

## CALIFORNIA ENERGY COMMISSION

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July 26, 2011

Mr. Michael J. Levy  
Office of Chief Counsel  
California Energy Commission  
1516 Ninth Street  
Sacramento, CA 95814

<b>DOCKET</b>	
<b>11-CA1-03</b>	
DATE	JUL 26 2011
RECD.	JUL 27 2011

*Re: Complaint against DyoCore, Inc.*

Dear Mr. Levy:

Enclosed is a complaint against DyoCore, Inc. ("DyoCore") filed pursuant to title 20, Section 1231 of the California Code of Regulations, which provides that "[a]ny person, including . . . commission staff . . . may file a complaint alleging a violation of a statute, regulation, order, *program*, or decision adopted, administered, or enforced by the commission."<sup>1</sup> As the Executive Director of the California Energy Commission ("Energy Commission" or "Commission"), I am filing this complaint to allege that DyoCore violated the intent of the Emerging Renewables Program ("ERP"), and, in particular, Appendix 3, Section (A)(2) of the Emerging Renewables Program Final Guidebook ("ERP Guidebook"),<sup>2</sup> by submitting grossly overstated information regarding the performance characteristics of the DyoCore SolAir wind turbine ("DyoCore turbine")<sup>3</sup> in order to have the DyoCore turbine listed by the Commission as eligible for use under the ERP.

For the reasons set forth in more detail below, I request that the DyoCore turbine be immediately removed from the Energy Commission's "List of Eligible Small Wind Turbines" on the ERP website, and that the Energy Commission provide guidance

<sup>1</sup> 20 CCR § 1231 (emphasis added). References to section numbers are to those in title 20 of the California Code of Regulations unless otherwise noted.

<sup>2</sup> Emerging Renewables Program Final Guidebook, Tenth Edition, California Energy Commission, April 2010, p. 49, available at <http://www.energy.ca.gov/2010publications/CEC-300-2010-003/CEC-300-2010-003-F.PDF> (referred to below as "ERP Guidebook").

<sup>3</sup> List of Eligible Small Wind Turbines on the ERP website, California Energy Commission, available at [http://www.consumerenergycenter.org/cgi-bin/eligible\\_smallwind.cgi](http://www.consumerenergycenter.org/cgi-bin/eligible_smallwind.cgi) (the List of Eligible Small Wind Turbines on the ERP website identifies the DyoCore turbine as the "SolAir 1600W hybrid wind/solar generator," and provides the following model number, "S80015dc"). However, the DyoCore turbine is also referred to on DyoCore's website as the "DyoCore SolAir I 800 Hybrid Wind Solar Generator," and the "SolAir I 800." See DyoCore's website, available at <http://www.dyocore.com/> (referring to the DyoCore turbine as the "DyoCore SolAir I 800 Hybrid Wind Solar Generator"); *id.*, available at <http://www.dyocore.com/solair.html> (referring to the "SolAir I 800"). In addition, applications for rebate reservations under the ERP have also referred to the DyoCore turbine as the "DyoCore SolAir I 800W." Nonetheless, Commission staff understand that DyoCore only manufactures one turbine which is referred to in this complaint as the "DyoCore turbine."

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regarding the resolution of applications for rebate reservations and payment requests under the ERP for small wind systems that use DyoCore turbines, and take such action as may be necessary to recover ERP funds that were paid as rebates for such systems. In addition, I request that the Energy Commission refer this matter to the Attorney General for investigation and prosecution, as appropriate.

**I. Identification of Complainant (§ 1231(b)(1))**

Robert P. Oglesby  
Executive Director  
California Energy Commission  
1516 Ninth Street  
Sacramento, CA 95814  
(916) 654-4996

**II. Identification of Respondent (§ 1231(b)(2))**

Ralph Bettencourt, CEO  
DyoCore, Inc.  
3125 Tiger Run Court, #104  
Carlsbad, CA 92010  
(866) 404-2428

David Raine, CTO  
DyoCore, Inc.  
3125 Tiger Run Court, #104  
Carlsbad, CA 92010  
(760) 580-4271

**III. Statement of Program and Regulation Upon Which the Complaint is Based (§ 1231(b)(4))**

**A. The Purpose of the ERP**

The ERP was established in 1998 to help develop self-sustaining markets for renewable energy systems, *i.e.*, solar and small wind, by providing rebates and production incentives to end-use consumers who purchase and install such systems for on-site generation in California. However, after the Energy Commission established the New Solar Homes Partnership ("NSHP") in 2006, the ERP no longer provided funding for solar energy systems and expanded the program to include fuel cells. Thus, payments under the ERP are currently intended to stimulate increased sales of small wind systems that have a generating capacity up to 50 kilowatts ("kW") and fuel cells that have a generating capacity up to 30 kW, and thereby, encourage manufacturers, sellers, and installers to expand their operations, improve distribution, and reduce system costs associated with these renewable technologies.<sup>4</sup> Significantly, the ERP is not intended to cover the total purchase and installation costs of small wind systems or fuel cells for end-use consumers,<sup>5</sup> as such a complete subsidy is unsustainable and sends improper signals to the market by motivating increased sales of these renewable

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<sup>4</sup> *Id.* at iii, 1.

<sup>5</sup> See *id.* at 11 (emphasis added) (explaining that rebates offered under the ERP "must be used to *reduce* the purchase or lease cost of the eligible system, or the cost of electricity produced by the eligible system

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energy systems without concern for cost-effective siting and/or operation. Since 1998, the ERP has issued \$8.7 million in rebates for 577 small wind systems, with a cumulative installed capacity of 3.6 megawatts.

**B. Requirements and Process for Listing Small Wind Systems as Eligible for Use in the ERP**

The rules adopted by the Energy Commission to govern the administration of the ERP are contained in the ERP Guidebook, and the Renewable Energy Program Overall Program Guidebook ("Overall Program Guidebook").<sup>6</sup> Further, additional procedures for listing specific equipment, e.g., wind turbines, as eligible for use in the ERP are found on the ERP website.<sup>7</sup>

Pursuant to Appendix 3, Section (A)(2) of the ERP Guidebook, the Commission provides manufacturers with two options for having their small wind systems listed as eligible for use in the ERP:

1. Small wind turbines must be certified as meeting the requirements of a small wind turbine-specific safety and/or performance standard adopted by a national or international standards setting body, including, but not limited to International Electrical Code (IEC) 61400-2. The Energy Commission will monitor, review, and may participate in the Interstate Renewable Energy Council's efforts to create a national certification program.

OR

2. Manufacturers of small wind systems must provide monthly data of average energy produced (kWh) and average wind speed for one consecutive year for each model of system they wish to be considered eligible for this program to demonstrate reliable operation of that model of equipment at a site with average annual wind speeds of at least 12 mph.

Specific procedural requirements for having wind turbines listed as eligible for use in the ERP are contained in a form on the ERP website titled, "Wind Turbine Eligibility Listing

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for the on-site customer. . . . [u]nder no circumstances will the incentive from the ERP exceed the net purchase price of the system to the final customer (before ERP incentives).")

<sup>6</sup> *Id.* at 1. Pursuant to Public Resources Code Section 25747, subdivision (a) the Commission is required to adopt guidelines governing the funding programs under its Renewable Energy Program, including the ERP, and such guidelines are exempt from the requirements of the Administrative Procedures Act ("APA"), as codified at Government Code Section 11340, *et seq.*

<sup>7</sup> Consumer Energy Center, California Energy Commission, see heading "Adding Equipment," available at <http://www.consumerenergycenter.org/erprebate/equipment.html>.

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Procedure," attached as Exhibit A. The form provides that if a manufacturer elects option two, as identified above, then it must submit the following information to the Commission's consultant, KEMA, Inc. ("KEMA"):

- **A year of operational data for the turbine** (including wind speeds and power output) – used to demonstrate the reliable and safe performance of the turbine;<sup>8</sup>
- **The power curve** for the turbine indicates the turbine's generating capacity, or how much power (in watts or kilowatts) the turbine will produce at any given wind speed, referred to in this complaint as the *rated output*, when used to describe the generating capacity of a single turbine, or the *system rated output*, when used to describe the generating capacity of multiple turbines the comprise a solar energy system;
- **The power curve data**, or data upon which the power curve is based; and,
- **A short product description for the ERP website** that includes the rated output at which the manufacturer seeks to list the turbine.

During the period in which DyoCore requested that the DyoCore turbine be included on the "List of Eligible Small Wind Turbines" on the ERP website, *i.e.*, prior to the suspension of the program, KEMA was tasked with performing a completeness and consistency check to confirm that manufacturers had submitted the requisite information to have equipment listed as eligible for use in the ERP but was not charged with substantively analyzing the data received.

### C. Requirements for Securing a Reservation under the ERP

Applicants seeking rebates for small wind systems under the ERP must submit a completed Reservation Request Form, CEC-1038 R1 ("R1 Form") and supporting documentation to reserve a fixed amount of program funds.<sup>9</sup> Applicants must identify the "System Rated Output" on the R1 Form.<sup>10</sup> The system rated output, as provided by the applicant, is an essential part of the request for a reservation given that rebates offered through the ERP "are based on the generating capacity of the system."<sup>11</sup> Once the R1 Form is reviewed and approved, the Commission sends the applicant a Payment Claim Form, CEC-1038 R2 ("R2 Form") that identifies the amount of funds reserved and the date upon which the reservation expires.<sup>12</sup> The system rated output is also included on the R2 Form.<sup>13</sup> The R1 and R2 Forms require the end-use consumer and the

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<sup>8</sup> Pursuant to option two referenced above, the Energy Commission requires manufacturers to provide one-year of operational data in order to demonstrate the reliable and safe performance of their turbine.

<sup>9</sup> ERP Guidebook, *supra* note 2, at 2

<sup>10</sup> *Id.* at 33.

<sup>11</sup> *Id.* at 11; see *id.* at iv ("Incentives for small wind turbines . . . are calculated by multiplying the rated output by the incentive level [currently \$3.00/watt for the first 10 kW]").

<sup>12</sup> *Id.* at 2.

<sup>13</sup> *Id.* at 39.

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equipment seller to attest under penalty of perjury that the information provided in each form is "true and correct to the best of their knowledge."<sup>14</sup>

#### **IV. Authority Under Which the Commission May Take Action (§ 1231(b)(6))**

Pursuant to Section 2, subdivision (K) of the ERP Guidebook, titled "Audits and Inspections," the Commission "will conduct audits of the applications it receives to verify that the information provided in the applications is true and correct."<sup>15</sup> Subdivision (K) states that if information contained in an application or payment request "appears to be false or misrepresented" then the Commission will take one or more of eight identified measures, *e.g.*, rejection of the application or payment request, or notification of the proper authorities so appropriate enforcement action may be initiated.<sup>16</sup>

Further, Section 7, subdivision (B) of the Overall Program Guidebook, titled "Fraud and Misrepresentation," provides the Commission's Renewables Committee ("Committee") broad authority to investigate "any awardee who the Committee has reason to believe may have misstated, falsified, or misrepresented information in applying for . . . funding" under the Renewable Energy Program.<sup>17</sup> Subdivision (B) states that based upon the results of an investigation, "the Committee may take any action that it deems appropriate, including, but not limited to . . . cancellation of the funding award . . . recovery of any overpayment, and, with concurrence of the Energy Commission, recommending the Attorney General initiate an investigation and prosecution pursuant to Government Code Section 12650, *et seq.*, or other provisions of law."

#### **V. Statement of Facts Upon Which the Complaint is Based (§ 1231(b)(3))**

##### **A. DyoCore and the DyoCore Turbine**

DyoCore manufactures a small wind turbine that may be roof-top mounted or pole-mounted, *i.e.*, the DyoCore turbine, which it markets as potentially eligible for a one-hundred percent rebate under the ERP. See screenshot of DyoCore, Inc. website ("DyoCore website"), attached as Exhibit B. According to the DyoCore website, the DyoCore turbine appears to have a rated output of 1.6 kW at 18 mph and to cost approximately \$2,000 to purchase. At the current rebate level of \$3.00 per watt for systems with a total rated output of up to 10 kW,<sup>18</sup> purchasers of the DyoCore turbine

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<sup>14</sup> *Id.* at 33; 39.

<sup>15</sup> *Id.* at 9 (Notably, subdivision (K) further provides, "[t]he Energy Commission may also conduct field inspections to verify systems are operating properly and installed as specified in the reservation request and payment claim applications.").

<sup>16</sup> *Id.*

<sup>17</sup> Renewable Energy Program, Overall Program Guidebook, Third Edition, January 2011, p. 17, available at <http://www.energy.ca.gov/2010publications/CEC-300-2010-008/CEC-300-2010-008-CMF.PDF> (referred to below as "Overall Program Guidebook").

<sup>18</sup> ERP Guidebook, *supra* note 2, at 11 (stating that the current rebate level for the first 10 kW of a small wind system is \$3.00 per watt). Prior to the suspension of the ERP, the incentive level was scheduled to decrease to \$2.50 per watt on April 7, 2011. *Id.* However, the Notice of Temporary Suspension of the

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are eligible for a \$4,800 rebate for a single installed turbine under the ERP. The typical application, however, is comprised of six DyoCore turbines, representing 9.6 kW, and a corresponding rebate amount of \$28,800.

DyoCore has directly applied to the ERP for rebates for small wind systems using DyoCore turbines as an equipment seller, but, more often, works with a network of certified distributors.<sup>19</sup>

## **B. The Listing of the DyoCore Turbine**

DyoCore requested that the DyoCore turbine be listed as eligible for use in the ERP in February of 2010. DyoCore originally asserted that the rated output of the DyoCore turbine should be listed as .8 kW, or 800 watts, at 12 miles per hour ("mph") winds and provided the requisite operational data, power curve, and power curve data in support of that claim.<sup>20</sup> Based upon the information submitted by DyoCore regarding the performance characteristics of the DyoCore turbine, on March 2, 2010, KEMA included it on the "List of Eligible Small Wind Turbines" on the ERP website with a rated output of .8 kW at 12 mph winds.

However, DyoCore subsequently claimed that the rated output for the DyoCore turbine was actually 1.6 kW at 18 mph winds.<sup>21</sup> In light of the disparity, a KEMA representative questioned DyoCore's claim.<sup>22</sup> DyoCore, however, provided an explanation for the difference and furnished a revised power curve and new power

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Emerging Renewables Program, attached as Exhibit C, provided that "[t]o avoid affecting any pending negotiations or potential sales that are contingent on the higher rebate level of \$3.00 per watt the Energy Commission intends to extend the \$3.00 per watt rebate level for approximately 30 days after the suspension is lifted."

<sup>19</sup> Letter from Ralph Bettencourt, CEO, DyoCore to Energy Commission, April 20, 2011, Docket No. 02-REN-1038 ("Dyocore has a network of 12 California distributors who undergo training and adhere to diligent standards as they relate to locations of installations of the products. Those 12 certified distributors have submitted approximately 800 R-1 applications (65 per distributor) [under the ERP]."). Notably, DyoCore lists 13 certified distributors on its website, all of whom are identified as potentially affected parties in Section 8, subdivision (A) of this complaint.

