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IN THE UNITED STATES DISTRICT COURT FOR THE
DISTRICT OF UTAH, CENTRAL DIVISION

UNITED STATES OF AMERICA, Plaintiff, vs. RAPOWER-3, LLC, INTERNATIONAL AUTOMATED SYSTEMS, INC., LTB1, LLC, R. GREGORY SHEPARD, and NELDON JOHNSON, Defendants.	**DECLARATION OF JOHN T. KRACZEK** Civil No. 2:15-cv-00828-DN-EJF Judge David Nuffer Magistrate Judge Evelyn J. Furse

Pursuant to 28 U.S.C. § 1746, I hereby declare as follows:

1. My name is John T. Kraczek and I make this declaration under oath and based on my personal knowledge.

2. I am over the age of 18 and hold a BS degree in Mechanical Engineering Technology from Weber State University.

3. I have served in many engineering project and business capacities over the last 30 years of my professional carrier. A copy of my resume is attached hereto as Exhibit 1.

4. During my career I have worked and lead teams in an effort to develop and promote cost effective renewable energy technologies. In the capacity of Lead Project Engineer, I have worked on $350 million-dollar projects.

5. My team and I were asked to review the installation of an Infinia "Colorado" Stirling engine onto a solar array containing the Johnson Fresnel lenses. We prepared a PE stamped report showing power generation from the Johnson Lenses through the Stiling Engine. A copy of my report is attached hereto as Exhibit 2.

6. I have reviewed the declaration of Dr. Mancini submitted with the United States' Opposition to Defendants' Motion to Alter or Amend Findings, Orders, and Judgment.

7. There are multiple inaccurate or illogical conclusions in Dr. Mancini's declaration which would tend to indicate his opinions are significantly biased against the defendants and cast doubt on his ability to analyze unemotionally defendant's new technology development. These include the following problems:

8. In paragraph 10 of his Declaration, Dr. Mancini acknowledges that when he previously conducted his study, the defendant was working on using a different power generation technology.

9. In paragraph 11 of his Declaration, Dr. Mancini informs the court that he would need to conduct a formal analysis of the new system to determine its commercial and technical viability.

10. Yet in paragraph 12, he asserts without performing the formal analysis he acknowledges will be required, that the system will not work based on his opinion. Because of his statement in paragraph 11 that a study would need to be undertaken to evaluate the system, all of his subsequent opinions are simply conjecture based upon previous now unrelated conclusions and incomplete information.

11. Regarding alignment and tracking issues, Dr. Mancini concludes that the system cannot be made to work. He states:

> "The problem with this design is that there are major alignment and tracking issues to be overcome in order to keep all four dish/Stirling engine generators aligned with their respective solar concentrator on a single tower while tracking and the sun's position in the sky. Furthermore, even if the apparatus did track the sun, any amount of wind would cause the dish/Stirling engine generators to move out of the focused solar energy beams, thereby losing the sun's energy."

12. Dr. Mancini's conclusion is flawed in three ways:

a. First, his conclusion is logically parallel to saying, "the car does not work; therefore, it will never work." This is a difficult statement to support when one is surrounded by many other cars that do work, and mechanics and engineers that can make any car work using basic off the shelf parts and technologies. It doesn't matter what it looked like many months ago when Dr. Mancini visited the site, at this point, they can make it work. Dr. Mancini's implication that the tracking system did not work when he visited the site and therefore does not work now, and his subsequent inference that it will therefore never work, is this same flawed logic. There are currently many, (multiple dozens), of sun tracking systems that have been built and are effective, and not just used in the solar industry.

b. Second, Dr. Mancini makes an argument, which is not compelling, that if the wind blows then the alignment will be thrown off and the system will not work. Given that this may or may not be true, at this point in the historical and technological development of all renewable energy systems, all renewable energy systems have moments when nature does not play well with them. The wind does not always blow for wind turbines. The sun does not always shine for solar. To say that the system is flawed because it is susceptible to occasional weather

caprice is to say that all renewable energy systems are flawed because they are all susceptible to intermittent weather conditions affecting their ability capture energy. The assertion that the system is flawed because it may or may not be susceptible to wind interference is obviously not a flaw in the Johnson Fresnel system but a standard challenge of all renewable energy systems, and therefore not a compelling point in his argument that the Johnson system is flawed or his erroneous conclusion that it will never work.

