

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to Continue  
Implementation and Administration of  
California Renewables Portfolio Standard  
Program

Rulemaking 11-05-005  
(Filed May 5, 2011)

**OPENING COMMENTS OF SOLARRESERVE, LLC  
IN RESPONSE TO RULING REQUESTING COMMENTS ON  
IMPLEMENTATION OF NEW PORTFOLIO CONTENT CATEGORIES FOR THE  
RENEWABLES PORTFOLIO STANDARD PROGRAM ISSUED JULY 12, 2011**

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August 8, 2011

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Pursuant to Administrative Law Judge Anne Simon’s *Ruling Requesting Comments on Implementation of New Portfolio Content Categories for the Renewables Portfolio Standard Program* issued July 12, 2011 (“ALJ’s Ruling”), SolarReserve, LLC (“SolarReserve”) hereby submits these comments in accordance with the California Public Utilities Commission’s (“Commission’s”) Rules of Practice and Procedure.

**I. INTRODUCTION**

As more fully described in Attachment B, SolarReserve is a solar energy project development company developing large-scale concentrated solar power (“CSP”) projects with the molten salt power tower technology developed by United Technologies Corporation.

SolarReserve’s Rice Solar Energy Project in Riverside County, California has already received all major permits and has signed a power purchase agreement with Pacific Gas & Electric Co. The project will be interconnected to the transmission lines of the Western Area Power Administration and will deliver power into the California Independent System Operator (“CAISO”) balancing authority area under the terms of a pilot pseudo-tie agreement with the

CAISO.<sup>1</sup> SolarReserve continues to develop other projects that will enable load serving entities to meet California’s renewables portfolio standards set forth in Senate Bill (SB) 2 (1x) (Simitian). SolarReserve’s development portfolio includes projects inside California and outside, and includes a mix of projects that will interconnect directly with transmission lines under the control of California balancing authorities and projects that will dynamically transfer power into California balancing authority areas.<sup>2</sup>

SolarReserve’s molten salt storage technology provides a way to store the energy from sunlight before it is delivered to the grid in the form of electricity. As such, a SolarReserve CSP facility is able to provide firm, uninterrupted power from a conventional steam turbine generator, similar to conventional power plants (e.g., a natural gas combined cycle plant), even after the sun has set. Furthermore, SolarReserve is capable of exerting control over its output, ramping up or down, providing ancillary services, scheduling deliveries with high levels of certainty, etc. These capabilities are fundamentally different from the performance characteristics of other renewable technologies such as wind and photovoltaic generators.

SolarReserve is participating in this proceeding to ensure that its technology is allowed to compete fairly on its merits, and that the product definitions that result from these proceedings do not preclude the full range of benefits from being realized. While it is tempting to categorically treat renewable energy as intermittent, such an assumption would be unfair and would ultimately disadvantage an innovative and potentially beneficial technology.

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<sup>1</sup> The CAISO has filed the agreement with the Federal Energy Regulatory Commission. *See* FERC Docket ER11-3778-000.

<sup>2</sup> SolarReserve is also developing projects for out-of-state utilities. SolarReserve is the developer of the Tonopah Solar Energy project (“Tonopah project”) in Tonopah, Nevada which will deliver 110 MW to NV Energy under a 25-year term power purchase agreement. SolarReserve has received a conditional commitment for a loan guarantee from the U.S. Department of Energy for the Tonopah project.

## **II. RESPONSE TO QUESTIONS**

SolarReserve's responses to selected questions are found in Attachment A to these comments. As necessary, SolarReserve will continue to participate in the proceeding by providing comments. SolarReserve recognizes that dispatchable solar energy offers a unique and perhaps unfamiliar energy product. As California grapples with integration of intermittent renewables, the nuances surrounding non-intermittent, fully dispatchable renewables must not be overlooked.

## **III. CONCLUSION**

SolarReserve appreciates the opportunity to contribute these comments and to participate in this proceeding.

Respectfully submitted,

By: \_\_\_\_\_ /s/  
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Dated: August 8, 2011

## Attachment A

***Question 4:*** *How should the phrase in new § 399.16(b)(1)(A) ". . . scheduled from the eligible renewable energy resource into a California balancing authority without substituting electricity from another source" be interpreted? Please provide relevant examples.*

SolarReserve believes that the power it intends to sell directly to California retail sellers will be eligible for the first portfolio content category.<sup>3</sup> SolarReserve is concerned, however, that unless the Commission appropriately interprets the language “without substituting electricity from another source,” it is possible that questions will arise concerning whether power it sells as substitute power or for firming and shaping is eligible for the first category.

SolarReserve notes that the language “without substituting electricity from another source” is ambiguous since it is not clear what is meant by “another source.” Some participants in this proceeding may argue that the words “without substituting electricity from another source” were intended to bar all substitutions. The effect of this interpretation would be to permit eligible renewable energy resources to be considered within the first category only if energy from a single eligible renewable energy resource is scheduled into a California balancing authority.

SolarReserve does not believe that the statute was intended to bar substitutions of power when the source of the substitute power is itself an eligible renewable energy resource. Renewable energy resources can be sold pursuant to agreements that allow substitution of a second eligible renewable energy resource if the first eligible renewable energy resource is not available or to firm and shape deliveries from the first eligible renewable energy resource. For instance, a utility that contracts for power from a wind resource may find it desirable to buy a second renewable energy resource product from a dispatchable renewable technology, which would permit substitution of power from that

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<sup>3</sup> References herein to the to first portfolio content category specified in Section 399.16(b)(1) will be to the “first category.” References herein to the second portfolio content category specified in Section 399.16(b)(2) will be to the “second category.”

resource when power from the wind resource is not available, or to firm and shape deliveries.

SolarReserve believes that it is appropriate to include in the first category substitutions of power from eligible renewable energy resources. On the face of the statute it is not clear what the term “another source” means in the clause “without substituting electricity from another source.” SolarReserve believes the language should be interpreted to mean “without substituting electricity from another source *that is not an eligible renewable energy resource.*” The effect of this interpretation is to make it clear that the first category includes an eligible renewable energy resource scheduled into a California balancing authority as well as power from an eligible renewable energy resource used as substitute power or to firm and shape deliveries. This interpretation would facilitate using eligible renewable energy resources, such as dispatchable CSP with molten salt energy storage, as substitute power and for firming and shaping purposes.

Adopting the interpretation SolarReserve suggests is also important to facilitate verification of compliance. The ALJ’s ruling specifies that one of the factors parties are to consider is “ease of verifying the categorization of an RPS procurement transaction.” ALJ Ruling at 3. Adopting SolarReserve’s interpretation would make it much easier to verify whether power is appropriately in the first category. In particular, it will make it easier to verify whether power belongs in the first category because it is “scheduled from the eligible renewable energy resource into a California balancing authority with substituting electricity from another source.”

SolarReserve believes that if the interpretation it is suggesting is adopted it will be possible to verify that eligible renewable energy resources belong in the first category with minimal changes to the existing RPS verification procedures. Because of the need to be able to determine compliance with the “delivery” requirement in the old RPS law, the Western Renewable Energy Generation Information System (“WREGIS”) already makes it possible to verify whether power is “scheduled” into a California balancing

authority area and whether it was generated by an eligible renewable energy resource.<sup>4</sup> If the Commission adopts SolarReserve's interpretation of what the legislature intended for inclusion in the first category, then all power scheduled into a California balancing authority area from an eligible renewable energy resource would be in the first category so it would be easy to verify what belongs in the first category with the information currently available from WREGIS. But, the information that is currently available through WREGIS will not make it clear whether power that is scheduled into a California balancing authority area from an eligible renewable energy resource is being sold and scheduled directly, as substitute power, or for firming and shaping purposes.<sup>5</sup> So, by contrast, if the Commission were to adopt an interpretation that puts some power scheduled into a California balancing authority area from an eligible renewable energy resource into the first category and some into the second category it would also have to develop a new mechanism for verifying categorization.

***Question 7:*** Please provide relevant examples of the situation described in the second sentence of § 399.16(b)(1)(A): "the use of another source to provide real-time ancillary services required to maintain an hourly or sub-hourly import schedule into a California balancing authority. . ." How should the subsequent qualifying phrase, "but only the fraction of the schedule actually generated by the eligible renewable energy resources shall count toward this portfolio content category" be interpreted in light of your response? Please provide relevant examples.

As described in the "Technology Overview" section of Attachment B, SolarReserve's technology is capable of providing real-time ancillary services. To the extent that provision of ancillary services also generates additional renewable energy, any such energy should be given fair treatment under these new rules.

SolarReserve recognizes that there currently is no requirement that utilities procure ancillary services from generators using renewable energy resources. However, many ancillary service products deliver energy in addition to providing some other characteristics; for instance, a generator providing *regulation up* services will deviate

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<sup>4</sup> See generally California Energy Commission, *Renewables Portfolio Standards Eligibility*, Fourth Edition, January 2011, at 71-72 and Appendix A. available at <http://www.energy.ca.gov/2010publications/CEC-300-2010-007/CEC-300-2010-007-CMF.PDF>.

<sup>5</sup> See generally WREGIS Operating Rules available at <http://www.wregis.org/uploads/files/851/WREGIS%20Operating%20Rules%20v%2012%209%2010.pdf>.

from its scheduled deliveries and produce more energy than it otherwise would. This service could come from a renewable generator.

For example, consider the following: Generator A is a 100 MW CSP plant with molten salt storage, which provides dispatchable renewable energy, and is directly connected to a California balancing authority. Generator B is a 15 MW wind generator not connected to a California balancing authority, but which has arranged for a dynamic transfer into a California balancing authority. Both Generator A and Generator B are eligible renewable energy resources and each should qualify independently for the first category under Section 399.16(b)(1)(A). But, it should also be possible for the utility to make arrangements to buy a renewable resource electricity product which includes some energy from both generators and count all of the energy toward the first category. For instance, assume that Generator A agrees to provide 15 MW of firming capability to fully compensate for Generator B's intermittency. Between 1:00 and 1:15 PM on January 1<sup>st</sup>, when Generator B had scheduled delivery of 15 MW, the wind declines unexpectedly for Generator B, reducing its output to 7 MW; in response, Generator A increases its output by 8 MW, allowing Generator B's schedule of 15 MW to be maintained. Eight MWh of energy would be delivered by Generator A as a result of this arrangement. This energy should be given the same treatment as the other output from Generator A, regardless of whether it is provided as part of an ancillary service, a firming arrangement, or a scheduled delivery.

The wording in Section 399.16(b)(1)(A) should be clarified so that it extends the same treatment to all eligible renewable generation, even if that generation is caused by provision of a real-time ancillary service.

SolarReserve notes that the language referred to in this Question, as with Question 4, above, contains an ambiguous reference to "another source." The interpretation that SolarReserve offered above, that "another source" means "another source that is not an eligible renewable energy resource" should also apply to the portion of Section 399.16(b)(1)(A) referred to in this Question. If this substitution is made in Section



399.16(b)(1), the first category of eligible renewable energy resource electricity products would include those that meet this criteria:

(a) Have a first point of interconnection with a California balancing authority area, have a first point of interconnection with distribution facilities used to serve end users within a California balancing authority area, or are scheduled from the eligible renewable energy resource into a California balancing authority without substituting electricity from another source ***THAT IS NOT AN ELIGIBLE RENEWABLE ENERGY RESOURCE***. The use of another source ***THAT IS NOT AN ELIGIBLE RENEWABLE ENERGY RESOURCE*** to provide real-time ancillary services required to maintain an hourly or sub-hourly import schedule into a California balancing authority shall be permitted, but only the fraction of the schedule actually generated by the eligible renewable energy resources shall count toward this portfolio content category.

(Words in all caps and italics have been added.)

***Question 11, first bullet:*** *Section 399.16(b)(3) includes "[e]ligible renewable energy resource electricity products, or any fraction of the electricity generated, including unbundled renewable energy credits, that do not qualify under the criteria of paragraph (1) or (2). " ... Should the phrase, "or any fraction of the electricity generated" be interpreted as meaning "any fraction of the electricity generated by the eligible renewable energy resource"?*

Yes, the correct interpretation should be, “any fraction of the electricity generated by the eligible renewable energy resource.” No non-renewable generation should be eligible under this program.

***Questions 12:*** *"Firmed" is not defined in SB 2 (1x). Please provide a definition or description of this term. Please include relevant examples.*

AND

***Questions 13:*** *"Shaped" is not defined in SB 2 (1x). Please provide a definition or description of this term. Please include relevant examples.*

No definition of “firmed” and “shaped” should preclude a utility from counting generation from an eligible renewable energy resource toward the first category if it otherwise qualifies for the first category. The new statute should not be interpreted to in any way discourage the provision of firming and shaping services from eligible renewable sources.

**Question 15:** *Should § 399.16(b)(2) be interpreted to refer only to energy generated outside the boundaries of a California balancing authority, or may it refer also to energy generated within the boundaries of a California balancing authority? Please provide relevant examples.*

- *Should this section be interpreted as applying only to transactions where the RPS-eligible generation is intermittent? Is the location of the generator within or outside of a California balancing authority area relevant to your response?*

Section 399.16(b)(2) provides that the second category of eligible renewable energy resources includes: “Firmed and shaped eligible renewable energy resource electricity products providing incremental electricity and scheduled into a California balancing authority.”

SolarReserve believes that by asking the Question in the way that it did, the Commission may be considering further defining what falls within this second category in ways that are inappropriate in two ways:

1. “Boundaries:” The language of the statute refers to electricity which is “scheduled into a California balancing authority area.” The statute does not use the words “boundaries of a California balancing authority area” which only appear in the ALJ Ruling. It is important for the Commission to define the second category in accordance with the words of the statute which focuses on the words “scheduled into” rather than focusing on “boundaries.” The term “boundaries” suggests that balancing authority areas have geographically distinct territories. But, the balancing authority area of a generator is determined in the first instance by what entity controls the transmission or distribution line where the generating facility interconnects. At the borders of balancing authority areas it is often difficult to determine where a “boundary” exists in geographic terms. For example, it is possible for a generator to build a generating facility that is not considered within the geographic boundary of a California balancing authority, but then convey the energy to a California balancing authority area by building a generator tie-line to a transmission or distribution line controlled by a California balancing authority. While “boundaries” are not well defined, the physical assets of California balancing authority areas are well defined.

2. “Intermittent.” The Question also suggests that the Commission is considering defining what falls within the second category by including only RPS-eligible generation that is “intermittent.” But, the term “intermittent” is not defined in the statute and is not easy to define. There are different degrees of intermittency. For example, photovoltaic generation will typically vary instantaneously with changes in the amount of sunlight. Wind generation will vary more slowly in response to changes in wind speed. CSP with molten salt storage will essentially have no unanticipated variation in moment-to-moment output, but total daily deliveries will be dependent upon total daily sunshine, which will vary. Most geothermal generators will only come offline for maintenance reasons. No generation technology, whether renewable or conventional, is 100% reliable.

***Question 16:*** *Should the requirement in § 399.16(b)(1)(A) that the generation must be "scheduled from the eligible renewable energy resource into a California balancing authority without substituting electricity from another source" be interpreted to mean that no firmed and shaped electricity, as set forth in § 399.16(b)(2), may be considered as meeting the requirements of § 399.16(b)(1)(A)? Please provide relevant examples.*

As described in greater detail above in response to Questions 4 and 7, we note again that electricity from “another source” should be interpreted to mean “another source that is not an eligible renewable energy resource.” Interpreted in this manner, energy from an eligible renewable energy resource that qualifies for treatment under the first category will be in the first category even if it is used for firming and shaping.

If the Commission adopts SolarReserve’s view that the first category includes eligible renewable energy resources used for firming and shaping deliveries, then the Commission’s interpretation suggested in this Question - i.e. no firmed and shaped electricity will be in the first category - is appropriate. The second category would include only eligible renewable energy resources firmed and shaped with resources other than eligible renewable energy resources.

**Question 23:** *Reviewing your proposals above, please describe the value to the buyer, the seller, and ratepayers of transactions in each portfolio content category. Identify the direct and indirect costs that would be associated with transactions in each category.*

Dispatchable solar energy, such as the type that SolarReserve provides, contributes valuable benefits to the buyer and ratepayer when integrated into the electrical grid. These benefits are much more likely to be realized by making it clear that the first portfolio content category includes eligible renewable energy resources used for substitutions and for firming and shaping services. The benefits are as follows:

1. High Capacity Factor. Molten salt energy storage enables SolarReserve's technology to operate at a higher capacity factor than most other solar technologies, including capacity to meet peak summer loads.<sup>6</sup> As the transmission system is built to serve peak loads, a generator with a higher capacity factor will utilize transmission assets more effectively by operating at peak capacity more often. This should result in lower overall transmission costs.
2. High Capacity Value. A recent NREL publication, entitled *Capacity Value of Concentrating Solar Power Plants*, shows that CSP with molten salt storage should generally receive a capacity value in excess of 90%.<sup>7</sup> This compares to 10-15% for wind generation and 25-30% for photovoltaic generation.<sup>8</sup> A higher capacity value should allow the utility to spend less on other transactions required to satisfy their peak load requirements, which protects the ratepayer from additional costs.

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<sup>6</sup> The National Renewable Energy Laboratories has compared the capacity factors for wind, solar PV, and a solar thermal technology with six hours of storage capability. See National Renewable Energy Laboratories, *Western Wind and Solar Integration Study*(2010), available at [http://www.nrel.gov/wind/systemsintegration/pdfs/2010/wwsis\\_final\\_report.pdf](http://www.nrel.gov/wind/systemsintegration/pdfs/2010/wwsis_final_report.pdf).

<sup>7</sup> National Renewable Energy Laboratories, *Capacity Value of Concentrating Solar Power Plants* (2011), at "Executive Summary" and 38, available at <http://www.nrel.gov/docs/fy11osti/51253.pdf>.

<sup>8</sup> See National Renewable Energy Laboratories, *Western Wind and Solar Integration Study*(2010), at 308, available at [http://www.nrel.gov/wind/systemsintegration/pdfs/2010/wwsis\\_final\\_report.pdf](http://www.nrel.gov/wind/systemsintegration/pdfs/2010/wwsis_final_report.pdf)

3. Value as a System Resource. In its certification of SolarReserve’s Rice Solar Energy Project ( the “Project”), the California Energy Commission (“CEC”) recognized the facility’s value as a system resource. As the CEC found: “The evidence shows that the Rice Solar project will provide reliable, renewable energy on hot summer afternoons and evenings, when it is most needed. The evidence characterizes this as a ‘noteworthy project benefit.’”<sup>9</sup> The CEC also found that because the Project is load-following and dispatchable it will help to reduce overall greenhouse gas emissions not only because the Project will produce electricity from solar power, but also because the output of the project can be used to back-down high heat rate fossil fuel-fired power plants that are currently used to balance system loads.<sup>10</sup>

When the Commission adopted a resolution approving the PPA in 2010 it also acknowledged the benefits of the technology for the system noting: “The use of molten salt and storage provides greater value to the purchasing utility, and the transmission system.”<sup>11</sup>

*See also* Appendix B (description of benefits of SolarReserve technology).

SolarReserve believes that all of the above benefits should be made available to utilities (and, ultimately, ratepayers) through fair procurement processes and well-designed market rules.

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<sup>9</sup> California Energy Commission, *Final Decision on Application for Certification of the Rice Solar Energy Project*, CEC-800-2010-019 CMF, Docket No. 09-AFC-10 (2010), at Section IV. C at 5.

<sup>10</sup> California Energy Commission, Rice Solar Energy Project, *Staff Assessment and Draft Environmental Impact Statement*, CEC-700-2010-016-SA-DEIS,DOE/EIS-0439, Docket No. 09-AFC (2010) at Appendix Air-1.

<sup>11</sup> CPUC Resolution E-4340 (2010) at 11.

## **Attachment B**

### **About SolarReserve**

SolarReserve, headquartered in Santa Monica, California, is a solar energy project development company developing large-scale concentrated solar power (“CSP”) projects worldwide. It holds the exclusive worldwide license to the molten salt power tower technology developed by United Technologies Corporation.

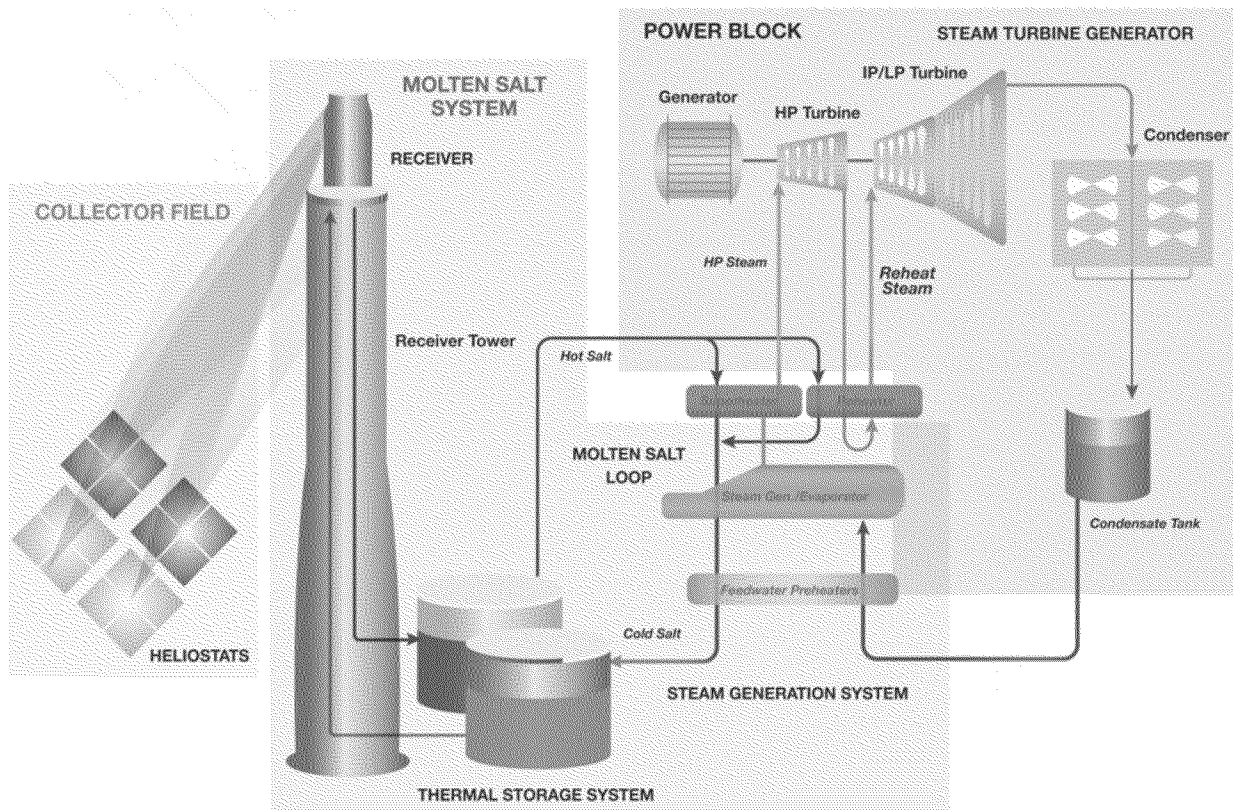
SolarReserve’s molten salt, concentrating solar power tower technology was successfully demonstrated in California under two U.S. Department of Energy-sponsored pilot projects in the 1980s and 1990s known as Solar One and Solar Two. The 10 MW pilot facility at Solar Two utilized a molten salt receiver designed, engineered, and assembled by Rocketdyne, now a part of United Technologies Corporation. A consortium of major utilities and industrial partners took part in Solar Two as well. Today, SolarReserve is the leading global developer of CSP projects with molten salt thermal energy storage technology based on the technology demonstrated at Solar One and Solar Two.

Since its formation in late 2007, SolarReserve’s team of power project professionals have assembled a CSP development portfolio of more than 25 projects featuring its licensed solar power technology with potential output of more than 3,000 megawatts in the United States and Europe.

### **Technology Overview**

SolarReserve is developing projects utilizing the next phase of the technology from Solar One and Solar Two. As shown below, a field of sun-tracking mirrors called heliostats is used to reflect and concentrate the solar radiation onto the receiver. What distinguishes SolarReserve technology from other “power tower” technologies is the heat transfer medium or working fluid in the receiver. With the SolarReserve technology, molten salt is circulated through tubes in the receiver, collecting the energy gathered from the sun. The hot molten salt is then routed to an insulated hot thermal storage tank, where the energy can be stored with minimal energy losses. When electricity is to be generated, the hot molten salt is routed to a heat exchanger (or steam

generator) and used to produce steam at utility-scale temperatures and pressures. The steam is then used to power a conventional steam turbine, generating electricity. After exiting the steam generator, the molten salt is sent to the cold salt storage tank and the cycle is repeated.



Utilizing molten salt storage technology, SolarReserve’s renewable energy projects are designed to generate cost-competitive, clean, and reliable electrical power. The technology’s inherent thermal energy storage capability allows solar power generation on demand, even during the night and during periods of unfavorable transient weather. These projects will provide system benefits due to their ability to be load-following and dispatchable, and to provide ancillary services.

The advantages of SolarReserve’s technology include:

1. Storing solar energy and delivering it on-demand. SolarReserve can deliver a higher-value energy product to utilities by collecting solar energy when the sun shines, and then delivering firm, uninterrupted power when the grid needs it most.

2. Cost-effective storage. Storage technologies being promoted today are at prices between roughly \$500 and \$5,000 per kilowatt-hour (“kWh”). But SolarReserve can design its system with more storage – by installing larger holding tanks for molten salt and using more salt – at a cost of roughly \$15 per kWh of incremental storage ability.
3. Ancillary services. The dispatchable steam turbine will be equipped with Automatic Generator Control (“AGC”) and can be used to provide ancillary services, including frequency regulation (up and down) and spinning and non-spinning reserves. Ramping services (up and down) could also be provided, if and when the CAISO develops a compensation mechanism. Each of these products helps balance the electrical grid, improving its stability and allowing other, more intermittent renewable energy sources (such as wind) to be operated effectively.
4. Scheduling. The plant operator will always know the level of the molten salt inventory. Coupled with accurate solar forecasts, this bestows a unique ability to make more accurate generation forecasts and scheduling statements than any intermittent renewable resource.
5. Curtailed tolerance. If the plant’s output is curtailed for a short period, the solar collection process can still continue, and thermal energy will remain in the tank for dispatch at a later time. Most generators using renewable resources cannot use energy when they are curtailed since they cannot store it.
6. Capacity value. Dispatchable solar resources can more reliably perform during peak hours – even when those peak hours are not sunny – and thus are more reliably available to meet peak demand. Thus, addition of the molten salt storage increases the value of the capacity.



**VERIFICATION**

(Rule 1.11)

I am an officer of the corporation submitting the comments herein, and am authorized to make this verification on its behalf. The statements in the foregoing document are true of my own knowledge, except as to matters which are therein stated on information or belief, and as to those matters I believe them to be true.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on August 8, 2011, at Santa Monica, California.

/s/

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