<sup>20</sup> Email from David Raine, CTO, DyoCore to Pete Baumstark, PE, Energy Engineer, KEMA, February 16, 2010.

<sup>21</sup> Email from David Raine, CTO, DyoCore to Daria S. Mashnick, Energy Engineer, KEMA, April 9, 2010 (stating "[at] 18mph . . . our output is 1.6 kW. This should be the posted data or applied output."); email from Rick Berry, DyoCore, Inc. to Daria S. Mashnik, Energy Engineer, KEMA, April 22, 2010 ("our CEO Dave Raine sent you the info to upgrade our state listing on 4/14/2010 from [.8 kW] which was my mistake to the actual watts per the curve of [1.6 kW]. This is causing some problems with people purchasing the units. . ."). Mr. Berry refers to an email that was supposedly sent by Mr. Raine to Ms. Mashnik on April 14, 2011 in which Mr. Raine allegedly asserts that the rated output for the DyoCore turbine is 1.6 kW. However, KEMA has no record of any such email. In fact, it appears that Mr. Berry intended to reference the email sent by Mr. Raine to Ms. Mashnik on April 9, 2011, which is cited above.

<sup>22</sup> Email from Daria S. Mashnik, Energy Engineer, KEMA, to David Raine, CTO, May 28, 2010 ("My question (and what needs to be verified by you) is as follows: I graphed the data that you sent me below to get the following Performance Curve for your product (same as the one you sent me below). You would like your product to be rated at [1.6 kW], however based on the curve the output only goes up to [.7 kW] which happens at ~ 26 mph. Please clarify.").

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curve data in support of their assertion that the rated output for the DyoCore turbine should be 1.6 kW at 18 mph winds.<sup>23</sup> Notably, DyoCore did not provide new operational data in support of their assertion regarding the increased generating capacity of the DyoCore turbine. KEMA ultimately accepted DyoCore's explanation and the manufacturer's submission of the revised power curve and new power curve data as sufficient. Consequently, KEMA aggregated the turbines to be added to the List of Eligible Small Wind Turbines on the ERP website for the month of June, including the DyoCore turbine at a rated output of 1.6 kW at 18 mph winds, and forwarded the information to Commission staff who promptly updated the list on June 2, 2010.<sup>24</sup>

### C. Temporary Suspension of the ERP

During the initial months of 2011, Energy Commission staff became aware of three issues with DyoCore turbines that necessitated the temporary suspension of the ERP. See Notice of Temporary Suspension of Emerging Renewables Program, attached as Exhibit C. First, Energy Commission staff learned that the ERP was essentially providing free DyoCore turbines to end-use consumers which, as noted, is problematic for two reasons: such a complete subsidy is unsustainable and sends improper signals to the market by motivating increased sales of renewable energy systems without concern for cost-effective operation. Second, staff received reservation applications for rebates for DyoCore turbines that were to be installed in locations with poor wind resources, increasing the concern that the incentives were driving increased sales at the expense of cost-effective siting and operation of small wind systems. Third, during this same period the number of reservation applications for rebates for DyoCore systems received by the Commission increased dramatically.

As of the filing of this complaint on July 26, 2011, approximately:

- 33 systems using DyoCore turbines have been installed and ERP rebates had been paid, totaling \$515,385
- 249 reservation applications for rebates for systems using DyoCore turbines have been approved, totaling \$6,393,544.
- 1069 applications have been received and are pending review, totaling \$31,220,976.

As such, there are a grand total of 1351 applications or payment requests for small wind systems using DyoCore turbines under the ERP that have been paid, approved, or which are currently pending, totaling \$38,129,905.

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<sup>23</sup> Email from David Raine, CTO, DyoCore, to Daria S. Mashnick, Energy Engineer, KEMA, June 1, 2010.

<sup>24</sup> List of Eligible Small Wind Turbines on the ERP website, California Energy Commission, available at [http://www.consumerenergycenter.org/cgi-bin/eligible\\_smallwind.cgi](http://www.consumerenergycenter.org/cgi-bin/eligible_smallwind.cgi).

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#### D. The KEMA Report

Following the suspension of the ERP, the Energy Commission obtained information which alleged that the rated output for the DyoCore turbine may have been misstated, and further, might be physically impossible.<sup>25</sup> In response to questions raised about the validity of DyoCore's performance claims, and in reliance upon the Audit and Inspection provisions in the ERP Guidebook and the Fraud and Misrepresentation provisions in the Overall Program Guidebook, the Energy Commission engaged KEMA to analyze the operational data, power curve, and power curve data submitted by DyoCore. See KEMA's report of July 25, 2011 ("KEMA Report"), attached as Exhibit D.

The KEMA Report analyzed the power curve data submitted by DyoCore and concluded:

DyoCore's claim of 1600 watts power output at 18 miles per hour (8.1 m/s) is 7.5 times greater than the theoretical maximum power output at that wind speed and 9.0 times greater than an optimal state-of-the-art turbine rotor with the same diameter.<sup>26</sup>

KEMA's analysis of the power curve is based on the Betz Limit theory, which posits that a wind turbine can capture no more than 59.3 percent of the kinetic energy in wind, which is calculated in relation to the diameter of its rotor. The KEMA Report concludes that if the DyoCore turbine, which has a rotor that is 1.2 meters in diameter, had an actual rated output of 1.6 kW at 18 mph winds, it would represent a machine that could extract 7.5 times more energy from wind than is thought possible under the Betz Limit theory.

The KEMA Report reached a similar conclusion when analyzing the one year of operational data submitted by DyoCore. The one year of operational data submitted by DyoCore showed an annual average wind speed of 15.3 miles per hour and an annual energy production of 2,554 kWh.<sup>27</sup> The KEMA Report shows that this is inconsistent with the power curve data submitted by DyoCore. Using the power curve submitted by

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<sup>25</sup> See e.g., Trabish, *Have Small Wind Manufacturers Exploited Loopholes in California Rebates?*, Greentech Media, March 15, 2001, available at <http://www.greentechmedia.com/articles/read/have-small-wind-manufacturers-exploited-loopholes-in-california-rebates/> (The article quotes several prominent figures in the small wind industry, including DyoCore's competitors, who suggest that the system rated output listed on the ERP website for the DyoCore turbine of 1.6 kW at 18 mph is physically impossible based upon the diameter of the turbine's rotor.

Further, the article states that David Raine, CTO of DyoCore, asserts that the company's performance claims are backed up by laboratory and field performance tests, referencing the work of Chuck Skinner, a field evaluation engineer with TUV America. However, the article questions the accuracy of this assertion, stating, "[f]or his part, Skinner said that TUV America had done no testing that would confirm anything but the electrical safety of the DyoCore turbine.").

<sup>26</sup> KEMA Report, at 5, attached as Exhibit D.

<sup>27</sup> *Id.* at 7.

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DyoCore and the same annual average wind speed of 15.3 miles per hour, the annual energy production was calculated to be 9,513 kWh, which far exceeds the annual production data submitted by DyoCore.<sup>28</sup> In addition, the KEMA Report concluded that DyoCore's claimed annual energy production of 2,554 kWh with annual average wind speed of 15.3 miles per hour "is not possible because the claimed power curve exceeds the performance of a state-of-the-art wind turbine rotor by 9.0 times."<sup>29</sup>

The analysis in the KEMA Report demonstrates that DyoCore's submissions to KEMA for the purpose of listing the DyoCore turbine as eligible for use under the ERP fail to support the asserted rated output of 1.6 kW at 18 mph winds. More specifically, the power curve data grossly overstates the amount of energy that a turbine with a 1.2 diameter rotor can extract from the wind, and the one year of operational data does not support a rating of 1.6 kW at 18 mph winds.

After KEMA had been engaged to analyze DyoCore's operational data, power curve, and power curve data, the Commission learned that DyoCore had posted yet another power curve for the DyoCore turbine on its website. See Revised Power Curve, attached as Exhibit E. David Raine, DyoCore's CTO, posted the revised power curve on the company's blog on April 11, 2011, stating:

This is the most accurate reference to estimated power production based on wind conditions. Though this does not account for gusts or rapid changes it can provide a basis for your production expectations at specific constant wind speeds:

Significantly, the revised power curve more closely corresponds to KEMA's analysis, and in particular, reflects a rated output of approximately .25 kW at 18 mph winds.

As of the filing of this complaint on July 26, 2011, DyoCore had not disclosed any new information regarding the rated output of the DyoCore turbine to KEMA or the Commission, and further, continues to state on its website that the DyoCore turbine is "CEC Listed: 1.6kW at 18mph." See DyoCore website, attached as Exhibit B.

## **VI. Argument**

### **A. DyoCore's Actions Contravene the Purpose of the ERP**

As explained above, the current purpose of the ERP is to incentivize increased sales of small wind systems and fuels cells for on-site generation in California and thereby encourage manufacturers, sellers, and installers to expand their operations, improve distribution, and reduce system costs for the end-use consumer.<sup>30</sup> The underlying rationale of any such incentive program is to encourage legitimate

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<sup>28</sup> *Id.*

<sup>29</sup> *Id.*

<sup>30</sup> ERP Guidebook, *supra* note 2, at iii, 1.

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competition with the ultimate goal of inspiring and rewarding innovation. DyoCore claims that the DyoCore turbine reflects "New Innovative Technology," and further, that the manufacturer "has demonstrated significant success in accomplishing ERP objectives," by offering "lower cost margin products" which, in turn, "opens the door for greater deployment." See Letter from David Raine, CTO, DyoCore to Energy Commission, April 18, 2011, Docket No. 02-REN-1038, p. 1, 3-4, attached as Exhibit F, ("Raine Letter").

However, any such purported "success" is premised upon the DyoCore turbine performing as advertised, *i.e.*, approximately generating 1.6 kW at 18 mph winds. The Commission relied upon the accuracy of the information that DyoCore submitted for the purpose of having the DyoCore turbine listed as eligible for use under the ERP, *i.e.*, one-year of operational data, power curve, and corresponding power curve data. Yet the KEMA report demonstrates that the information submitted by DyoCore to the Commission grossly overstates the performance characteristics of the DyoCore turbine. KEMA Report, p. 5-6. Moreover, the manufacturer's statements regarding the rated output of the DyoCore turbine on its own website are inconsistent and irreconcilable, *e.g.*, DyoCore's website states that the DyoCore turbine is "CEC Listed: 1.6kW at 18mph" yet also provides a newly revised power curve that indicates a rated output of less than .3 kW at 18 mph winds. See DyoCore website, attached as Exhibit B. Similarly, DyoCore inconsistently represented the rated output of the DyoCore turbine to the Commission itself, via the Commission's agent, KEMA, by initially advocating for a rating of .8 kW watts at 12 mph winds and then asserting that the rating should be 1.6 kW at 18 mph winds.

DyoCore's actions have negatively impacted legitimate competition under the ERP insofar as other providers of small wind systems are unable to compete with DyoCore's "low cost margin products," which are, in turn, based on a false premise, *i.e.*, the manufacturer's grossly overstated performance claims of the DyoCore turbine. Further, DyoCore appears to have directly harmed end-use consumers who presumably relied, at least in part, upon the manufacturer's advertising regarding the performance characteristics of the DyoCore turbine in making their purchasing decision. These end-use consumers may ultimately be subject to revocation or withholding of rebate payments under the ERP based upon false or misrepresented statements regarding the rated output of their systems in their submitted R1 and R2 Forms. Moreover, DyoCore's actions necessitated the temporary suspension of the ERP and the corresponding diversion of program resources, *i.e.*, Commission staff time.

**B. DyoCore Violated Appendix 3, Section (A)(2) of the ERP Guidebook by Submitting Operational Data That Does Not Support the Asserted Performance Claims of the DyoCore Turbine**

DyoCore's submission of inaccurate and invalid operational data should serve as an independent basis for immediately removing the DyoCore turbine from the "List of Eligible Small Wind Turbines" on the ERP website. As noted, the KEMA Report concluded that the one-year of operational data originally submitted by DyoCore in

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order to have the DyoCore turbine listed on the ERP website, initially with a rated output of .8 kW at 12 mph winds, and then, 1.6 kW at 18 mph, was inconsistent with the submitted power curve, and failed to substantiate the manufacturer's claim of increased generating capacity as it is "not possible because the claimed power curve exceeds the performance of a state-of-the-art wind turbine rotor by 9.0 times."<sup>31</sup> Under the ERP Guidebook, the identification of the DyoCore turbine on the ERP website was premised upon the submission of the operational data; the Commission relied upon the accuracy and validity of this data when it added the DyoCore turbine to the list and identified the rated output as 1.6 kW at 18 mph winds. However, the operational data submitted by DyoCore and relied upon by the Commission grossly overstates the performance characteristics of the DyoCore turbine, and thus, is inaccurate and invalid. Accordingly, the DyoCore turbine should be de-listed from the ERP website on this basis alone.

#### **VII. Requested Action (§ 1231(b)(5))**

I respectfully request that the DyoCore turbine be immediately removed from the Energy Commission's list of eligible equipment for use in the ERP. As shown by the KEMA report, and reflected by DyoCore's admissions on its own website, the DyoCore turbine was listed as eligible for use in the ERP on the basis of grossly overstated, inaccurate, and invalid information. I further request that the Energy Commission provide guidance regarding the resolution of applications for rebate reservations and payment requests under the ERP for small wind systems that use DyoCore turbines, and take such action as may be necessary to recover ERP funds that were paid as rebates for such systems.

In addition, I request that the Energy Commission refer this matter to the Attorney General for investigation and prosecution, as appropriate.

Finally, I also request that the Energy Commission send the following or similar notice to all retailers and end-use consumers who applied for rebates under the ERP for small wind systems using DyoCore turbines along with the Energy Commission's order serving this complaint:

Under the Emerging Renewables Program ("ERP") there are three categories of consumers who may be affected by the attached complaint proceeding: (1) consumers who received a rebate payment under the ERP for the purchase and installation of a small wind system that uses DyoCore SolAir wind turbines ("DyoCore turbines"); (2) consumers who were issued an R2 Form reserving ERP funding for systems that use DyoCore turbines, but have not received, or submitted a request for a rebate payment; and, (3) consumers who have pending applications for rebate reservations under the ERP for systems that use DyoCore turbines. All parties to these

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<sup>31</sup> KEMA Report, p.7,

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rebate payments, payment requests and applications are on notice that payments may be revoked or withheld, and pending applications may be rejected, pursuant to the Audits and Inspections provisions contained in Section 2, subdivision (K) of the ERP Guidebook, and the Fraud and Misrepresentation provisions contained in Section 7, subdivision (b) of the Renewable Energy Program Overall Program Guidebook ("Overall Program Guidebook"). Further, any misstatements, falsifications, or misrepresentations contained in these payment requests or applications may be referred to the Attorney General for possible investigation and prosecution pursuant to Section 7, subdivision (b) of the Overall Program Guidebook.

