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July 17, 2013

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VIA E-MAIL

The Honorable Mary D. Nichols, Chairman
California Air Resources Board
1001 "I" Street
Sacramento, CA 95814

Re: Concentrated Solar Power Alliance Comments Regarding Proposed Regulatory Amendments to CARB's Cap-and-Trade Program

Dear Chairman Nichols:

On behalf of the Concentrated Solar Power Alliance¹ ("CSP Alliance"), we write regarding an important issue related to the California Air Resources Board ("CARB" or the "Board") Cap-and-Trade Regulation (the "Regulation"),² which may impact the successful deployment of solar thermal electric generating facilities in California and the ability of the State to meet its renewable portfolio standard ("RPS") and its underlying environmental goals. For the reasons described below, we respectfully request that CARB staff propose amendments to the Regulation, for the Board to consider at its October 2013 hearing, to exempt solar thermal facilities that use a minimal amount of conventional fuel to support plant operations. Maximizing the efficiency and output of renewable energy from such facilities will result in less use of electricity from conventional power sources, causing a net *decrease* in greenhouse gas ("GHG") emissions statewide.

Introduction

There are a limited number of solar thermal facilities licensed within the past five years ("non-legacy facilities") in late stage development and under contract with California utilities.³ To efficiently utilize the capabilities of their technology, members of the CSP Alliance (which includes the developers of some of the noted projects) use, or intend to use, a small amount of conventional, or nonrenewable, fuel to assist in the efficient operation of such power plants during morning startups and periods of temporary cloud cover, as well as to maintain critical equipment overnight. A subset of these facilities may have GHG emissions associated with such operations that will exceed the applicability threshold under the Regulation for electricity generating facilities. Consistent with State law allowing a *de minimis* use of nonrenewable fuels to count as RPS-eligible generation,⁴ we believe CARB should exempt certain emissions from nonrenewable fuel at solar thermal facilities from any compliance obligation under the Regulation, consistent with existing statutory and regulatory determinations. Providing such an exemption would increase the quantum of GHG-free renewable energy on the grid by preparing critical

¹ The CSP Alliance is an advocacy group whose membership is drawn from the world's leading concentrating solar power ("CSP", or alternatively, "solar thermal") development companies and their suppliers. For more information, please see <http://www.csp-alliance.org>.

² Cal. Code Regs., tit. 17, §§ 95000 *et seq.*

³ *E.g.*, Abengoa Mojave Solar Project Power Plant, Genesis Solar Energy Project, Ivanpah Solar Electric Generating System, Palen Solar Energy Generating System, and Rice Solar Energy Project.

⁴ Pub. Util. Code § 399.12(h)(3)(A); Assembly Bill 1954 (Skinner; Stats 2010, ch. 460) ("AB 1954").

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equipment each day to maximize the availability of solar fuel and by reducing the frequency and magnitude of output fluctuations from large solar thermal facilities that would otherwise need to be balanced by conventional power sources. In addition, consistent with determinations already made by the Legislature and the California Energy Commission ("CEC"), such an approach would advance the State's RPS goal of achieving a statewide renewable energy mix of 33 percent by 2020. Further, given there are only a handful of non-legacy solar thermal facilities under construction or planned for construction in the foreseeable future, an exemption of the GHG emissions associated with such facilities would not undermine the integrity of the GHG emissions cap set forth in the Regulation and will advance the GHG emissions reduction goals of AB 32.

I. Unique Attributes of Solar Thermal Can Require *De Minimis* Use of Conventional Power to Operate Critical Equipment

Solar thermal power plants use mirrors to collect sunlight and produce steam to drive turbines for generating power. However, solar thermal power plants can, and many do, utilize a small amount of conventional fuel in boilers to (i) maintain steam turbines or other critical equipment at night, (ii) assist with morning startup of the power plant, and (iii) maintain heat levels during periods when solar "fuel" availability is diminished. The use of such conventional energy sources improves overall plant efficiency and maximizes the environmental benefits derived from solar thermal power plants.

