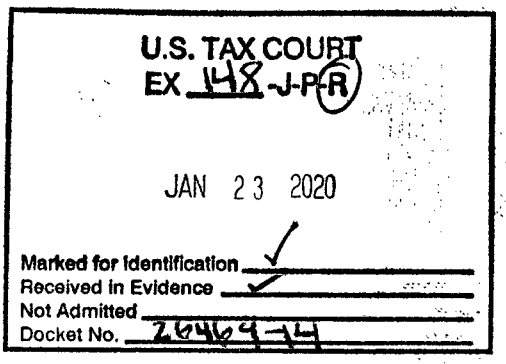

Plaintiff
Exhibit
976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Rebuttal Expert Report Prepared in Response to the Expert Witness Report of Mr. Ken Gardner

Preston and Elizabeth Olsen vs. Commissioner of Internal Revenue
United States Tax Court, Docket Nos. 26469-14 and 21247-16

Prepared by

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December 16, 2019

Summary

It appears that Mr. Gardner has extensive experience in solar photovoltaic technology and he addresses these technologies extensively in his report. However, because the technology proposed by International Automated Systems (IAS) and the related company RaPower3 is a concentrating solar power (CSP) system that utilizes the thermal energy from the sun to drive a Rankine power cycle, his introduction and discussion of solar photovoltaics are not relevant to this case.

In this case, the technology discussion is focused on the modular system proposed by IAS as described in various versions of their White Paper[1] comprising concentrating solar towers with four Fresnel lenses, four thermal receivers, piping to carry molten salt or hot oil to a centrally-located turbine generator power block where the hot oil produces steam to drive the Rankine power cycle before being returned to the solar field to be reheated.[2]

Because solar photovoltaics is not applicable to the IAS technology under discussion, I will comment in this rebuttal only on those instances in Mr. Gardner's report where he specifically references CSP solar thermal power technology. Mr. Gardner's report does not have page numbers so, for reference I have taken the liberty of numbering the pages of his report starting with the Title page 1 through page 19. The remainder of Mr. Gardner's report, labeled Exhibit A, contains the documents he references. The majority of these referenced materials, numbered pages 17– 33, is a direct copy of material in the White Paper of reference 1, i.e., footnote 1 of this rebuttal report.

My Rebuttal Comments and Discussion

p.2, para. 1 ***"This report sets forth the opinions that I have formed regarding certain Fresnel lens purchased by Preston Olsen from RaPower3 LLC and/or RaPower-3, LLC."***

Apparently, Mr. Gardner is limiting his opinions only to the Fresnel lenses. The Fresnel lenses are only the first part of the solar system described in detail in the IAS White Paper referred to in footnote 1 of this rebuttal report.

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[1] Attachments 2, 3, and 4 to IAS Solar Dish Technology Evaluation, Reference: Preston Olsen and Elizabeth Olsen v. Commissioner Docket Nos. 26469-14 and 21247-16, by Thomas R. Mancini, PhD, November 13, 2019.

[2] Ibid. reference no. 1, Par. 63 -- 67

p. 3 para. 2 "OPINION #1: A Solar Lens is a part and/or component that is related to the functioning of equipment that uses solar energy directly to generate electricity."

I have no issue with this statement other than to note that it is extremely broad and vague. Clearly, the Solar Lens is only one part of a functioning solar energy system and cannot in and of itself produce electricity.

p.3, para. 3 "OPINION #2: The system using a tower design and an array of the Solar Lenses, which was installed at facilities I visited in Delta, Utah by International Automated Systems, Inc. (or its affiliated entities), is technically viable to generate electricity with either steam operated generators or concentrated photovoltaic power "

Mr. Gardner has not provided any background, discussion, or analysis to support this opinion. He has not defined the specific "steam operated system" that he purports to be "technically viable." Apart from mentioning the "Solar Lenses," Mr. Gardner did not identify the other system components and he did not perform any technical analysis of the other system components required to produce electricity. Also, Mr. Gardner did not present, review, or analyze operational data for any of the system components or for a complete operational CSP solar thermal system in arriving at his opinion.

Mr. Gardner does not define what he means by the term "technically viable." Many types of system are technically viable but are not technically practical or are too expensive to build and operate as a commercial power generation system.

p. 5, para. 3 "The main characteristics of the non-imaging systems is their concentration ratios (i.e., the geometric concentration ratio C) which are commonly classified as being low for C ≤ 10, or medium for 10 ≤ C ≤ 100, or high for C > 100."