**VIII. Identification of All Parties Who Would be Affected by Relief Sought (§ 1231(b)(7))**

**A. The following retailers will be affected by the relief sought in the complaint. Each of these retailers has submitted applications for rebate reservations and/or payment request claims under the ERP for small wind systems that use DyoCore turbines.**

Bay Area Energy Solutions  
1326 Marsten Road  
Burlingame, CA 94010  
(650) 375-5955

Solar Point Resources  
P.O. Box 4761  
San Jose, CA 95150  
(408) 313-2814

California Solar Systems  
1411 Rusch Court  
Santa Rosa, CA 95401  
(707) 637-0762

Energy Pros  
2235 Solitude Court  
Rocklin, CA 95765  
(800) 709-4168

Synergy Corp.  
863 N Bush Avenue  
Clovis, CA 93611  
(559) 352-6987

Canaday Electric  
402 Avalon Street  
Morro Bay, CA 93442  
(805) 975-7739

Crizer Wind Energy, Inc.  
1191 4th St  
Los Osos, CA 93402  
(805) 528-4812

CA Green Team  
337 Ridgecrest Blvd  
Ridgecrest, CA 93555  
(760) 684-4458

My Wind Power  
4037 Phelan Road, A267  
Phelan, CA 92371  
(760) 314-9375

Prevailing Wind Power  
324 N Gertruda  
Redondo Beach, CA 90277  
(310) 529-5217

Mr. Michael J. Levy  
July 26, 2011

Green Solar Solutions, Inc.  
22267 Vacation Dr.  
Canyon Lakes, CA 92587  
(951) 258-8580

San Diego Small Wind  
3125 Tiger Run Ct. #103  
San Marcos, CA 92009  
(866) 404-2428

Desert Power, Inc.  
77380 Michigan Dr.  
Palm Desert, CA 92211  
(760) 360-9060

Apple Acres, Inc. DBA GRIDNOT  
P.O. Box 645  
Lucerne Valley, CA 92356  
(760) 978-6840

- B. All end-use consumers who have submitted applications for rebate reservations and/or payment request claims under the ERP for small wind systems using the DyoCore turbine.**

**VIII. Declaration of Penalty under Perjury (§ 1231(b)(8))**

I, the undersigned, declare to the best of my knowledge and under penalty of perjury, to the truth and accuracy of all factual allegations contained in this complaint.

Sincerely,



Robert P. Oglesby  
Executive Director  
California Energy Commission

# EXHIBIT A

The Emerging Renewables Program (ERP) is for all small wind and fuel cell market segments for distributed generation offsetting on-site load. For wind turbine eligibility, a manufacturer must either have the turbine certified to IEC 61400-2, or a similar certification from a national or international standards setting body, or gather one year of operational data.<sup>1</sup>

The process for adding wind turbines for ERP is as follows:

1. The manufacturer either gets their product certified as meeting the requirements of a small wind turbine-specific safety and/or performance standard adopted by a national or international standards setting body, including, but not limited to International Electric Code (IEC) 61400-2 or gathers one year of operational data.

This is a non-exhaustive list of companies that perform IEC 61400-2 testing:

- SGS Taipei (Taiwan)
  - Germanischer Lloyd (Germany)
  - Dynatech Engineering, Inc. (California, USA)
2. The manufacturer generates a power curve for the turbine. This is often already known and readily available.
  3. Submit documentation to KEMA, Inc. **All documentation must be in English – KEMA will reject any test reports that are not in English.** Required documentation is either:
    - a. The turbine's power curve data, a copy of the IEC 61400-2 Certification or similar certification, and a short product description (under 10 words) for the website.
    - b. The turbine's power curve data, a year of operational data (including wind speeds and power output), and a short product description (under 10 words) for the website.

The small wind turbine eligibility list is updated monthly on the first of the month. The cut-off date for the monthly update is the 15th day of the preceding month; all documentation must be submitted before this date.

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<sup>1</sup> <http://www.energy.ca.gov/2010publications/CEC-300-2010-003/CEC-300-2010-003-F.PDF>. *Emerging Renewables Program Guidebook, Tenth Edition*; Appendix 3 describes the requirements for listing small wind turbines.

# EXHIBIT B



### SolAir 1800

SolAir is a dynamic hybrid vertical mill that combines wind/solar integrated into a single balanced frame/fin design. SolAir is designed so versatile it can be mounted on any flat horizontal, vertical or pitched surface and can be either bolted or ballasted down. SolAir's unique design allows it to work effectively in low turbulent winds from any direction.

For the majority of property owners living in urban areas, installing wind turbines on or close to buildings with overall wind speeds of less than 14 mph has not been a realistic proposition. Equipment is expensive, hard to install, electricity generation will be disappointing and pay-back periods are likely to recede into the distant future if at all.

DyoCore products present a dramatic change to this way of thinking. DyoCore turbines have been specifically tool and specifically created for turbulent wind in both low wind and obstructed areas. Perfect for the average home roof.

#### Technical Specs

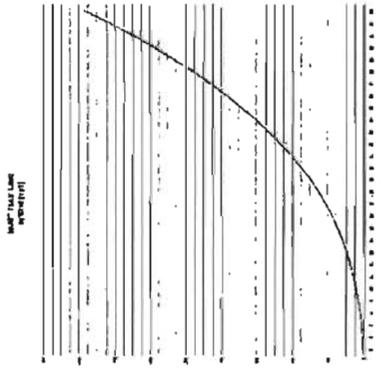
- Weight 60 lbs, fully assembled.
- Can be setup and installed within minutes out of box
- Height of SolAir from its mount bracket surface to the blade at its highest point is only 67".
- Blade diameter is 67".
- Number of Blades: 3 (Aluminum)
- CEC Listed: 1.5kW at 16mph
- Maximum output is approximately 2.2kW (26 to 30mph winds)
- Average power is approximately 400watts (12 to 14mph winds)
- Quieter than a whiplast with no vibration
- Optimal install height is along the roof line or approximately 20'.
- SolAir units can be stacked when more energy generation/storage power is needed.
- Federal 30% tax credit
- CA DEC - up to 100% direct rebates
- On-grid or Off-Grid - combined DC solar/wind output for simple plug and play.
- Shipping Details:
  - Frame & Mounting Hardware - 1 Box 60" x 11" x 20", 60 lbs
  - SolAir Motor - 1 Box 13" x 13" x 10", 26 lbs

#### Easy Math! Simple tool to calculate your SolAir Equipment Costs

DyoCore Installation/Setup of a SolAir System

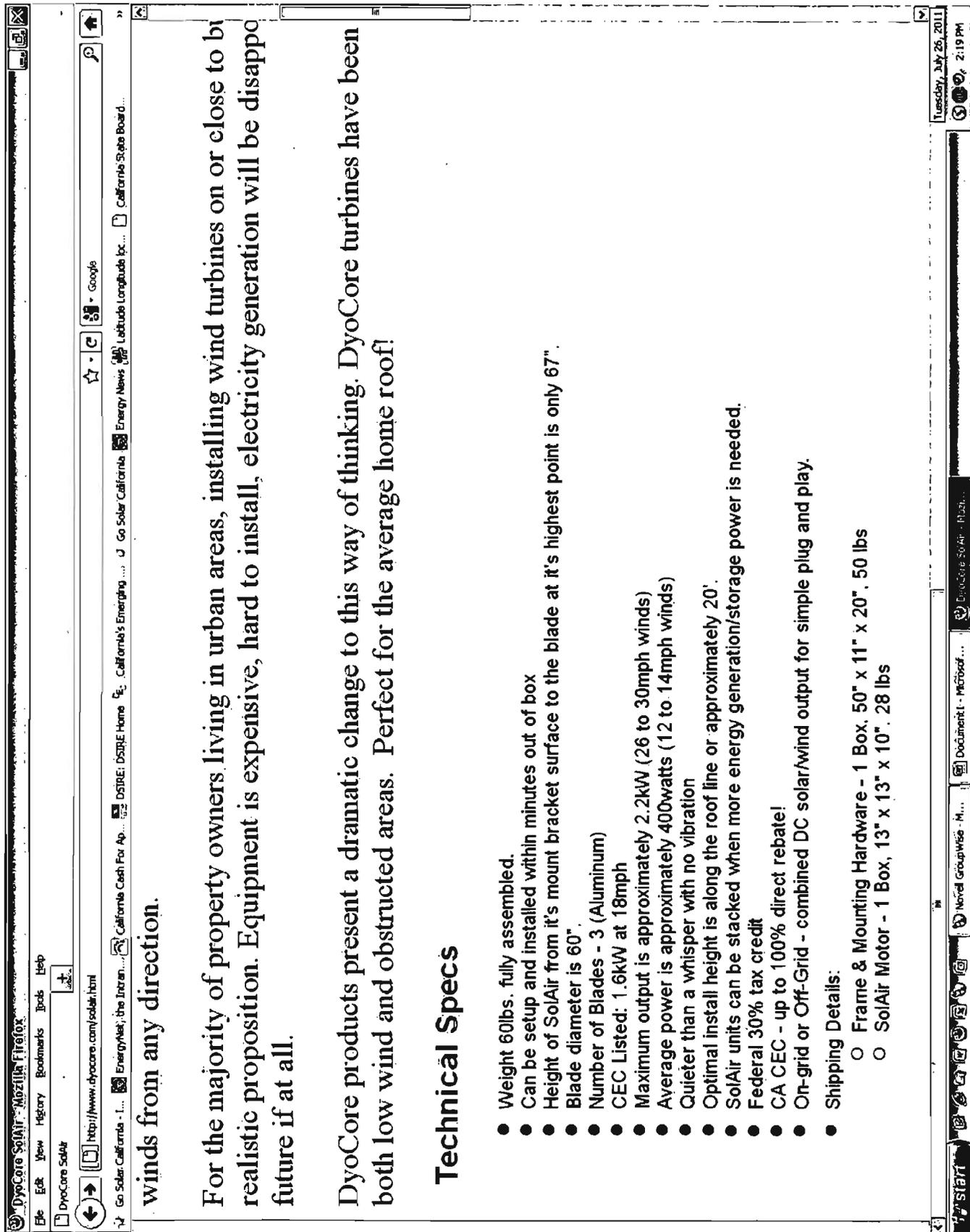
<http://www.youtube.com/watch?v=4AQfEgVXI>

- SolAir Performance
- Small Wind Basics
- Installation
- Environmental Conditions at Install Sites
- Additional Equipment - Shippers / Organizers
- Technology Development
- Successful Deployment Model



Annual Wind Power production is based on the estimated annual energy you can potential experience from a collective average annual wind speed.

17



winds from any direction.

For the majority of property owners living in urban areas, installing wind turbines on or close to a realistic proposition. Equipment is expensive, hard to install, electricity generation will be disappointing if at all.

DyoCore products present a dramatic change to this way of thinking. DyoCore turbines have been both low wind and obstructed areas. Perfect for the average home roof!

### Technical Specs

- Weight 60lbs. fully assembled.
- Can be setup and installed within minutes out of box
- Height of SolAir from it's mount bracket surface to the blade at it's highest point is only 67".
- Blade diameter is 60".
- Number of Blades - 3 (Aluminum)
- CEC Listed: 1.6kW at 18mph
- Maximum output is approximately 2.2kW (26 to 30mph winds)
- Average power is approximately 400watts (12 to 14mph winds)
- Quieter than a whisper with no vibration
- Optimal install height is along the roof line or approximately 20'.
- SolAir units can be stacked when more energy generation/storage power is needed.
- Federal 30% tax credit
- CA CEC - up to 100% direct rebate!
- On-grid or Off-Grid - combined DC solar/wind output for simple plug and play.
- Shipping Details:
  - Frame & Mounting Hardware - 1 Box, 50" x 11" x 20", 50 lbs
  - SolAir Motor - 1 Box, 13" x 13" x 10", 28 lbs

# EXHIBIT C

**CALIFORNIA ENERGY COMMISSION**1516 Ninth Street  
Sacramento, California 95814Main website: [www.energy.ca.gov](http://www.energy.ca.gov)

## Temporary Suspension of the Emerging Renewables Program

The Energy Commission is temporarily suspending the Emerging Renewables Program (ERP) effective March 4, 2011, at 5 pm PST. New applications for ERP rebate reservations will not be accepted after this date. The Energy Commission will, however, continue to process payment claims for rebate reservations approved before this date.

Complete applications for rebate reservations postmarked through March 4, 2011, or received via fax or email before the suspension takes effect will be processed. Applications submitted by fax must be sent to (916) 653-2543. Applications submitted by email must include a scanned copy of the application as an attachment, and be sent to [ang@energy.state.ca.us](mailto:ang@energy.state.ca.us). Please include "ERP Rebate Application" in the subject line.

The Energy Commission is suspending the ERP so it may address deficiencies with the program requirements. The goal of the ERP is to increase the installation of small wind systems and fuel cells using renewable fuels, by reducing the net cost of on-site renewable energy systems. The program, however, is not intended to fully eliminate a consumer's economic interest by covering the entire cost of the system. Over the last several weeks, the Energy Commission has seen a significant increase in applications for small wind energy systems, where the applicant is requesting rebate amounts close to or equal to the total installed cost of the system. As a result, the consumer and retailer/installation contractor may have no interest in verifying that the installation site has adequate wind resources to accommodate the wind energy system and generate enough electricity to offset the consumer's electrical load. Wind energy systems installed in locations with a poor wind resource are likely to underperform and result in a poor investment and use of ERP funding.

During this suspension the Energy Commission will review its current ERP Guidelines and adopt necessary changes to guidelines to address deficiencies with the program requirements. The suspension will remain in effect until further notice. The Energy Commission anticipates that it will take 60 to 120 days to review the ERP Guidelines and adopt necessary changes. New applications for rebate reservations received after the suspension becomes effective, will **NOT** be reviewed or approved by the Energy Commission and will be returned to the applicant.

The Energy Commission recognizes that the current rebate level for wind energy systems is scheduled to drop from \$3.00 per watt to \$2.50 per watt on April 7, 2011, and that the suspension of the ERP will extend beyond this date, thereby precluding prospective applicants from taking advantage of the higher rebate level. To avoid affecting any pending negotiations or potential sales that are contingent on the higher rebate level of \$3.00 per watt, the Energy Commission intends to extend the \$3.00 per watt rebate level for approximately 30 days after the suspension is lifted. Applications for rebate reservations submitted to the Energy Commission after the suspension is lifted and the ERP is re-started **will** be subject to *ERP Guideline* changes that are adopted while the suspension is in place.