Specifically, during morning start-ups, power plant equipment is cold and cannot be utilized until it reaches a minimum temperature. Without the aid of auxiliary boilers (typically natural gas-fired) or grid electricity (if designed accordingly) to warm up power plant equipment, the daytime hours for utilizing the sun's energy would not be fully utilized to generate solar thermal electricity. Significantly, a "solar-only" cold start-up would reduce the production of solar thermal electricity, as no electricity can be produced until the equipment reaches the requisite minimum temperature. Thus, for an extended period of time, the solar energy received by the solar field cannot be converted into electricity. Using conventional or "external" energy sources for pre-sunrise assisted start-ups shortens the startup time and allows for greater utilization of the solar resource as it will immediately displace or avoid electricity production from GHG-emitting facilities once it has synchronized with the grid. Also, most steam turbines use steam while inactive or cooling to maintain a protective "blanket" that prevents water condensation. This blanketing steam prevents potential damage to the turbine. Certain solar thermal systems may additionally burn natural gas to maintain the temperature of a heat transfer fluid (e.g., therminol) above its freezing point.

Renewable generation aided by conventional fuel can also minimize the system operating and GHG impacts of intermittent cloud cover, which, if sufficiently dense, can effectively reduce the solar radiation below the level at which the power plant can operate and cause a shut-down. The more heat that is lost in the system during these periods, the longer it takes to bring the system back to full operations, and the less solar energy can be converted to electrical energy when the solar resource returns to full insolation. Similar to morning startups, minimal use of conventional fuel during cloud cover maintains the necessary level of heat in the system, which increases efficiency and utilization of the generating capacity of the power plant.

By ensuring that the capacity of a solar thermal plant is utilized to the greatest degree, the highly efficient use of natural gas in this regard results in a net *reduction* of GHG and criteria pollutant emissions overall. Significantly, by using small quantities of natural gas, the output of solar thermal power plants is more dependable, predictable and reliable, and this improves the ability of the grid operator to integrate

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this renewable energy generation. A small quantity of fossil fuel use can reduce not only the commitment of conventional fossil-fueled generators, but also the need to rapidly vary operation of those generators in response to renewable (potentially intermittent) generation. Although conventional generators can respond quickly to changes in demand, such operations can be inefficient and result in a relative increase in GHG and criteria air pollutants emissions.⁵

II. Solar Thermal Is Critical to the State's Efforts to Meet Its Renewable Portfolio Standard and GHG Reduction Goals Set Forth in AB 32

The Governor's Executive Order establishing the RPS recognizes that an "increased use of renewable electricity is one of the most promising means to reduce [GHG] emissions in the transportation sector and meet California's 2050 greenhouse gas reduction goals."⁶ As stated in Executive Order S-14-08, "increased development of renewable electricity sources, energy efficiency and demand response are needed to meet the GHG goal of 1990 levels and 80 percent of the 1990 levels by 2050, *making the success and expansion of renewable energy sources a key priority for California's economic and environmental future.*"⁷ CARB's Scoping Plan likewise recognizes that achieving a statewide renewable energy mix of 33 percent is a key element in the State's ability to reduce GHG emission to 1990 levels by 2020.⁸

Facilitating a transition to renewable energy sources without significantly disrupting the historic functionality and reliability of the grid, however, requires careful and creative planning, especially if 33 percent is merely a starting point for the integration of renewables. To meet the ambitious GHG emission reduction goals set in AB 32,⁹ the State must encourage innovative technologies that maximize the capabilities of renewable energy generation technologies. Indeed, the RPS recognizes that "promot[ing] stable electricity prices" and "stimulat[ing] sustainable economic development" are necessary components of a practical effort to "ameliorate air quality problems throughout the state and improve public health by reducing the burning of fossil fuels and the associated environmental impacts and by reducing in-state fossil fuel consumption"¹⁰

The California Legislature and the CEC have accordingly recognized the important role that nonrenewable fuel sources serve in enabling more efficient operation of solar thermal facilities and reducing system-wide GHG emissions. Specifically, a *de minimis* quantity of nonrenewable fuel (between two and five percent of annual generation from a renewable energy generation facility) can be utilized in creating renewable energy credits ("RECs") in furtherance of the State's RPS program.¹¹ The Legislature

⁵ See, e.g., Katzenstein & Apt, *Air Emissions Due to Wind and Solar Power*, 43 *Env. Sci. & Tech.* 253–258 (2009).

⁶ Executive Order S-21-09 (September 15, 2009).

⁷ Executive Order S-14-08 (November 17, 2008).

⁸ CARB, *Climate Change Scoping Plan* (Dec. 2008), at p. 16.

⁹ Health & Saf. Code, §§ 38500 *et seq.* (The Global Warming Solutions Act of 2006).

¹⁰ Pub. Util. Code, § 399.11(b), (c); *id.* § 399.12(h)(3)(A).