This range of the concentration ratio C is clearly for concentrating photovoltaics as the concentration ratio for dish engine systems, which use concentrators not unlike those proposed by IAS, are typically ~ 3000.[3]

p.8, para. 1 "I observed the focused heat generated through the Solar Lenses at the facility in Delta, Utah. Thus, it is my opinion that a Solar Lens is a part and/or component that is related to the functioning of equipment that uses solar energy to generate electricity."

[3] Ibid., reference 1, para. 22

Mr. Gardner does not document precisely what he physically observed, the date on which he observed it, the conditions at the time the observation was made, or any data and/or measurements that were taken at the time of the observation. This opinion has no data to support it or to allow one to analyze or test the opinion that is offered. In fact, because there is so little information provided, Mr. Gardner's opinion generates more questions than can be addressed.

Mr. Gardner suggests that he observed heat generated by the solar lenses. However, he does not mention any other systems components, such as thermal receivers, piping, pumps, turbine, heat exchangers etc., that would be required to "generate electricity."

Mr. Gardner does not document how much energy was in the concentrated beam or how much heat was or could be collected. This leaves open the question of whether Mr. Gardner was just observing the burning of a piece of wood by the focusing of a lens, which is a "test" that has been described by others to "document" (incorrectly) the generation of electricity.

p.15, para. 2 ***"The Fresnel lens concentrate irradiance received to a focal point located approximately 30' perpendicular from each of the four circular lenses. The sun's concentrated energy from the four combined collectors heats oil which is then transmitted to a heat exchanger (without a boiler) and produces steam or high pressure hot water to drive a generator which uses four rocket nozzle emitters which then produces approximately 10 kW. The speed of the generator is dependent energy from the sun. The generator (3 phase induction motor running in reverse) can run wild (more or less than 60 hertz) and then be rectified to DC power which is then run into a solar inverter converted to AC power and then connected to the grid."***

This paragraph just ***appears*** in Mr. Gardner's report in the middle of a discussion about concentrating photovoltaics. He provides no background discussion or context for its inclusion at this point in his report and there does not appear to be any opinion provided by Mr Gardner about the system described in this paragraph.

This system description is precisely the one that IAS would claim that they are developing and the one referred to in the White Paper and in my report of reference 1. As I describe in my report, IAS has not developed, demonstrated, or operated a system as described above. They

have a series of components that do not appear to operate together[4] and that have not been assembled into a system to produce electricity.[5]

p. 17, para. 3 "IAS is developing a concentrated photovoltaic device that can use dual axis trackers to concentrate sun on a focal point to generate power directly from the sun. The device uses multiple layered P-N junctions to boost efficiency to approximately 43%."

Mr. Gardner does not describe the concentrated photovoltaics system or the components that "IAS is developing." He does not document the developmental status of any IAS concentrated photovoltaic technology nor does he present any analysis to support his statement of a system in design or in operation. He also does not present any analysis to support his claim of a "boost efficiency to approximately 43%."

In their White Paper of reference 1, IAS mentions a number of solar-related technologies including concentrated photovoltaics, water desalination, molten salt thermal energy storage, and zinc oxide batteries. However, at no point in my review of all available information for IAS (two visits to IAS facilities and in excess of 26,000 documents) did I observe any design data, engineering drawings, actual hardware, test results or other information indicating that IAS was developing anything other than the CSP solar thermal system described in their White Paper and analyzed by me in reference 1.

p. 18-19, para. 2 "The stream [sic] generator technology though feasible may not now compete with standard photovoltaic power producing equipment as costs continue to drop for standard solar modules."

Mr. Gardner has provided no background documentation in the form of design information, test results, or in any other form to support his opinion that the "stream [sic] generator technology" is feasible.

I performed a detailed analysis of each component design and performance and combined them into a system which I compared with the same system that IAS described in their White Paper.[6] My analysis demonstrated that, even if these components were assembled into a system (which they were not), the system would only convert 4.7% of the incident solar energy into electricity.

[4] Ibid., reference 1, para. 171 and 173
[5] Ibid., reference 1, para. 175
[6] Ibid., reference 1, Para. 170

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While this could be described as "technically feasible," it certainly is not a system which anyone would want to develop because the cost of the electricity would not be competitive with conventional power generation or even other renewable energy resources.

Thomas R. Mancini

Dec. 16, 2019

Thomas R. Mancini

Date