Please direct all news media inquiries to the Media and Public Communications Office at (916) 654-4989, or by e-mail at [[mediaoffice@energy.state.ca.us](mailto:mediaoffice@energy.state.ca.us)]. For technical questions on the subject matter, please contact James Lee, at (916) 653-1195 or by e-mail at [[jslee@energy.state.ca.us](mailto:jslee@energy.state.ca.us)].

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JAMES D. BOYD  
Vice Chair and Presiding Member  
Renewables Committee

Electronic Mail Lists: Renewables  
Date: March 4, 2011

# EXHIBIT D



## memo

To: CEC ERP Staff Date: July 25, 2011  
From: KEMA Team  
Copy:  
Subject: Small Wind Data Review

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### **Objective**

Review certification data for DyoCore SolAir wind turbine and evaluate claimed performance.

### **Methods**

Two types of data must be submitted to the CEC to become eligible to qualify for rebates from the Emerging Renewables Program: power curve and either one year of operational data or IEC 61400-2 Certification. Dyocore opted to submit power curve and one year of operational data. Using this data, KEMA were able to perform the following analyses to evaluate their claimed performance.

#### **Power Curve Analysis**

A power curve shows the power output of a wind turbine system over the operational range of wind speeds. An example power curve is shown in Figure 1. The power output in watts or kilowatts is shown on the vertical axis and the wind speed in meters per second or miles per hour is shown on the horizontal axis. Due to the variable nature of wind, the standard method for measuring a power curve requires taking many measurements over the entire operational range of the wind turbine and averaging power output over a range of wind speeds.

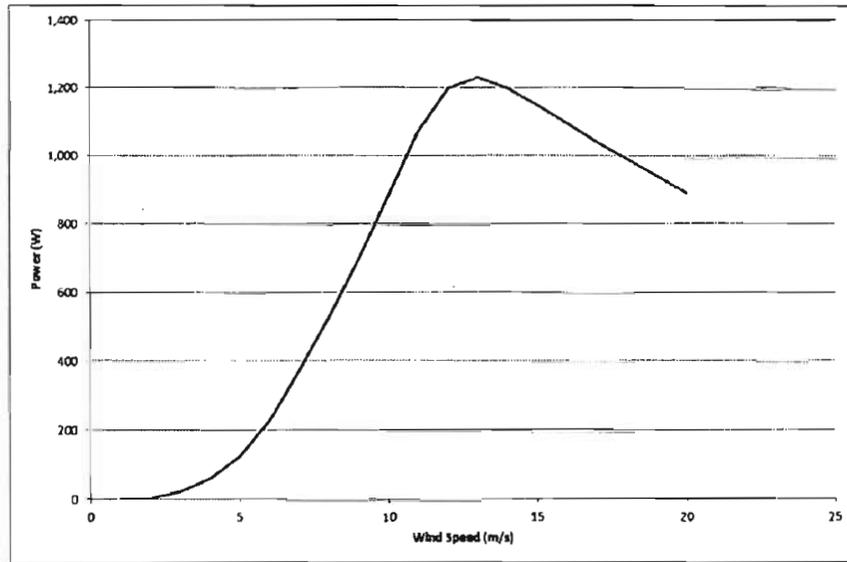


Figure 1 Example power curve of a 1 kW wind turbine.

The power curve can be evaluated by comparing the claimed turbine performance to the theoretical maximum performance as well as the current state-of-the-art performance. These comparisons can be made using the power coefficient ( $C_p$ ) -- a percentage of how much power a wind turbine rotor is able to extract from the total wind available. For this analysis,  $C_p$  is determined by dividing the turbine power output at a certain wind speed by the total power in wind at that speed (Equation 1).

$$C_p = \frac{P_{\text{turbine}}}{P_{\text{wind}}}$$

Equation 1

The equation for the total power in the wind is shown in Equation 2

$$P_{\text{wind}} = \frac{1}{2} \rho V^3 A$$

Equation 2

Where:

- $P_{\text{wind}}$  is the power of the wind in watts
- $\rho$  is the air density in  $\text{kg/m}^3$  ( $1.225 \text{ kg/m}^3$  unless otherwise noted)
- $V$  is the wind speed in  $\text{m/s}$
- $A$  is the swept area of the rotor in  $\text{m}^2$

This approach neglects mechanical and electrical losses in the turbine system and results in a conservative value for  $C_p$ , but is still sufficient to determine if the claimed power curve is in within a reasonable range.

The theoretical maximum for  $C_p$  is 0.593, which is known as the Betz limit and was derived in the early 1900's by Albert Betz and others [1]. With substantial development, current utility scale turbines can attain peak rotor  $C_p$  values of 0.49 [2]. The  $C_p$  of the claimed power curve was compared to the theoretical maximum performance as well current state-of-the-art performance of utility scale turbines.

### Annual Energy Production Analysis

The Annual Energy Production (AEP) for a turbine can be estimated for a given wind resource using the power curve and a standard wind speed distribution. To calculate the AEP, first an annual wind speed distribution (number of hours per year spent at each wind speed) is determined using a Rayleigh probability distribution with the average annual wind speed from the test site. Equation 3 gives the Rayleigh distribution of the number of hours per year at a wind speed ( $V_i$ ) given the site average wind speed ( $V_{ave}$ ) and the wind speed bin size of 1.

$$\text{Number of hours per year at } V_i = \frac{\pi}{2} * \frac{V_i}{V_{ave}^2} * e^{-\frac{\pi}{4}(\frac{V_i}{V_{ave}})^2} * 8760 * 1$$

Equation 3

Where:

- $V_i$  = Wind speed of interest
- $V_{ave}$  = Average wind speed
- 8760 = total number of hours per year
- 1 = size of the wind bin (spacing between each  $V_i$ )

Figure 2 shows an example Rayleigh wind speed distribution with an annual average wind speed of 7 m/s.

wind speed (m/s)	Hours per year
0	0
0.5	140
1.5	406
2.5	635
3.5	807
4.5	913
5.5	951
6.5	927
7.5	855
8.5	750
9.5	628
10.5	504
11.5	388
12.5	287
13.5	204
14.5	140
15.5	93
16.5	58
17.5	36
18.5	22
19.5	12
20.5	7
21.5	4
22.5	2
23.5	1
24.5	0

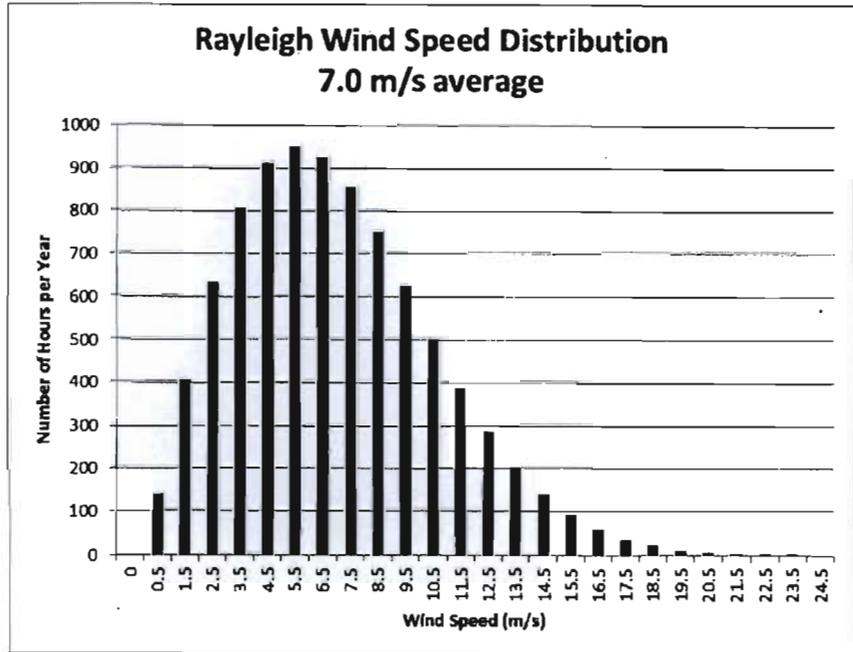


Figure 2 Table and graph of an example Rayleigh wind speed distribution

The energy production at each wind speed is the product of the turbine power output at that wind speed and the number of hours each year that the wind speed occurs. The AEP is then the sum of energy production at all of the different wind speeds. The estimated AEP was then compared to the claimed AEP taken from the operational data submitted by the manufacturer.

$$AEP = \sum_{i=0}^{V_{max}} P_t(i) \times \text{Hours per year at } V_i$$

Equation 4

Where:

- $P_t(i)$  = turbine power output at wind speed  $i$

## Results

Using Power Curve Analysis and Annual Energy Production Analysis, KEMA evaluated the following equipment.

Manufacturer Name: DyoCore  
 Model Number: S80015dc  
 Description: SolAir 1600W  
 Rotor Diameter: 1.2 meter  
 Claimed Power Output: 1,600 Watts  
 Claimed Annual Energy Production: 2,554 kWh  
 Notes: Produces rated power at 18 mph

Table 1 shows a list of data files submitted by DyoCore for the SolAir turbine for eligibility for the CEC Emerging Renewables Program. Additional information and sources used in the analysis are also listed.

**Table 1 DyoCore data summary.**

File/Document Title	Description
<b>Submitted Data</b>	
DATA.xls	Correct Performance Curve, Performance Curve, Operational Year Data
DATA;001.xls	Performance Curve, Operational Year Data
DATA;002.xls	Correct Performance Curve, Performance Curve, Operational Year Data
DATA;003.xls	Correct Performance Curve, Performance Curve, Operational Year Data
Dyocore_Hamshire_IL_compile d_raw_ginlong_1_hr.xlsx	Operational Year Data
image003.png	Voltage/RPM Graph
image005.png	Power/RPM Graph
image007.png	Annual Energy/Wind speed Graph
Power Curve.bmp	Graph
rawdata09_hampshireIL.xlsx	Operational Data
rawdata09_hampshireIL;001.xls x	Operational Data (Same as above)
<b>Additional Information</b>	
<a href="http://www.dyocore.com/solair.html">www.dyocore.com/solair.html</a>	DyoCore web site turbine information page
IEC Standard_61400-SolAir.pdf	Turbine and Testing overview document
<a href="http://www.dyocore.com/images/power_curve.JPG">www.dyocore.com/images/power_curve.JPG</a>	Power curve picture on web site dated April 11, 2011
<a href="http://www.dyocore.com/sphblog_0511/index.php?entry=entry110130-214346">www.dyocore.com/sphblog_0511/index.php?entry=entry110130-214346</a>	DyoCore blog entry dated January 30, 2011 that includes power curve data
<a href="http://www.dyocore.com/sphblog_0511/index.php?entry=entry110608-120151">www.dyocore.com/sphblog_0511/index.php?entry=entry110608-120151</a>	DyoCore blog entry dated June 8, 2011 that includes power curve data

### Power Curve Analysis

Several power curves were found in the submitted data and on the SolAir web site. The submitted file named Power Curve.bmp contained mis-labeled and unlabeled data and was not used in this analysis. Data for the Claimed Power Curve 1 shown in Figure 3 was taken from the submitted file "DATA.xls" on the tab titled "Correct Performance Curve". Data for the Claimed Power Curve 2 was taken from Figure 3 in the file "IEC\_Standard\_61400-SolAir.pdf" found on the DyoCore website. The third curve shown is the theoretical maximum power (Betz Limit) that a 1.2 meter diameter rotor could extract from the wind. The fourth curve on Figure 3 is the power curve of an optimal state-of-the-art turbine rotor with the same diameter as the DyoCore rotor.

DyoCore's claim of 1600 watts power output at 18 miles per hour (8.1 m/s) is 7.5 times greater than the theoretical maximum power output at that wind speed and 9.0 times greater than an optimal state-of-the-art turbine rotor with the same diameter.

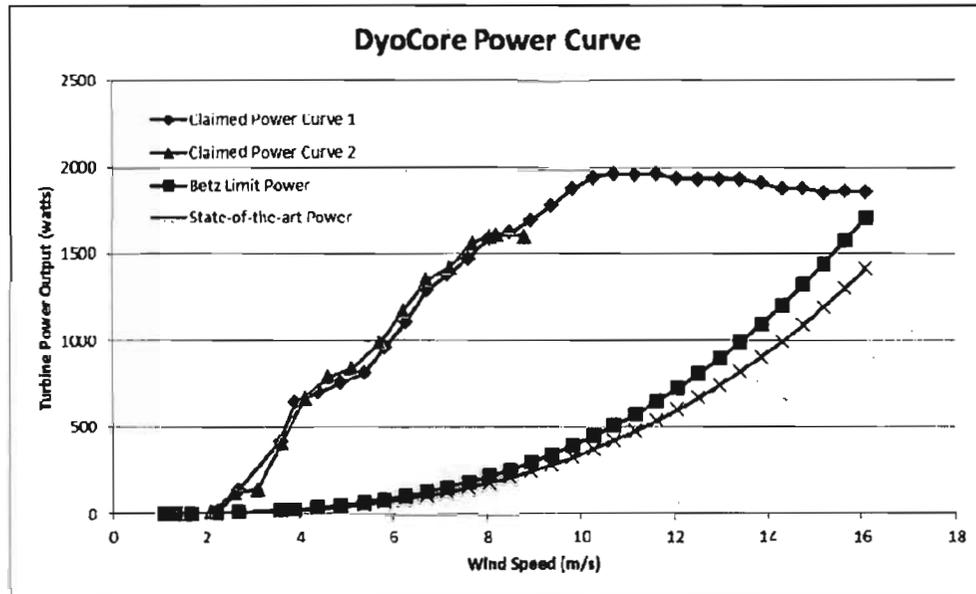


Figure 3 Power curves from DyoCore submitted data and Betz Limit.

Several other power curves were found on the manufacturer's web site that are substantially different than the claimed power curve submitted to the CEC. The data was found in two blog posts, dated January 30, 2011 and June 8, 2011 and a picture of a power curve graph that was added to the DyoCore web site on April 11, 2011. Website address for these data can be found in Table 1. The power curve picture can be found in Appendix A. These three power curves were very similar to each other, so only the data from the January 30 blog post was included on Figure 4. Figure 4 also shows the power curve from the submitted file "DATA.xls" and the Betz Limit and State-of-the-art power curves for reference. The power curve from the blog post is much lower than the submitted power curve, but still above the theoretical maximum of the Betz Limit power curve.