c. Third, the consideration of the idea that wind will always throw off the focal point of the lenses when used with Stirling engines, is incorrect. Because of the significant energy capture by the lenses, some inaccuracy is tolerable with the energy that does hit the target offering a significant energy contribution to the Stirling target. In addition, Dr. Mancini seems to infer that wind will move or flex the lens or lens carriage. While the lens holder and carriage may not be highly attractive, it is actually very stiff. While working at the site we noted the stability of the focal point in field conditions. It does not appear that Dr. Mancini gathered any data to opine whether (and at what level) wind actually will affect the focal point, so his comment should be considered conjecture.

13. Dr. Mancini seems to imply in his report that he holds an opinion which is that no concentrated solar system is commercially viable. For if any other concentrated system is commercially viable, and the Fresnel Lenses used in the Johnson system are 10% the cost of traditional lenses, or even significantly less than stainless reflective mirrors, and as they work under the same physics principals, then it's logical the Johnson system would cost less to produce and therefore potentially is more commercially viable than other concentrated systems.

If it is the case that no concentrated solar system is commercially viable, then Dr. Mancini as expert witness should disclose to the court that under his definition of commercial viability there is no concentrated solar system that can or does meet his high bar of commercial viability definition.

14. In paragraph 14 of his Declaration, Dr. Mancini tries to discredit the original manufacturer of the Stirling Engine, Infinia, and makes the statement that their system was not commercially viable, because it was more expensive than fossil fuel, which resulted in company bankruptcy. He thereby tries to imply that because Infinia failed the defendant will also fail. This logic is clearly faulty in the commercial market. Because one manufacturer failed in their attempt to realize profits on an initiative, it does not follow that all will. Apple iPad for example succeeded when others failed in the early tablet market.

15. In paragraph 14, Dr. Mancini implies that because the amount of electricity produced was small in the test, it follows that the system will not be commercially viable. Yet in paragraph 15, he acknowledges that the authors of the electrical test confirmed that the model of Stirling was not optimized to the lenses. It therefore does not follow that the lenses themselves are not commercially viable, or that lenses with a different Stirling engine would not be commercially viable. The only real conclusion that can be inferred here is that this lens size with a poorly matched and untuned Stirling engine would not be viable. Also Dr. Mancini's assumption that because the amount of electricity produced in this test was small does not logically follow through to "therefore" it will always be small. Tuning and matching are part of the normal field adaptations expected to be overcome.

16. Dr. Mancini states, in paragraph 14 that "Simply generating "measurable electricity" does not mean that a project will be commercially viable. This is a very small amount of electricity."

This criticism begs the question, what is Dr. Mancini's definition of commercially viable and does that have any relation to the dispute between the parties? This comment from Dr. Mancini, who presents himself as an expert witness in renewable energy systems, seems more the role of a financial market expert than someone with Dr. Mancini's background. For true market commercial viability most economists, business owners, and consumers would argue that the product or commodity sold from a given system would need to be cost effective or at least present a balanced cost verses value selling proposition. Dr. Mancini implied in his declaration that the Infinia Power dish system failed to be commercially viable because it could not compete with fossil fuel. Apparently, Dr. Mancini is unaware, or chooses to conceal the fact, that there are **no** renewable energy systems that are cost effective or commercially viable in cost only comparison against fossil fuel systems, particularly coal powered electricity. At $0.03 per kilowatt hour to produce, utility operators can sell coal powered electricity at $0.06 per kilowatt and make an impressive 50% margin. To make renewable energy viable, other considerations must be reviewed and value attached to those considerations to make these systems commercially viable and competitive in the market place. For the most part these attached values are tax incentives and rebates offered by governments and communities in order to reduce the impact of fossil fuel use on the environment and energy dependence of a nation. These government subsidies are in part to prepare for an anticipated time when fossil fuel becomes scarce.