¹¹ The *de minimis* allowance is set at two percent. Pub. Res. Code, § 399.12(h)(3)(A). However, the CEC may adjust the *de minimis* quantity of nonrenewable fuel for an individual facility, up to a maximum of five percent, if: "(i) The facility demonstrates that the higher quantity of nonrenewable fuel will lead to an increase in generation from the eligible renewable energy facility that is significantly greater than generation from the nonrenewable fuel alone[,] (ii) The facility demonstrates that the higher quantity of nonrenewable fuels will reduce the variability of its electrical output in a manner that results in net

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made allowances for the use of fossil fuels at renewable generation facilities, including the *de minimis* use of such fuels to generate electricity, in recognition of the overall contribution that such activities might have to achieving the RPS goals and their underlying objectives.¹² The analysis supporting the Legislature's decision specifically explained that

[A] solar thermal facility might use a natural gas turbine to maintain fluids at a higher temperature when the sun isn't shining to reduce the time to ramp-up the solar thermal facility when the sun is shining because less sun time would be required to heat the fluids that run the turbines. As long as the natural gas turbine does not comprise more than two percent of the electricity production [annually] at the facility, electricity produced by the gas turbine and the renewable resource would both be considered RPS eligible delivered electricity.¹³

The Legislature additionally reasoned that allowing the "the use of fossil fuels to boost the output of electricity from a renewable generator and to count that generation as renewable" was justified because "in total, the kilowatt hours produced with the boost of fossil fuel is a more efficient use of the renewable generator."¹⁴

After a lengthy policy development process, the CEC similarly concluded that the use of up to five percent of nonrenewable fuel, as a percentage of total generation, at solar thermal facilities can potentially result in generation that provides "net environmental benefits to the state."¹⁵ Specifically, nonrenewable fuel use can reduce variability of output, improve synchronization with the grid, and/or facilitate better facility ramp rates, "which can improve the ability of renewables to integrate into the California electrical system and achieve the state's RPS and climate change targets."¹⁶ In addition to these attributes, the California Public Utilities Commission ("CPUC"), California Independent System Operator ("CAISO"), and the CEC are interested in increasing the deployment of solar thermal technology because of natural synergy with thermal energy storage capabilities (such as the application of molten salt as a storage medium), which, in certain applications, also utilizes a minimal amount of nonrenewable fuel use.

While the Legislature and CEC recognize that solar thermal facilities should not be penalized for the use of minimal amounts of nonrenewable fuels, CARB's Regulation does not contain similar protections. Specifically, if the annual emissions at solar thermal facilities due to the allowable *de minimis*

environmental benefits to the state[, and] (iii) The higher quantity of nonrenewable fuel is limited to either natural gas or hydrogen derived by reformation of a fossil fuel." *Id.*

¹² In particular, RPS goals that are relevant to this discussion include: "(1) Displacing fossil fuel consumption within the state. . . . (3) Reducing air pollution in the state. . . . (4) Meeting the state's climate change goals by reducing emissions of greenhouse gases associated with electrical generation. . . . (6) Meeting the state's need for a diversified and balanced energy generation portfolio. . . . [and] (8) Contributing to the safe and reliable operation of the electrical grid, including providing predictable electrical supply" Pub. Util. Code, § 399.11(b).

¹³ Sen. Rules Comm. Analysis of Assembly Bill 1954, 2009-2010 Reg. Sess. (Aug. 4, 2010).

¹⁴ Sen. Energy, Utils. & Communications Comm. Analysis of Assembly Bill 1954, 2009-2010 Reg. Sess. (June 27, 2010).

¹⁵ See footnote 11.

¹⁶ CEC Guidebook, *Renewables Portfolio Standard Eligibility* (7th ed. Apr. 2013), at p. 46.

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use of nonrenewable fuel annually exceed 25,000 metric tons of carbon dioxide equivalents (CO₂e), the facility will qualify as a covered entity under the Regulation.¹⁷ As described below, without an exemption from the Regulation for such emissions, solar thermal facilities will be forced to incur unrecoverable costs that will substantially burden and possibly jeopardize the successful deployment of this technology, which is important to the State's ability to reach its goals under AB 32 and the RPS.