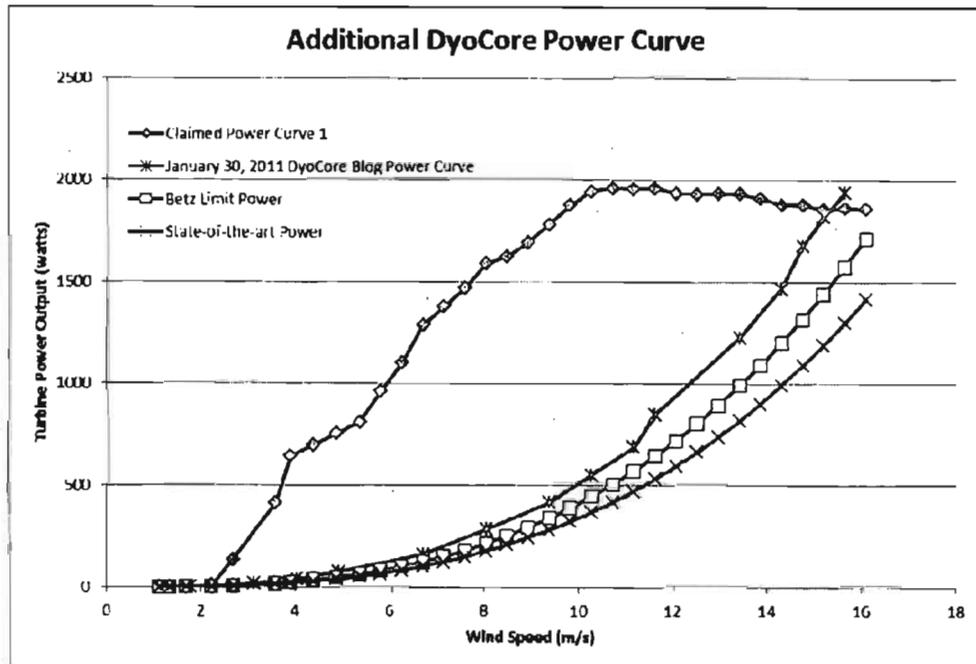


Figure 4 Power curves from DyoCore web site and Betz Limit.

**Annual Energy Production Analysis**

Data for the AEP analysis was taken from the file "DATA.xls". This same data was repeated in several of the other submitted data files (DATA;001.xls, DATA;002.xls, DATA;003.xls, and DyoCore\_Hamshire\_IL\_compiled\_raw\_ginlong\_1\_hr.xlsx). Units for winds speed and energy production were not stated, and assumed to be miles per hour and kilowatt-hours respectively. These assumptions lead to results with the correct order of magnitude and are shown in Table 2 as the Claimed AEP. The annual average wind speed for the site was calculated from the submitted data to be 6.8 m/s (15.3 mph). Using Equation 3 and Equation 4 above and the Claimed Power Curve 1 shown in Figure 3, the annual energy production was calculated to be 9,513 kWh. The same analysis method using the state-of-the-art rotor power curve results in an annual energy production of 1,643 kWh.

Table 2 Annual energy production analysis results.

Claimed AEP	2,554 kWh
AEP using Claimed Power Curve	9,513 kWh
AEP using state-of-the-art rotor	1,643 kWh

**Conclusions**

From the above analysis, the manufacture's claimed performance is not possible because the claimed power curve exceeds the performance of a state-of-the-art wind turbine rotor by 9.0 times.

**References**

1. de Vries, O., Fluid Dynamic Aspects of Wind Energy Conversion, National Aerospace Laboratory NLR, The Netherlands, 1979.
2. Based on industry experience and conversations with experts in wind turbine aerodynamics.

**Appendix A**

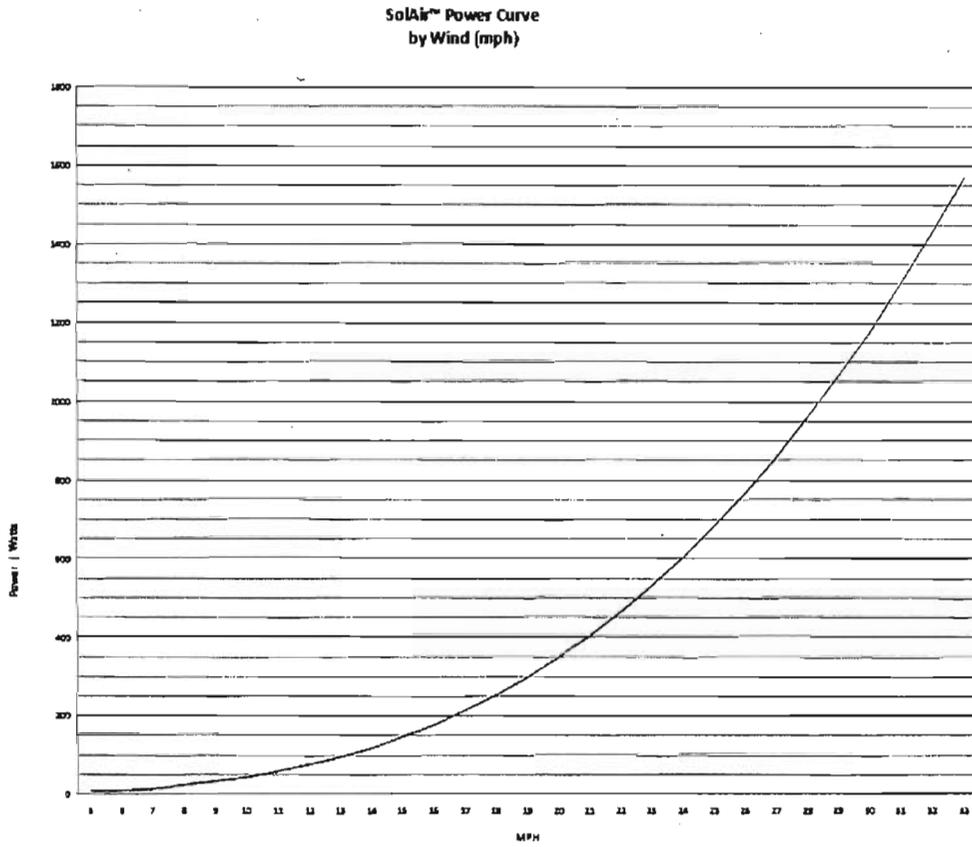


Figure 5 Power curve picture found on DyoCore web site ([www.dyocore.com//images/power\\_curve.JPG](http://www.dyocore.com//images/power_curve.JPG)).

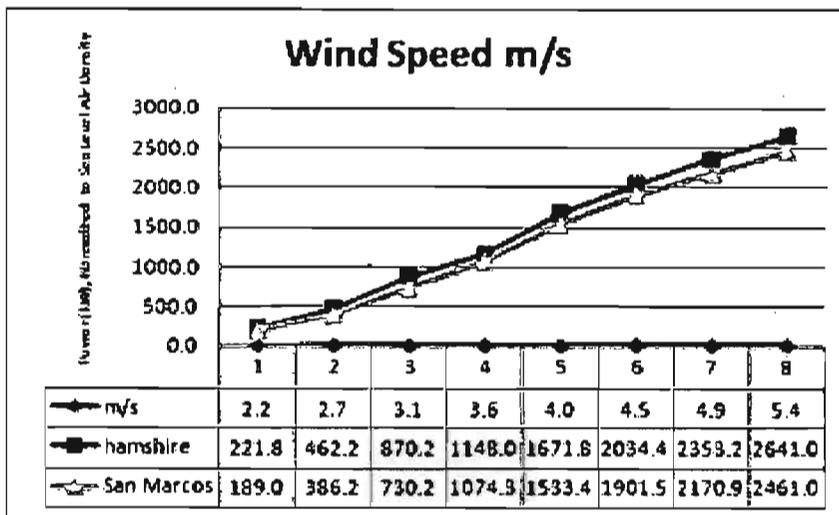


Figure 6 Picture titled "Power Curve.bmp" submitted by DyoCore.

# EXHIBIT E

### DyoCore SolAir Wind Pit

Monday, February 7, 2011, 09:40 AM Technology

February 2011 DyoCore completes the setup of its testing facility in Carlsbad CA. Now called the SolAir Wind Pit, DyoCore will expand testing and further development of its unique low turbulent wind solution called SolAir.

The wind pit can create simulated winds up to 30mph and DyoCore techs indicate with a little modification wind simulation tests can reach upwards of 60 or 70mph!

DyoCore's new facility is one of only a small handful of wind simulation testing facilities nationwide and demonstrates our commitment to making SolAir the best solution for the homeowner, said David Raine, founder of DyoCore. Within this new facility we can simulate, within reason, actual conditions in a controlled environment on demand to further test and develop our product to optimal performance. We will additionally make this facility available to our industry to assist in the continued momentum to make small wind power obtainable, efficient and affordable for the average home owner.

Testing begins this week and guests are welcomed. Over the next few months DyoCore expects to log hundreds of simulation hours and continue to add on new testing tools to its facility. For more information about the SolAir Wind Pit email [testing@dyocore.com](mailto:testing@dyocore.com).



### Administrator (David Raine)

Monday, April 11, 2011, 08:30 AM

This is the most accurate reference to estimated power production based on wind conditions. Though this does not account for gusts or rapid changes it can provide a basis for your production expectations at specific constant wind speeds:

[http://www.dyocore.com/images/powel\\_curve.JPG](http://www.dyocore.com/images/powel_curve.JPG)

power\_curve.JPG (JPEG Image, 839x674 pixels) - Mozilla Firefox

File Edit View History Bookmarks Tools Help

power\_curve.JPG (JPEG Image, 839x674 pt...)

Go Solar California - 1... EnergyNet, the Intran... California Cash For Ap... DSIRE: DSIRE Home California's Emerging ... Go Solar California Energy News Latitude Longitude Inc... California State Board...

Go Solar California - 1... EnergyNet, the Intran... California Cash For Ap... DSIRE: DSIRE Home California's Emerging ... Go Solar California Energy News Latitude Longitude Inc... California State Board...

power\_curve.JPG (JPEG Image, 839x674 pixels)

Address: http://www.dyocore.com/images/power\_curve.JPG

Type: image/jpeg

Render Mode: Quirks mode

Encoding: ISO-8859-1

Size: 69.49 KB (71,157 bytes)

Referring URL: http://www.dyocore.com/solar.html

Modified: Monday, April 11, 2011 7:15:45 AM

Security information for this page

This web site does not supply ownership information.

Connection Not Encrypted

Details

### Solar™ Power Curve by Wind (mph)

Wind Speed (mph)	Power (Watts)
0	0
5	100
10	1300
15	1400
20	1300
25	1200
30	1000
33	0

Power / Watts

MPH

35

Start

Document1 - Microsoft... power\_curve.JPG (P... power\_curve.JPG (P... Navell GroupWise - M... Tuesday, July 25, 2011 2:17 PM

# EXHIBIT F

DyoCore, Inc.  
3125 Tiger Run Court, #104  
Carlsbad, CA 92010

P/F 866.404.2428

www.dyocore.com



California Energy Commission  
1516 Ninth Street  
Sacramento, California 95814

<b>DOCKET</b>	
<b>02-REN-1038</b>	
DATE	APR 18 2011
RECD.	APR 18 2011

April 18, 2011

California Energy Commission,

Thank you for this opportunity to present and thank you to the committee for your diligent efforts in reinstatement of the ERP.

California created the Renewable Portfolio Standard (RPS). Under the RPS, the Renewable Energy Program's focus is twofold as published;

- To increase, in the near term, the quantity of California's electricity generated by renewable energy resources, while protecting system reliability, fostering resource diversity, and obtaining the greatest environmental benefits for California residents.
- To identify and support emerging renewable energy technologies with the greatest near-term commercial promise that merit targeted assistance.

In 1996 ERP was established as an initiative to promote "wind" but later was re-invested in to promote energy conservation. Then after very few qualified recipients the program evolved into an incentive to promote new technology. This is the current modern direction of the plan. With the recent economy downfall and more direct financial crisis in CA, I think that, now today, the program is also in place to promote jobs and economy within CA.

- Companies like DyoCore are the intended target of the program.
- DyoCore's SolAir is New innovative Technology
- SolAir applies to the largest majority of CA residents who directly funded the program
- DyoCore both as a CA company and through its organization of professional distributors represents 100's of jobs and millions into our economy.
- DyoCore is the forefront company for the momentum created within local communities towards the acceptance and installation of Wind power technology throughout CA and the US.
- SolAir combines wind and solar, this is again the most innovative development of technology towards the ERP's intended objectives.

California Wind Commission Workshop

Docket Number: 02-REN-1038

DyoCore, Inc.  
3125 Tiger Run Court, #104  
Carlsbad, CA 92010

P/F 866.404.2428

[www.dyocore.com](http://www.dyocore.com)



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#### **Summary concerns with the current ERP:**

On March 4th the CEC sent notice that it suspended the renewables rebate program so it may address deficiencies with the program requirements.

The goal of the ERP is to increase the installation of small wind systems and fuel cells

Though the suspension notice indicated "deficiencies with the program requirements", this does not fit well into the intention of the program as outlined.

The most current intention of the program, the state and our country is to promote the development of new technologies.

The concern is the recent large activity of ERP reservations from a single company whereas only a few months ago only a very few manufacturer products applied to a very few qualified recipients. Additionally these products are priced at significantly higher price points.

Now that products are available to a larger quantity of participating recipients Attention is now being placed on the production of energy at installation sites and the method of rating products qualified for the program.

#### **Solution overview:**

Separation of wind into specific qualification categories. Currently a power/wind rating incentive applies equally to a vague range of installation sites regardless of the wind conditions. A turbine qualified at 2kW @ 25mph and a turbine qualified at 2kW at 35mph apply to the exact same incentive regardless if either are installed in wind conditions substantially less than the rated wind speed.

By defining wind categories and ratings based on qualified installed locations will strengthen the intended benefits of the program. A turbine should be qualified based on its location and based on the projected power production as applied to that location.

Unfortunately wind experienced at a location can change dramatically from day to day less year to year. A qualified site today might not be qualified next week, however, relevance at the time of qualification and good history data should present a foundation for future expectations. we recommend the consideration of wind, product categories (wind zone categories)

Wind zones specific to turbines in size and intended use can be created that build a foundation for qualifying the program as applied to specific expected conditions. Data is readily available for easy separation of these categories.

DyoCore, Inc.  
3125 Tiger Run Court, #104  
Carlsbad, CA 92010

P/F 866.404.2428

www.dyocore.com



- Micro wind – turbines under 500w or under a specific blade size, usually less than 48" (more appropriate) can only produce so much power and intended use is typically at ground level.
- Low or small wind – Turbines again with a blade diameter under 70' and whereas the intended installation is under 50' fall well into this category.
- Medium wind – installation sites well above 50', typically large pole mount, and with blade diameters exceeding 70" typically apply to this category.
- High wind – greater than 5kW and installed on poles exceeding 100'.

Special circumstances can apply to any category whereas local wind conditions at the intended site could be greater or lower than normally anticipated for the original category. A smaller turbine can be applied to a pole mount application and increase it's expected normal applied performance. The solution is a simple application exception request that can be accompanied with supporting data, installation details and wind analysis.

#### **Summary Conclusion:**

The ERP program was designed and is in effect today to:

- make green energy available financially
- create green jobs
- promote green technology
- make CA a green community
- make green products accessible to everyone

Until small wind products like DyoCore the program did not fully accomplish any of these objectives. Manufacturers like DyoCore are the core of the ERP intended results and DyoCore has demonstrated significant success in accomplishing the ERP objectives.

Unfortunately without site qualifications any turbine can be installed in a location that does not meet the intentions of the ERP. If you create site specific guidelines and more specific product categories for incentive qualification you can distinguish between productive and non-productive installations.

An incentive that varies based on the installed location and turbine size creates a powerful tool that maintains the direction of the program as designated.

California Wind Commission Workshop

Docket Number: 02-REN-1038

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3125 Tiger Run Court, #104  
Carlsbad, CA 92010

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---

## DyoCore notes from ERP workshop

### Presentation moderator – Anthony NG

April 14, 2011

1. Primary stated barrier and cause to suspension of the ERP; Rebate amounts applied for in reservations covered most and in some all costs of the systems resulting in systems being installed that could possibly have little owner vested interest in the success of the application.

Response:

This is a direct correlation with over inflated Industry pricing / overpriced products. ERP was projected to bring down costs. New tech is less expensive and opens doors for greater deployment. New technology and resources for manufacturers present lower price point advantages and in turn will drive down pricing – this in turn is a benefit to the program and its success.

The program as it is priced today should remain the same and be a tool to reward companies that maintain lower cost margin products and an incentive for larger turbine manufacturers to reduce highly over inflated price points.

Manufacturers already have tremendous pressure to assure the success their products as installed and spend considerable resources to assure installations meet expectations.

2. It was presented that a \$ per kWh produced annually could be applied.

Response:

If backed by an upfront incentive as applied to an annual objective it could be a good solution. However, we caution that any program with a spread out rebate structure will provide barriers to financing for product sales. If banks are unable to provide financing for installation of proposed/qualified systems due to lengthy repayment of their funds the sales agents will not have the resources needed to maintain growth within the market.

A potential solution is the state initiates a direct funding incentive and provides the rebate based on pre-qualified conditions which then apply to a term loan or other method of payback over time that is funded through the existing program.

DyoCore, Inc.  
3125 Tiger Run Court, #104  
Carlsbad, CA 92010

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www.dyocore.com



3. Bergey presented that they, Bergey, are the only qualified product. Bergey presented that the list should be scrubbed. Mike Bergey is on the SWCC board and has already demonstrated extreme bias towards the industry – specifically towards “small wind”.

Response:

All turbines installed in California by simple permitting standards have to present extensive 3<sup>rd</sup> party engineering, testing and performance proof prior to being issued a permit for installation. Even if a product acquires CEC listing, it will not be able to pull a permit until it can demonstrate it meets all the current applicable standards.

Proper equality in listing should be given to all companies. Manufacturers should not hold positions that allow discrimination against other companies. Any 3<sup>rd</sup> party certification body should be completely independent. To force companies to meet a standard that is enforced and managed by distributors directly is in conflict with the intentions of a fair program.

The ERP does and should encourage tech and its continued development. We cannot simply dismiss new development of tech and remove these tools from the eligibility, this is completely opposite of the ERP program. Without encouragement and resources of new tech there will be no new tech.

4. Listings at fixed wind speeds. It was discussed that turbines have arbitrary wind speed listings.

Response:

This is a valid point. Wind ratings are arbitrary and only effective if a turbine is installed in the rated conditions. This is highly unlikely. Most turbines will never experience the amount of wind they are rated for. 99% of the contributors to the program do not experience winds that most of the qualified products are listed at.

Ratings should be based on realistic expectations as related to the specific install site. A turbine size and intended use is a great indication of its performance.

Breaking up turbines into respective categories that label them for specific expectations and incentive consideration is a key method in the success of the program.

5. Site wind analysis reporting

Response:

Education is a primary solution, a wind turbine needs wind, an unqualified location damages the success of the program, distributors and manufacturers.

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[www.dyocore.com](http://www.dyocore.com)



High variable wind conditions make it difficult to do site evaluate in dense areas most applicable to the majority

Simple tools are fairly readily available for local area conditions through accumulated wind data but not always specific to a site. Possibly within several blocks and if specific to turbines than only applicable to 60' poles. Tools like Wind Cad are very expensive and only applicable to larger pole mounted turbines. They have no relevance on low wind and the majority of intended applications in California.

Large costs of formal assessments could be greater than the cost of the power benefit and possibly the cost of the system

Qualified professional installers should be held accountable for bad decisions. Training and certification by the ERP or CEC will provide the resources for distributors to make smart installation decisions.

Great source for residential and small commercial low wind analysis:  
<http://www.wunderground.com/wundermap/>

6. Certification qualification for ERP inclusion

Response:

Limited and expensive resources towards 3rd party testing, standards have not yet been formally accepted towards certification, no current standard exists or is agreed upon within the wind field directly. But readily available professional and recognized 3rd parties exist and are already required prior to a permit or installation being done in California.

Standards for safety already exist, are excepted by state codes and provide a solid foundation for qualification. Safety and quality should be the primary factor IEC standards present a very good guideline and 3rd party NRTL companies have done qualified testing for safety and engineering for years.

The current CEC qualification does not need to be changed. Any CA city or community already has a very stringent installation/permitting process to assure safety and quality standards are met. All of which already highly exceed any state minimums.

7. Combining solutions into the ERP (wind, solar, fuel cells)

Response:

DyoCore, Inc.  
3125 Tiger Run Court, #104  
Carlsbad, CA 92010

P/F 866.404.2428

[www.dyocore.com](http://www.dyocore.com)



---

Simple process for applying Additional Benefits to tie together wind, solar as a combined application.

Separation of fuel cells that could substantially improve wind, solar performance. A direct incentive would encourage important tech development in this direction. Similar to solar now.

8. Add a cost cap based incentive

Response:

Avoid cost cap, this encourages overpricing. Lower cost turbines move the market in the right direction holding manufactures to fair market prices.

We appreciate your consideration in reviewing our comments towards your objectives in reinstatement of the ERP.

Sincerely,

David Raine  
CTO, DyoCore Inc.  
760-580-4271  
[dave@dyocore.com](mailto:dave@dyocore.com)

cc  
Assemblyman Martin Garrick  
1910 Palomar Point Way, #106  
Carlsbad, CA 92008

**CALIFORNIA ENERGY COMMISSION**

1516 NINTH STREET  
SACRAMENTO, CA 95814-5512  
www.energy.ca.gov



September 9, 2011

Raoul A. Renaud  
Hearing Adviser II  
California Energy Commission  
1516 9th Street  
Sacramento, CA 95814

RE: Amendment of Complaint against DyoCore, Inc.  
Docket # 11-CAI-03

Dear Mr. Renaud:

Energy Commission staff request leave to amend the complaint filed against DyoCore, Inc. on July 26, 2011 ("Complaint") to clarify that staff are not seeking to recover rebate payments from consumers for small wind systems that use the DyoCore SolAir wind turbine.

The referenced clarifications are identified in Attachment 1 to this letter. The language that is proposed to be deleted from the Complaint appears in strike-through in Attachment 1 and the language that is proposed to be added is underlined.

Notably, the changes in the proposed amendment do not affect the allegations against DyoCore, Inc. Thus, if the Renewables Committee grants staff leave to amend the Complaint, it does not appear that it would be necessary for DyoCore, Inc. to respond.

Sincerely,

A handwritten signature in blue ink, appearing to read "R. P. Oglesby", with a horizontal line extending to the right.

Robert P. Oglesby  
Executive Director

Enclosure

**Attachment 1**  
**Changes to Complaint Filed Against DyoCore, Inc. (Docket # 11-CAI-03)**

**VII. Requested Action (§ 1231(b)(5))**

I respectfully request that the DyoCore turbine be immediately removed from the Energy Commission's list of eligible equipment for use in the ERP. As shown by the KEMA report, and reflected by DyoCore's admissions on its own website, the DyoCore turbine was listed as eligible for use in the ERP on the basis of grossly overstated, inaccurate, and invalid information. I further request that the Energy Commission provide guidance regarding the resolution of applications for rebate reservations and payment requests under the ERP for small wind systems that use DyoCore turbines, and take such action as may be necessary to recover ERP funds that were paid as rebates for such systems.

In addition, I request that the Energy Commission refer this matter to the Attorney General for investigation and prosecution, as appropriate.

Finally, I also request that the Energy Commission send the following or similar notice to all retailers and end-use consumers who applied for rebates under the ERP for small wind systems using DyoCore turbines along with the Energy Commission's order serving this complaint:

Under the Emerging Renewables Program ("ERP") there are ~~two~~<sup>three</sup> categories of consumers who may be affected by the attached complaint proceeding: (1) ~~consumers who received a rebate payment under the ERP for the purchase and installation of a small wind system that uses DyoCore SolAir wind turbines ("DyoCore turbines");~~ (2) consumers who were issued an R2 Form reserving ERP funding for systems that use DyoCore SolAir wind turbines ("DyoCore turbines"), but have not received, or submitted a request for a rebate payment; and, (2~~3~~) consumers who have pending applications for rebate reservations under the ERP for systems that use DyoCore turbines. All parties to these ~~rebate payments,~~ payment requests and applications are on notice that payments may be ~~revoked or withheld,~~ and pending applications may be rejected, pursuant to the Audits and Inspections provisions contained in Section 2, subdivision (K) of the ERP Guidebook, ~~and the Fraud and Misrepresentation provisions contained in Section 7, subdivision (b) of the Renewable Energy Program Overall Program Guidebook ("Overall Program Guidebook").~~

Energy Commission staff are NOT seeking to recover rebate payments from consumers for small wind systems that use DyoCore turbines.

~~Further, any misstatements, falsifications, or misrepresentations contained in these payment requests or applications~~ This matter may be referred to the Attorney General for possible investigation and prosecution pursuant to the Fraud and Misrepresentation provisions contained in Section 7, subdivision (b) of the Overall Program Guidebook.



BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT  
COMMISSION OF THE STATE OF CALIFORNIA  
1516 NINTH STREET, SACRAMENTO, CA 95814  
1-800-822-6228 – WWW.ENERGY.CA.GOV

**IN THE MATTER OF THE COMPLAINT AGAINST  
DYO CORE, INC. BROUGHT BY  
ENERGY COMMISSION STAFF**

**Docket No. 11-CAI-03  
(Revised 9/6/2011)**

**COMPLAINANT**

California Energy Commission  
Robert P. Oglesby  
Executive Director  
1516 Ninth Street  
Sacramento, CA 95814  
*e-mail service preferred*  
[roglesby@energy.state.ca.us](mailto:roglesby@energy.state.ca.us)

California Energy Commission  
Payam Narvand  
Program Manager  
1516 Ninth Street  
Sacramento, CA 95814  
*e-mail service preferred*  
[pnarvand@energy.state.ca.us](mailto:pnarvand@energy.state.ca.us)

**COUNSEL FOR COMPLAINANT**

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Senior Staff Counsel  
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[gherrera@energy.state.ca.us](mailto:gherrera@energy.state.ca.us)

California Energy Commission  
Jonathan Knapp  
Staff Counsel  
1516 Ninth Street  
Sacramento, CA 95814  
*e-mail service preferred*  
[jknapp@energy.state.ca.us](mailto:jknapp@energy.state.ca.us)

**RESPONDENT**

DyoCore, Inc.  
Ralph Bettencourt, CEO  
David Raine, CTO  
3125 Tiger run Court, #104  
Carlsbad, CA 92010  
[ralph@dyocore.com](mailto:ralph@dyocore.com)  
[dave@dyocore.com](mailto:dave@dyocore.com)

**INTERVENORS**

Solar Point Resources Inc.  
Jane E. Luckhardt  
Stephen J. Meyer  
Downey Brand, LLP  
621 Capitol Mall, 18th Floor  
Sacramento, CA 95814  
[jluckhardt@downeybrand.com](mailto:jluckhardt@downeybrand.com)  
[smeyer@downeybrand.com](mailto:smeyer@downeybrand.com)

**INTERESTED  
ENTITIES/AGENCIES**

Bay Area Energy Solutions  
1326 Marsten Road  
Burlingame, CA 94010  
[www.bayenergy.com](http://www.bayenergy.com)

California Solar Systems  
1411 Rusch Court  
Santa Rosa, CA 95401  
[barryw@855casolar.com](mailto:barryw@855casolar.com)

Synergy Corp.  
863 N Bush Avenue  
Clovis, CA 93611  
[marlin.magic@sbcglobal.net](mailto:marlin.magic@sbcglobal.net)

Crizer Wind Energy, Inc.  
1191 4<sup>th</sup> Street  
Los Osos, CA 93402  
[crizerwindenergy@sbcglobal.net](mailto:crizerwindenergy@sbcglobal.net)

My Wind Power  
4037 Phelan Road, A267  
Phelan, CA 92371  
[www.info@mywindpower.biz](http://www.info@mywindpower.biz)

Solar Point Resources  
P.O. Box 4761  
San Jose, CA 95150

Energy Pros  
2235 Solitude Court  
Rocklin, CA 95765  
[brian@energyproslc.com](mailto:brian@energyproslc.com)

**\*Wind Solar Solutions  
420 Avalon Street  
Morro Bay, CA 93442  
[corky@windandsolarsolutions.com](mailto:corky@windandsolarsolutions.com)**

**\*CA Green Team  
720 North China Lake Boulevard  
Ridgecrest, CA 93555  
[tammy@cagreenteam.com](mailto:tammy@cagreenteam.com)  
[rayw@cagreenteam.com](mailto:rayw@cagreenteam.com)**

Prevailing Wind Power  
324 N Gertruda  
Redondo Beach, CA 90277  
[bob@prevailingwindpower.com](mailto:bob@prevailingwindpower.com)

**INTERESTED ENTITIES/AGENCIES  
(cont.)**

Green Solar Solutions, Inc.  
22267 Vacation Dr.  
Canyon Lakes, CA 92587  
[greensolarsolutions@yahoo.com](mailto:greensolarsolutions@yahoo.com)

Desert Power, Inc.  
77380 Michigan Dr.  
Palm Desert, CA 92211

San Diego Small Wind  
3125 Tiger Run Ct. #103  
San Marcos, CA 92009

Apple Acres, Inc. DBA Gridnot  
P.O. Box 645  
Lucerne Valley, CA 92356  
[info@gridnot.com](mailto:info@gridnot.com)

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DECLARATION OF SERVICE

I, **Rhea Moyer**, declare that on **September 9, 2011**, I served and filed copies of the attached **Amendment of Complaint against DyoCore, Inc. Docket #11-CAI-03**, dated **September 9, 2011**. The original document, filed with the Docket Unit or the Chief Counsel, as required by the applicable regulation, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: [\[http://www.energy.ca.gov/renewables/emerging\\_renewables/11-cai-03/\]](http://www.energy.ca.gov/renewables/emerging_renewables/11-cai-03/).

The document has been sent to the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit or Chief Counsel, as appropriate, in the following manner:

**(Check all that Apply)**

**For service to all other parties:**

- Served electronically to all e-mail addresses on the Proof of Service list;
- Served by delivering on this date, either personally, or for mailing with the U.S. Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses **NOT** marked "e-mail service preferred."

**AND**

**For filing with the Docket Unit at the Energy Commission:**

- by sending an original paper copy and one electronic copy, mailed with the U.S. Postal Service with first class postage thereon fully prepaid and e-mailed respectively, to the address below (preferred method); **OR**
- by depositing an original and 12 paper copies in the mail with the U.S. Postal Service with first class postage thereon fully prepaid, as follows:

**CALIFORNIA ENERGY COMMISSION – DOCKET UNIT**

Attn: Docket No. 11-CAI-03  
1516 Ninth Street, MS-4  
Sacramento, CA 95814-5512  
[docket@energy.state.ca.us](mailto:docket@energy.state.ca.us)

**OR, if filing a Petition for Reconsideration of Decision or Order pursuant to Title 20, § 1720:**

- Served by delivering on this date one electronic copy by e-mail, and an original paper copy to the Chief Counsel at the following address, either personally, or for mailing with the U.S. Postal Service with first class postage thereon fully prepaid:

California Energy Commission  
Michael J. Levy, Chief Counsel  
1516 Ninth Street MS-14  
Sacramento, CA 95814  
[mlevy@energy.state.ca.us](mailto:mlevy@energy.state.ca.us)

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

\_\_\_\_\_  
*/s/ Rhea Moyer*  
Rhea Moyer

<b>DOCKET</b>	
<b>11-CAI-03</b>	
DATE	<u>JUL 26 2011</u>
RECD.	<u>JUL 27 2011</u>

**From:** David Raine <dave@dyocore.com>  
**To:** <mlevy@energy.state.ca.us>  
**Date:** 7/26/2011 10:23 PM  
**Subject:** Response to Complaint Re DyoCore, Inc., Solar Wind Turbine  
**Attachments:** DyoCore\_response to CEC Notice.pdf

-----Original Message-----

From: David Raine [mailto:dave@dyocore.com]  
Sent: Tuesday, July 26, 2011 10:20 PM  
To: 'Robert Oglesby'; 'ralph@dyocore.com'  
Subject: Response to Complaint Re DyoCore, Inc., Solar Wind Turbine

Thank you for this notice and the opportunity to respond.

We have attached our preliminary response. We hope it will be taken into consideration during your meeting.

We feel very strongly that the complaint is misleading and inaccurate of the facts.

Thank you for your consideration,

David Raine  
DyoCore

www.dyocore.com  
p&f. 866-404-2428  
c. 760-580-4271  
dave@dyocore.com

-----Original Message-----

From: Robert Oglesby [mailto:ROglesby@energy.state.ca.us]  
Sent: Tuesday, July 26, 2011 5:26 PM  
To: ralph@dyocore.com  
Cc: dave@dyocore.com  
Subject: Complaint Re DyoCore, Inc., Solar Wind Turbine

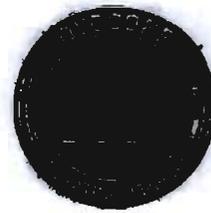
Please see attachments below. Thank you.

DyoCore, Inc.  
3125 Tiger Run Court, #104  
Carlsbad, CA 92010

P/F 866.404.2428

[www.dyocore.com](http://www.dyocore.com)

---



Mr. Michael J. Levy  
Office of Chief Counsel  
California Energy Commission  
1516 Ninth Street  
Sacramento, CA 95814

RE: DyoCore Response to Complaint

Dear Mr. Levy,

Following is our response to the complaint presented to us on July 26, 2011 submitted by Robert P. Oglesby. The allegations in the complaint are misleading and false. We request a formal hearing and to be allowed to present facts that would clarify that DyoCore both met the requirements of the intended program and represented the program with the highest of intentions, integrity and honorably.

**In response to point III A:**

DyoCore's SolAir is exactly why the ERP was created. DyoCore did not develop the ERP and had no part in its designation, rebate structure, amount of rebate or in its management. DyoCore's SolAir was in development and being sold within the market before DyoCore's application to be included into the ERP at the same price point upon inclusion. DyoCore's SolAir is the first product of its kind. It is amongst the lowest cost turbines on the market, it applies to the broadest range of potential users and meets all required certifications for use in most CA urban communities. In fact it is in most communities the very first and only allowed residential roof mounted turbine.

DyoCore has worked diligently in development of SolAir, education within the market and the drive behind the acceptance of new policies and regulations that will benefit the entire industry for years to come. DyoCore did this at its own expense, with no grants and no government funding. Because of these accomplishments the ERP now has a venue that applies to the majority of homeowners opposed to the 1% it previously applied to. This is not a burden on the ERP it lends to the pinnacle success of the ERP. Removing DyoCore from the listing based on false allegations substantially cripples the program and halts its intended purpose while also discouraging the development of new technology and lower cost energy alternatives.

DyoCore's product price point was established before application to the program and before knowledge of the rebate allotted to its product. The end result was that the rebate allotted upwards of 100% towards the full purchase and install of the SolAir system. This was known by the CEC and encouraged by the CEC program management staff. It was never indicated that this was a concern or that DyoCore's price point was a violation of the programs intention. The ERP states directly that it was designated to encourage lower cost products. DyoCore meets that expectation.

**In Response to part III B:**

DyoCore did not create the rules for application, DyoCore simply submitted an application and the materials requested. DyoCore collected almost two years of data from two reporting sites, one in Hampshire IL, the other in San Marcos CA. It was determined by NEMA that the raw data from the site in Hampshire IL would be acceptable due to higher average annual wind conditions. The review and listing of DyoCore's SolAir

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3125 Tiger Run Court, #104  
Carlsbad, CA 92010

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was done by NEMA, a third party with no affiliation to DyoCore. When the listing was granted it was DyoCore's understanding that the rating was based on Annual Average Wind and not based on a specific wind speed. These two are completely different sets of data. At an annual average wind speed of 18mph, which could and did represent times in which winds were substantially greater at both locations, the expected production was 1.8kW. In real-time winds of 18mph the production is approximately 212 watts, this is about 66% of the BETZ maximum 59%. This information was provided and available to NEMA upon application. It was our understanding that the rating was Annual Wind Speed Production and presented, evaluated and determined by NEMA not DyoCore.

A comparison of the two side by side is attached herein. (Attachment A)

When the listing rating was given to DyoCore NEMA contacted us and asked if we wanted to modify our rating from 12mph to a higher rated amount because we had the lowest rating wind speed on the approved list. Most other products were rated at winds well above 25mph. We had felt we were being conservative at only 18mph as we felt most Urban areas where our product primarily applied would never experience conditions greater than this. This is a direct indication of our integrity and intention upon acceptance of a listing.

Recently the CEC accepted the listing of another company's product that utilizes the DyoCore PMG. This product received a rating of 1.6 at approximately 32mph. Regardless of the "wind speed" rating, it has the same effect and outcome of rebate. The only variance is the wind speed at which the rating was applied. However, both our product and these companies receive the same rebate amount. This is not miss-intention on either party's part, it is simply a lack of formal standards for the purpose of qualification and rating.

At the time of listing DyoCore on the CEC the process was both new to us, to NEMA and to the CEC as only a handful of other products were ever listed with little or no standard in place. This is evident by the recent upset in the program and need for revision. However, even in its revision there still is no specific standard of rating or formal US process of certification other than suggested guidelines by AWEA. DyoCore has worked directly with TUV to meet UL standards and continues daily to collect and evaluate site data to better represent performance expectations based on specific install circumstances. DyoCore's website provides quite a bit of continued development material that is made public for the purpose of evaluation of its product and the intended use. [http://www.dyocore.com/sphpblog\\_0511/index.php](http://www.dyocore.com/sphpblog_0511/index.php). Almost 50,000 unique visitors have watched and some participated in our continued development towards smart low cost urban alternative energy solutions.

DyoCore provides the highest level of product warranty – a 100% no questions asked policy on the removal or replacement of a non working system in addition to being the only company with highly trained professional distributors and installers that in contract support the product 100% after installation through the entire warranty term.

**In response to part III C:**

DyoCore completes all R1 applications to the rules and to the best of its ability to estimate wind conditions based on site evaluations. DyoCore cannot answer directly for its distributors but works diligently and in good faith to educate all its distributors and clients about proper site evaluations and placement of SolAir units in qualified locations. However, the wind is a difficult aspect to estimate with recent changes in the environment and further completed by the Urban landscape where most SolAir units are installed. This is a new market and in most areas the first application of its kind. There are hundreds of Urban area installations throughout CA, some in great locations and some in poor locations. All of which are fairly recent and/or just being completed. DyoCore will continue to collect data and use that knowledge to make better decisions on installation sites but also estimates on production. There unfortunately no history to base these assumptions on.

DyoCore, Inc.  
3125 Tiger Run Court, #104  
Carlsbad, CA 92010

P/F 866.404.2428

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There were companies that mislead potential clients indicating that they were an authorized Distributor, however they were not and sent formal notices to cease all representation of the DyoCore product and notice was given to the CEC that they were not an authorized distributor. We recommended to the CEC that they deny any applications that this company falsely sent in as an authorized representative of our product. This is the only instance known to us of potentially false applications and this was not done on the part or by a representative of DyoCore.

**Our request for consideration and resolution:**

DyoCore's SolAir has grown to be a significant Hybrid Wind/Solar energy tool within the emerging market with now hundreds units installed throughout CA and over a thousand worldwide. Short term installations are estimated at a little over 4000 units within the next year. SolAir is a significant change in who small wind applies to. Removal of SolAir damages dozens of business who with high integrity and honorable actions submitted qualified ERP reservations representing thousands of CA residents. Based on the numbers submitted in the complaint it would indicate that SolAir is the most successful small wind solution ever developed both in public demand but also in the push for the continued development of new wind technologies that apply to everyone and not just the few in remote areas and with significant financial resources.

If the contention is the listing rating, DyoCore requests to be considered for re-rating to the new ERP playbook guidelines as outlined in the July 2011 DRAFT and apply that rating to all currently outstanding held R1 reservations. DyoCore does not feel it would be in good faith to make any changes retroactive for currently held/issued R2s as all parties have acted honorably and both dozens of business and hundreds of CA residents have applied under qualified terms and the intention of the program.

DyoCore in June of 2011 submitted application to the SWCC and expects testing towards formal rating certification to begin shortly that both meets the new playbook standards and provides the CEC with a direct resolution to the complaint.

In the event of consideration of removal of the DyoCore product listing with the CEC DyoCore requests a formal hearing and that the Energy Commission will allow DyoCore reasonable time to prepare and present facts that demonstrate the statements as indicated herein, address all statements falsely represented in the Complaint and present its belief that not only does DyoCore meet the requirements of the CEC listing and ERP it is the pinnacle intended purpose of the program.

David Raine,  
CTO DyoCore, Inc.  
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Carlsbad, CA 92010  
(760) 580-4271

CC:  
Robert Oglesby  
CALIFORNIA ENERGY COMMISSION  
1516 NINTH STREET  
SACRAMENTO, CA 95814-5512

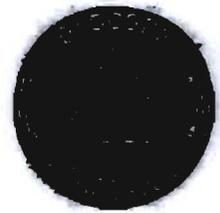
Office of Assemblyman  
Martin Garrick

Office of Senator Wyland

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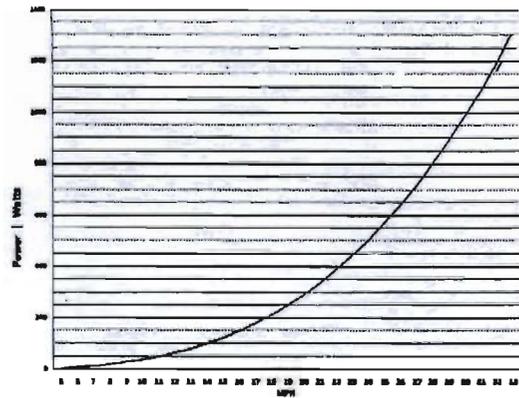


Attachment A

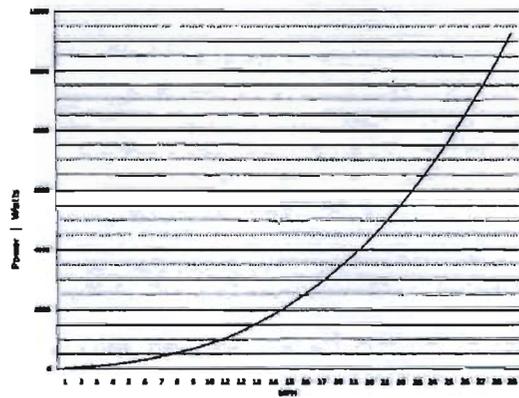
Table showing SolAir expected power vs BETZ limit at constant wind speeds. SolAir is approximately 66% of the BETZ limit at a Cp of 45%.

mph	W/m <sup>2</sup>	m/s	Betz Max @ 45%
1	0	0.4	0
2	0	0.9	0
3	1	1.3	1
4	3	1.8	3
5	5	2.2	7
6	8	2.7	13
7	12	3.1	19
8	16	3.6	27
9	20	4.0	36
10	25	4.5	46
11	30	4.9	57
12	36	5.4	69
13	42	5.8	82
14	49	6.3	96
15	57	6.7	111
16	65	7.2	126
17	74	7.6	142
18	83	8.1	159
19	93	8.5	177
20	104	9.0	195
21	115	9.4	214
22	127	9.9	233
23	140	10.3	253
24	153	10.7	274
25	167	11.2	295
26	181	11.7	317
27	195	12.1	340
28	210	12.5	363
29	225	13.0	387
30	240	13.4	411
31	256	13.9	436
32	271	14.3	461
33	287	14.8	487
34	303	15.3	513
35	319	15.6	540
36	336	16.1	567
37	353	16.5	595
38	370	17.0	623
39	388	17.4	652

SolAir™ Power Curve  
by Wind (mph)



SolAir™ Power Curve  
Estimated Annual Power Production by Wind (mph)



DYOCORE INC.  
3125 Tiger Run Court #104  
Carlsbad, CA 92010  
Phone and Fax: 866-404-2428

Carla Peterman  
CEC Commissioner

California Energy Commission  
Office of Chief Counsel  
1516 Ninth Street, MS-14  
Sacramento, CA 95814

<b>DOCKET</b> 11-CAI-03
DATE <u>AUG 08 2011</u>
RECD. <u>AUG 25 2011</u>

RE: DyoCore Response to Complaint of California Energy Commission  
Request for Informal Hearing

Dear Ms. Peterman,

DyoCore generally denies the allegations stated in the complaint of the California Energy Commission dated July 26, 2011 submitted by Robert P. Oglesby. Pursuant to California Code of Regulations, Title 20, Section 1217, DyoCore respectfully requests consideration for an informal hearing to present its facts and declarations in support of its denial.