17. In paragraph 15 of Dr. Mancini's declaration, he reviews the reported information and notes that the test documentation used a derated lens number of 50%. In other words, the analysis assumes only 50% of the available energy was passed from the sun to the Stirling

engine. While this was a calculation assumption, it is still impressive. Existing commercial PV systems typically capture 3 to 8% of the available energy striking the PV panels.

18. It turns out however that the test calculation assumption of 50% heat loss to scattering in the lenses was actually very much lower than actual system performance. Because we were curious to know the actual BTU capacity of the Johnson Fresnel Lens system, a quick test was devised.

19. This simplified test was done on site to understand the actual heat available. A single gallon bucket of water was placed in the focal point of the Fresnel lens and the time measured for how long it took the bucket to go from ambient to boiling. This was measured with a stop watch. The time showed it was only 70 seconds to bring the water to boiling.

20. Based on the definition of BTU and Kilowatt Hour, 1 KW Hr will raise the temperature of 22.8 lbs of water from 62 deg F to 212 in 1 hour. Based on this, the Johnson Fresnel Lens gathered between 17 and 18 KW Hours/Hour of heat power over that 70 seconds. This is the equivalent energy required to run 6 or more typical American homes during daylight hours, providing hot water and electricity. That's an energy capture equivalent to the energy used by 24 American houses per Johnson tower, or 4800 houses for the other towers that are currently purchased and in preparation to be activated.

21. Further, based on the amount of sunlight available during the day of the test, this meant that these inexpensive lenses successfully captured between 80% to 90% of the available sun energy and input it into the water. That is impressive energy capture by any competitive system comparison.

22. If Dr. Mancini's commission was to analyze the Johnson Fresnel system for commercial viability, he did not gather any data to support his conclusion that it was not viable. Specifically,

he failed to measure the amount of heat available at the focal point of the lens, the key to the conclusion on whether the lenses actually gather useful levels of heat.

23. The conclusion we can draw from this is that Dr. Mancini's interpretation that the calculation assumptions he cited in paragraph 15 of his declaration as evidence for his point that the lenses are not viable because they only capture 50% of the available energy, is not correct. The lenses are able to capture significantly more, approaching 90%, but Dr. Mancini did not gather this important piece of data.

24. Yet even if they were only able to capture 50%, unlike a coal powered electrical plant, where efficiency is extremely important because coal has to be purchased to drive the plant, a very inefficient solar system may still be commercially viable based on broader definitions. A good example is a photovoltaic receiver with its very low efficiencies. If the cost of concentrated solar is low enough and perhaps only 5% efficient, it may still be very competitive in the marketplace against other technologies because the sunlight is free and does not involve the costs of mining and transporting coal. Again, the power generation test Dr. Mancini cites in his affidavit clearly noted that the particular Stirling generator was not designed for, nor tuned for this specific lens system, but it was an adequate test piece to prove electricity could be made, as it was available for use.

25. The mounting data evidence is that not only are the Johnson Fresnel Lenses an inexpensive way of generating solar process heat, they are very effective at focusing it.

26. In summary, Dr. Mancini's argument that because the system was not working on the day he made his inspection, his conclusion that it could never work, is obviously an unwarranted leap. His failure to gather key data recording the lenses' ability to concentrate sun power

disqualifies his team from logically making the claim that the lenses do not now work in conjunction with a Stirling engine system.

27. Technologies grow as problems are solved and engineering completed until the point they reach commercial viability—however one chooses to define that. It seems very unusual to point at a developing technology with condemnation and the judgment it is invalid just because it has not yet fully matured.

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

DATED this 9th day of October, 2018.

/s/ John T. Kraczek *(authorized via email)*
John T. Kraczek

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing **DECLARATION OF JOHN T. KRACZEK** was sent to counsel for the United States in the manner described below.

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Attorneys for Defendants