other alternative fuels into hydrogen used for CHP generation.

Attributes of microCHP include:

- Reduces the carbon (CO<sub>2</sub>) profile of homes or small businesses by an average of 28%, or up to 48% depending upon the carbon profile of the local utility energy mix. Compared to combined cycle power plants, microCHP can reduce CO<sub>2</sub> 2,200 tons per MW per year (versus 1,000 and 1,300 tons for solar and wind, respectively).
- Improves the energy efficiency of a home or small business by up to 45% compared to typical grid electricity and natural gas heating appliances.
- Provides continuous 24/7 CHP, even during electrical grid interruptions.
- Capital cost, including installation, warranty and maintenance, is comparable to solar electric system on a per-watt basis, but delivers up to 9 times the energy output per dollar, depending upon a building's heat load.
- Operating cost is as low as 5 cents per kWh, assuming \$8 per MMBTU for natural gas, which is significantly below most grid rates in California.

We are fully supportive of ETAAC's efforts to complete its Final Report, and we would be pleased to discuss these recommendations with you at your convenience. I will be attending Thursday's meeting in UC Merced to offer any support I can.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Jon Slangerup", with a long horizontal stroke extending to the right.

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