III. Exempting Solar Thermal Is Consistent with CARB's Exemption of Geothermal Facilities and Similarly Furthers the State's Goals under AB 32 and the RPS Program

While the Regulation addresses direct GHG emissions, CARB exempted emissions from geothermal power plants¹⁸ from a compliance obligation under the Regulation, notwithstanding the GHG emissions associated with this alternative energy source. Although CO₂ emissions from geothermal power plants are non-anthropogenic, it is well recognized that geothermal development increases the rate at which GHGs are released into the atmosphere. Under natural conditions, CO₂ gradually seeps out into the biosphere and is very slowly replenished. However, the operation of geothermal power plants can disrupt the natural conditions and cause the CO₂ to escape from the subsurface more rapidly, resulting in higher rates of gas flow into the atmosphere than from the undisturbed system.¹⁹

Despite the direct GHG emissions associated with geothermal operations, CARB recognized that this method of generation is preferred over fossil fuel-based generation. Indeed, in response to comments that "reported data from California's geothermal facilities has clearly demonstrated that any GHG emissions associated with the generation of this electricity is de minimis," CARB modified the Regulation "to clarify that emissions from geothermal generating units and geothermal facilities do not hold a compliance obligation."²⁰ Like geothermal facilities, solar thermal facilities displace fossil fuel energy production resulting in an overall *decrease* in GHG emissions from power generation. It would accordingly be appropriate for CARB to provide for a similar, limited exemption to the Regulations that excludes solar thermal facilities' emissions from a compliance obligation, consistent with existing statutory and regulatory determinations.

Conclusion

Successful deployment of renewable energy is an integral part of California's ability to reach its goal of reducing statewide GHG emissions to 1990 levels and procuring 33% of its power from renewable sources by 2020. Most solar thermal facilities utilize small amounts of nonrenewable fuel to operate critical equipment necessary to ensure the proper and efficient operation of such facilities. Reducing the time to reach synchronization during morning startup and avoiding inefficiencies associated with fluctuations in facility output will increase the amount of renewable energy available to the grid thereby reducing demand for higher GHG-emitting sources of electricity. Such an exemption from the Regulation would clearly advance the GHG emission reduction goals of the Regulation in furtherance of AB 32 and would be consistent with other exemptions for valuable renewable generation facilities.

¹⁷ Cal. Code Regs. tit. 17, § 95812(c)(2)(A) ("The applicability threshold for an electricity generating facility is based on the annual emissions from which the electricity originated. The applicability threshold for an electricity generating facility is 25,000 metric tons or more of CO₂e per data year.").

¹⁸ *Id.* § 95852.2(b)(1).

¹⁹ Geothermal Energy Ass'n, *Geothermal Energy and Greenhouse Gas Emissions* (Nov. 2012), at p. 5.

²⁰ CARB FSOR, Response to Comment E-27, pp. 422, 224.

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These comments represent initial thoughts on necessary amendments to the Regulation to exempt otherwise covered emissions by solar thermal facilities from a compliance obligation. We plan to raise the issues and arguments made herein at the July 18, 2013 CARB workshop on proposed amendments to the Regulation. In addition, we hope to meet with CARB in the near future to discuss proposals regarding the specific language for suitable amendments to sections 95852 and 95852.2 of the Regulation, consistent with existing statutory and regulatory determinations, which would address our concerns and further promote the proliferation of GHG-reducing power generation technologies in California.

Respectfully submitted,



Peter H. Weiner
of PAUL HASTINGS LLP

cc: Dr. John R. Balmes, M.D., CARB Board Member
Sandra Berg, CARB Board Member
Hector De La Torre, CARB Board Member
John Gioia, CARB Board Member
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Cap-and-Trade Regulation Amendment Request

NOTE: Please use this form to highlight a request to amend a specific section (or related sections) of the Cap-and-Trade Regulation. Submission of this form aids staff in tracking requests and **does not mean** staff will ultimately propose an amendment in the version of the amendments noticed pursuant to the Administrative Procedure Act. This form is intended only as an additional tool ARB will use to evaluate requested changes to the regulation. Amendment requests may be for reasons of policy, clarity, or errors, etc. Staff may contact you if we need more information. Additionally, submission of this form will be a public record, and will be included in the ultimate rulemaking file related to these amendments, but may not be specifically answered in the Final Statement of Reasons. (Government Code section 11346.9(a)(3).) Please complete this form (with as much detail as possible, though it need not be formal regulatory language) and mail or email (preferred) to:

David Allgood (dallgood@arb.ca.gov)
Stationary Source Division
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General Information

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Section

Primary section(s): 17 CCR 95852.2

Related section(s):

Amendment Request

Type of amendment: Policy Error Clarity

Reason for amendment:

See Paul Hastings LLP July 17, 2013 Letter Re:
Concentrated Solar Power Alliance Comments Regarding
Proposed Regulatory Amendments to CARB's Cap-and-
Trade Program

Additional information: