Infinia Corporation Comments on the RETI Phase 1A Draft Report

General Comments

Infinia's overall concern is that the Solar Thermal section of the RETI Draft report is rather trough centric. There is even an admission to this affect on page 5-23; "Parabolic trough systems will therefore be used as a proxy for all solar thermal technologies…". This statement is potentially presumptuous and is based on what may likely be a false premise, namely later on page 5-23 the statement; "The levelized cost of energy as well as energy generation profile from trough should be roughly similar to that of other technologies". Infinia and our very well recognized, knowledgeable and experienced solar industry investor syndicate, believes this is very likely a false premise.

There are two major reasons why this is likely a false premise;

1. Performance is significantly and inherently different - Trough systems are single axis tracking while other technologies, namely dish Stirling are dual axis tracking and as such have a significantly different power generation profile over day and a calendar year.
2. Additionally, the two business models are significantly different - Trough developers believe that the economies of scale of a large power generation facility to be of import. Dish Stirling developers believe the economies of scale created by the mass manufacture of individual units to be paramount. (One should note that a similar argument exists in the power tower world all by itself. Solucar and Solar Reserve are developing very large power towers while Brightsource and eSolar's business model is to build many smaller power towers.

I could go on here on why one power generation profile is better or why one business model is superior – but that is somewhat irrelevant for the purposes of the RETI Phase1A Draft Report. What is relevant is that these are legitimate technical and philosophical disagreements and ultimately the market will decide. It is inappropriate for Black & Veatch, as an independent and hopefully technologically agnostic reviewer, to opine as to which power generation profile is superior or which business model is superior.

It should be noted that the capital markets also see this as a legitimate disagreement and are hedging their bets. There are probably other examples, but two I can quickly note are.

1. Khosla Ventures is financially backing both Infinia (dish Stirling) and Asura (CLFR).

2. Idealab is financially backing both Infinia (dish Stirling) and eSolar (power towers).

It is far too early to declare one Solar Thermal technology the winner or to assume one Solar Thermal technology will perform sufficiently similarly to others to act as a proxy for all Solar Thermal technologies. In fact, it is likely all (or certainly many) will be economically viable depending on the geography, load profiles, etc. – "Horses for Courses" as the English would say.

Infinia Background

Infinia Corporation has developed and is currently testing and demonstrating a 3-kW (not 5 kW as mentioned on page 5-19) Dish-Stirling "Solar Appliance". Infinia uses the description "Solar Appliance" because we are not offering an engineered solution. It is a plug and play solution – i.e. Drill a hole in the ground, stick the post in and plug the system in. There is no optical or other field alignment or similar required. Our technology is suitable for residential, distributed generation and utility scale power generation.

The major difference between our technology and SES's and SBP's (SBP is a business partner of Infinia's and helped design Infinia's parabolic concentrator) dish Stirling systems is Infinia uses a

free-piston Stirling engine. SES and SBP both use Kinematic Stirling engines. There are advantages and disadvantages to both Stirling engine types and again the market will decide the superior approach.

In February Infinia closed on $57M in equity financing from very significant renewable energy investors (press releases for this and the previous $9.5M financing round are attached to the email) to back commercial production of our approach. We will begin shipping commercial units late this year and already have our first 3 years of production capacity sold out - Several hundred MW's (with cash deposits in hand), mostly in Spain but also to significant customers in the U.S. It should be noted that our customers also believe in the efficacy of our approach and business model and are willing to put up cash deposits to secure production units for their projects.

Although we are a Solar Thermal technology, our deployment and economics are much more similar to (but much better than) utility scale PV installations. Where a utility scale PV installation is built from thousands and tens of thousands of 100 Watt to 200 Watt panels, often, though not always deployed on 2-axis tracking systems, a utility scale facility built around our technology will be built from hundreds and thousands of 3 kW systems. Our capacity increment (3 kW), though smaller than traditional Dish-Stirling (10 to 25 kW) is much larger than PV (100 to 200 Watts).

Specific Comments on the RETI Phase 1A Draft Report

Section 5.4

Page 5-15, 5.4, near the bottom – "Trough, tower and CLFR plants with their large central turbine generators and balance of plant equipment have a cost advantage of economy of scale." This is a presumptuous statement. We would argue that one of the reasons that trough systems are so large is the lack of an efficient small steam turbine – i.e. if an efficient small turbine existed, trough systems might be built in smaller module sizes. As noted above, Brightsource and eSolar, we believe, would also argue that a smaller module size is advantageous.

Page 5-16, 5.4, the very top of the page – 3 kW to 25 kW not 5 kW to 35 kW.

Page 5-16, 5.4, near the top – "Dish systems have the potential advantage of mass production of individual units, similar to the mass production of automobiles". Contrast the bias in the above two statements. In the page 5-15 quote the report states that the other technologies "HAVE a cost advantage of economy of scale", while in the page 5-16 quote "Dish systems HAVE THE POTENTIAL advantage…". Infinia (and we believe SES) would argue the converse is true. The other technologies MAY HAVE an advantage of economy of scale while Dish technologies HAVE the advantage of mass production. In support of this position we would note that automobile engines cost less $10 per kW to manufacture at scale and Stirling engines are much simpler with fewer parts than automobile engines.

Page 5-16, 5.4, second paragraph, first sentence – With respect to dish systems this paragraph is completely incorrect. Infinia currently has a U.S. Navy contract to integrate a thermal storage system with the same 3 kW Stirling engine we use for our solar power systems. The Navy project is even more complex than an application of thermal storage to a solar dish Stirling system because it also involves a pressurized underwater JP-8 burner. The integration of thermal storage to a solar receiver is much simpler. Infinia would argue we are much further down the road and much closer to offering economical thermal storage than any trough or tower system if for no other reason than we do not need to pump a liquid molten salt. The thermal storage system we use is directly attached to the engine and receives direct solar insolation from the parabolic mirror. One of the advantages of free piston engines is they can be shorted, i.e. the power electronics can turn the engine on and off. Just because heat is applied, a free-piston engine does not need to run. The heat can be stored in the thermal salt for later use.

Page 5-16, 5,4, second paragraph, last sentence - The statement is also inaccurate. Infinia demonstrated a hybrid, fossil fuel / solar receiver for a dish Stirling system over twenty years ago on an NREL contract. Because of the peculiarities of the Spanish feed through tariffs we are likely to offer this option for our Spanish customers fairly soon.

Page 5-18, 5.4.2, 2nd paragraph, 3rd sentence – Infinia uses helium rather than hydrogen as the working gas. (Some Stirling engines use nitrogen.) Hydrogen has better thermal properties than helium and we lose about 1% efficiency by using helium but helium is, in our opinion, much safer, less corrosive and much easier to work with than hydrogen. We assume SES uses hydrogen because of its superior thermal performance. Infinia believes the trade-off of performance for reliability is advantageous. Again this is a legitimate difference of opinion related to different business models not an indictment of either approach.

Page 5-18, 5.4.2, 2nd paragraph, last sentence – "Thermal Storage is not currently considered to be viable a viable option for dish Stirling systems." By who? As described above, this statement is simply not true.

Page 5-19, 5.4.2, 1st paragraph, 1st sentence - One of the reasons we chose a 3 kW module size was to obviate the need for level land either for installation or maintenance. We actually maximize performance by being located on a south or southwest facing hillside and our "Solar Appliance" is designed to take advantage of such potential deployments. This is another example why the premise that "Bigger is Better" is presumptuous.

Page 5-19, 5.4.2, 2nd paragraph, 1st sentence – Should say 3 kW to 25 kW.

Page 5-19, 5.4.2, 4th paragraph, last sentence – 3 kW not 5 kW as mentioned previously.

Page 5-22, 5.4.5, 1st sentence, - Infinia's minimum area for one MW is approximately 3 acres.

Page 5-23, 5.4.6, - Infinia's objection to this section its premises are already noted in "General Comments" above.

Section 6.4

Page 6-30, 6.4.1 – This methodology is only appropriate for trough systems and to a lesser extent power towers. Although power towers utilize 2-axis tracking, their tracking systems are typically less flexible than tracking systems for parabolic mirrors particularly at higher latitudes. Dish Stirling is economically viable for utility scale power generation at much lower insolation levels than troughs. The most significant implication of this is Dish Stirling is suitable for deployment at much higher latitudes than troughs and towers. Infinia is currently working with customers who plan to deploy utility scale systems in eastern Washington and Oregon for example – latitudes entirely unsuitable for towers and troughs.

Page 6-30, 6.4.1, 2nd paragraph – "The key exclusion is for land greater than 1 percent slope" This is a very trough centric exclusion. We note, foot note 29, at the bottom of the page but believe this is inadequate. Solar thermal technologies other than trough can definitely use land with greater than 1 percent slope – Our system is designed to take advantage of just such sites.

Page 6-32, 6.4.1, last paragraph, last sentence – Not true, Eastern Washington and Eastern Oregon are definitely economic for dish Stirling systems.

Page 6-41, 6.4.6, Table 6-21 – The resource is only NOT viable for troughs and perhaps towers - It is viable for dish Stirling.