The allegations in the complaint are misleading under the totality of the circumstances surrounding DyoCore's application and require clarification. DyoCore respectfully submits its response, Exhibits and Declarations in support of the proposition that DyoCore met the requirements of the Emerging Renewables Program (ERP).

### **1. Summary of Response**

It appears that DyoCore made some errors in obtaining its certification, however those errors were committed out of inexperience and naiveté in understanding the roles of the various parties involved in the certification process. It should be taken into consideration that DyoCore up until January 2011 was basically a business operated out of the garage of its founder Mr. Raine. Its SolAir product is the first and only experience DyoCore has had with wind generation of electricity and its only attempt at manufacturing any product and placing it into commerce and its first experience with working with the California Energy Commission.

In early 2009 DyoCore learned of the CEC's ERP program and applied for inclusion. The CEC instructed DyoCore to submit its application to the state's third party listing agent KEMA. Working with and in close communication with KEMA, DyoCore provided KEMA with data obtained from two independent testing sites, one in San Marcos California and a

second in Hampshire Illinois. DyoCore's product, SolAir, had been installed at these two locations for several months where electrical power output and wind condition data had been monitored and logged. Based on the data logs obtained from these two sites KEMA determined that the San Marcos California site did not meet the state listing criteria for minimum winds, however, KEMA concluded that the second site in Hampshire IL qualified.

DyoCore summarized annual performance data from the Hampshire IL site from approximately January 2009 through February 2010 and provided this information to KEMA. At KEMA's request the annual electrical generation performance data was summarized in monthly production schedules alongside coordinated wind data for the corresponding months and provided to KEMA for evaluation. From evaluation of this data KEMA provided DyoCore a power curve represented on a table and chart. KEMA also recommended a power curve listing to DyoCore. DyoCore responded to the suggested listing by asking for a listing at a different point in the curve to better represent the wind conditions where DyoCore believed the turbine would actually be installed. The listing at 1.6 kW at 18mph came off of the Power Curve calculations that KEMA reviewed from the wind and power data that DyoCore submitted. This was the first unintentional mistake made by DyoCore because as DyoCore has come to learn since it first submitted its data to KEMA, the data it submitted was not in the proper form from which to prepare a power curve.

Over the past year DyoCore has corresponded with several professionals within the industry that have aided DyoCore in reassessing of its raw data. Consequently DyoCore has created a wind to production power curve for direct real time indicated winds. DyoCore has maintained an updated record of this power curve work on its website. We have a general idea of what a power curve is but are still not certain as to how it was intended to apply to the listing, something we were ignorant of when we initiated the process with the CEC and KEMA. Furthermore DyoCore has taken steps to correct its mistake by including ongoing development information on its public website.

DyoCore's efforts to continue its education and better compliance with CEC regulations have been hampered from a current lack of understanding as to how the power curve is intended to apply as either Annual Average Wind Production or Real Time Wind Production, however DyoCore understands that its current data allows it to describe the performance of its SolAir product with sufficient accuracy as to not be materially misleading as to performance characteristics. In defense of DyoCore, as we were identifying our power curve, a third party whose product utilizes our motor was listed with the CEC (Exhibit 1 - TLG CEC Listing) at a similar rating to that of DyoCore but using higher wind speed. This shows that applying our real wind to power curve was accurate.

The new power curve data does show a lower power output at the same wind speeds, however, this change would not change the rebate applied to our product. It appears that although a mistake was made in our interpretation of the raw data and how it should be presented, that mistake did not amount to one that resulted in a material misrepresentation or result in a significant change to the qualification for rebate under the program.

The rebate program is currently in suspension and awaiting new guidelines. It has been indicated the new guidelines will require formal third party testing. DyoCore retained SWCC in June 2011 to assist DyoCore in meeting the expected new guidelines. As noted above, DyoCore is learning the processes necessary and diligently acting to ensure no further mistakes are made.

The California Energy Commission's complaint of July 26, 2011 alleges fraud against DyoCore. Fraud requires the intent to mislead others with false information. Being inexperienced and naïve in the application process should not rise to the level of intentional misrepresentation with the purpose of causing harm. DyoCore, upon realizing it had made a mistake in the information it presented to KEMA attempted to remedy and mitigate any harm it caused by publishing more accurate data on its public web site. The complaint of the CEC seeks to use this attempt at transparency, as further evidence of fraud and deceit. Admittedly, in hindsight DyoCore could have done some things better, but an attempt at correcting a mistake is not evidence of fraud, it is evidence of good faith and transparency and should not be used to condemn DyoCore. DyoCore mistakenly believed that KEMA was hired by CEC to confirm the accuracy and completeness of the data submitted by the applicants. DyoCore does not believe that a review of anything in the record would lead a reasonable person to believe that KEMA was hired only to ensure that the requested information was submitted but not to analyze or confirm that information. Working closely with KEMA as DyoCore did in establishing the initial power curve certainly did not remove this understanding from DyoCore. DyoCore, in its inexperience, relied upon KEMA and its representatives to review and assess the data DyoCore provided and make the appropriate listing.

Regardless of such listing by simply applying the correct real wind or annual wind would have resulted in the same rebate to be applied towards our product.

**Our request for consideration and resolution:**

DyoCore's SolAir has grown to be a significant Hybrid Wind/Solar energy tool within the emerging market. There are now hundreds of SolAir's installed throughout CA and over a thousand worldwide. New installations are estimated at a little over 4000 units within the next year. SolAir represents a significant change in who can afford and take advantage of small wind power generation. Removal of SolAir from the qualified list of products damages dozens of business who with high integrity and honorable actions submitted qualified ERP reservations representing thousands of CA residents. Based on the numbers presented in the complaint, SolAir appears to be the most successful and affordable small wind solution ever developed which advances the stated purpose of the program to the push for the continued development of new wind technologies that apply to everyone, not just the few in remote areas or those with significant financial resources.

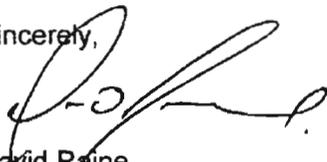
DyoCore requests to be considered for re-rating under the new ERP guidelines as outlined in the July 2011 DRAFT and apply that rating to all currently outstanding held R1

reservations. DyoCore proposes it would be unwise and unfair make any changes retroactive for currently held/issued R2s as all parties involved acted honorably and in good faith based on valid data. Changing or withholding those R2 already approved would only damage dozens of business and hundreds of CA residents have applied and qualified under the existing terms and the intention of the program. In this respect any deficiency applicable to the SolAir 800 could and is corrected by a change from Annual Average Wind to Real Wind but the end result in applying this change is the same listing incentive placement simply at a higher wind speed similar to 99% of other turbines listed as approved equipment that are rated at 30mph or higher.

DyoCore in June of 2011 submitted application to the SWCC and expects testing to commence soon resulting in a formal rating certification that meets the new ERP standards and provides the CEC with a direct resolution to the complaint. This will also make DyoCore the first turbine manufacturer to qualify under the new CEC program guidelines to meet these objectives.

It is my strong belief that DyoCore meets the requirements of the CEC listing and the intended purpose ERP to encourage the development of affordable alternative renewable sources for everyone. Thank you for your consideration of our request for an informal hearing and resolution.

Sincerely,



David Raine,  
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Direct: (760) 580-4271

**Topic Areas of Discussion in Response to the Proposed Complaint:**

**In response to Complaint point III A (Purpose of the ERP):**

The complaint states that the purpose of the ERP is to stimulate increased sales of small wind systems that have a generating capacity of up to 50 Kilowatts ...thereby, encourage manufactures, sellers and installers to expand their operations, improve distribution, and reduce system costs associated with these renewable technologies.

DyoCore's SolAir is exactly why the ERP was created. DyoCore did not develop the ERP and had no part in its designation, rebate structure, amount of rebate or in its management. DyoCore's SolAir developed and being sold at its price point within the market before DyoCore submitted its application to be included into the ERP at the same price point upon inclusion. DyoCore's SolAir is the first product of its kind. It is among the lowest cost turbines on the market; it applies to the broadest range of potential users; and meets all required certifications for use in most CA urban communities. In fact it is in most communities the very first and only residential roof mounted turbine allowed.

DyoCore has worked diligently in development of SolAir, education within the market and the drive behind the acceptance of new policies and regulations that will benefit the entire industry for years to come. DyoCore did this at its own expense, with no grants and no government funding. Because of these accomplishments the ERP now has a venue that applies to the majority of homeowners opposed to the 1% it previously applied to. This is not a burden on the ERP it contributes to the success of the ERP. Removing DyoCore from the listing based on allegations arising from the misunderstood circumstances surrounding DyoCore's application substantially damages the program and interferes with its intended purpose while discouraging the development of new technology and lower cost energy alternatives.

DyoCore's product price point was established before application to the program and before knowledge of the rebate allotted to its product. The end result was that the rebate allotted upwards of 100% towards the full purchase and install of the SolAir system. This was known by the CEC and encouraged by the CEC program management staff. It was never indicated that this was a concern or that DyoCore's price point was a violation of the programs intention. The ERP states directly that it was designated to encourage lower cost products. DyoCore meets that expectation.

**In response to Complaint point III B (Requirements and Process for Listing Small Wind Systems as Eligible for Use in the ERP)**

Pursuant to Appendix 3, Section (A)(2) of the ERP Guidebook DyoCore provided KEMA with summary monthly data of collected Average Wind conditions with Energy produced for one consecutive year. (Exhibit 2 - Hampshire IL summary data)

In early 2010 DyoCore submitted an application and the materials requested to KEMA. DyoCore collected data from two reporting sites, one in Hampshire IL, the other in San Marcos CA. It was determined by KEMA that the raw data from the site in Hampshire IL would be acceptable due to higher average annual wind conditions. The review and listing of DyoCore's SolAir was done by KEMA, a third party with no affiliation to DyoCore. When the listing was granted DyoCore understood that the rating was based on Annual Average Wind and not based on a specific wind speed. These two are completely different sets of data. At an annual average wind speed of 18mph, which could and did represent times in which winds were substantially greater at both locations, the expected production was 1.8kW. In real-time winds of 18mph the production is approximately 212 watts, this is about 66% of the BETZ maximum 59%. This information was provided and available to KEMA upon application. It was our understanding that the rating was Annual Wind Speed Production and presented, evaluated and determined by KEMA.

A comparison of the two side by side is attached herein. (Exhibit 3 - Annual Wind vs Real Wind with Betz comparison)

When the listing rating was given to DyoCore KEMA contacted us and asked if we wanted to modify our rating from 12mph to a higher rated amount because we had the lowest rating wind speed on the approved list. Most other products were rated at winds well above 30mph. We had felt we were being conservative at only 18mph (*Exhibit 4 - Correspondence with KEMA pertaining rating*) as we felt most Urban areas where our product primarily applied would never experience conditions greater than this. This is a direct indication of our integrity and intention upon acceptance of a listing.

Recently the CEC accepted the listing of another company's product that utilizes the DyoCore PMG. (Exhibit 1 - TLG CEC listing) This product received a rating of 1.6 at approximately 32mph. Regardless of the "wind speed" rating, it has the same effect and outcome of rebate. The only variance is the wind speed at which the rating was applied. However, both our product and this company's product receive the same rebate amount. This is not miss-intention on either party's part, it is simply a lack of formal standards for the purpose of qualification and rating combined with our lack of knowledge within the industry.

The rated wind speed has no correlation towards the rebate amount. Both turbines in the following example use the exact same PMG (Motor) :

DyoCore rated at 18mph at 1.6kW – Rebate amount \$3 per Watt or \$4800  
TLG rated at 30mph at 1.8kW – Rebate amount \$3 per Watt or \$5400

At the time of listing DyoCore's product SolAir within the ERP program the process was both new to us, to KEMA and to the CEC as only a handful of other products were ever listed with little or no standard in place. Products listed on the approved ERP list demonstrate a wide assortment of wind speeds and corresponding rated performance. There was and still is no fixed standard in place. With approximately 180 products listed ([www.consumerenergycenter.org / cqi-bin / ELIGIBLE SMALLWIND](http://www.consumerenergycenter.org/cqi-bin/ELIGIBLE_SMALLWIND)) at wind speeds from 42mph<sup>1</sup> to 16mph<sup>2</sup> and power outputs range from 100watts<sup>3</sup> to 1000,000watts<sup>4</sup> it is very confusing as to how power curves apply and how they correlate to a unified rating system.

1	Home Energy International B.v.	Energy Ball V200	2,500W Wind Turbine	2,500	42
2	Hummer Wind Power, LLC/EES Greentech	H2.7-500W	500W Wind Turbine	500	16
3	Jetpro Technology Inc.	JPT-100	100W HAWT Turbine	100	26.9
4	Shanghai Ghrepower	FD20-100/12	100kW Wind Turbine	100,000	26

Table 1: [http://www.consumerenergycenter.org/cqi-bin/eligible\\_smallwind.cqi](http://www.consumerenergycenter.org/cqi-bin/eligible_smallwind.cqi)

DyoCore submitted its application under the expectations that KEMA was the rating authority and tasked by the CEC to qualify all applications to the program. KEMA at the time of evaluating SolAir was under considerable pressure from workflow (*Exhibit 10 - KEMA email pertaining workload*) which might have contributed to an error in the evaluation of DyoCore's submitted application. DyoCore had never submitted its product to a power curve and had no formal knowledge base or education that would qualify DyoCore or its representatives to formulate a power curve.

It is our intention to continue to move towards meeting requirements for certification as determined by outcome of the new ERP guidelines for qualification. DyoCore has worked with MET and TUV to meet safety and quality standards and continues daily to collect and evaluate site data to better represent performance expectations based on specific install circumstances. DyoCore's website provides quite a bit of continued development material that is made public for the purpose of evaluation of its product and the intended use. [http://www.dyocore.com/sphblog\\_0511/index.php](http://www.dyocore.com/sphblog_0511/index.php). Almost 50,000 unique visitors have viewed and participated in our continued development towards smart low cost urban alternative energy solutions.

DyoCore provides the highest level of product warranty – a 100% no questions asked policy on the removal or replacement of a non working system in addition to being the only company with highly trained

professional distributors and installers that in contract support the product 100% after installation through the entire warranty term.

**In response to Complaint point III C (Requirements for Securing a Reservation under the ERP)**

DyoCore completes all R1 applications to the rules and to the best of its ability to estimate wind conditions based on site evaluations. DyoCore cannot answer directly for its distributors but works diligently and in good faith to educate all its distributors and clients about proper site evaluations and placement of SolAir units in qualified locations. However, the wind is a difficult aspect to estimate with recent changes in the environment and further completed by the Urban landscape where most SolAir units are installed. This is a new market and in most areas the first application of its kind. There are hundreds of Urban area installations throughout CA, some in great locations and some in poor locations. All of which are fairly recent and/or just being completed. DyoCore will continue to collect data and use that knowledge to make better decisions on installation sites but also estimates on production. There unfortunately no history to base these assumptions on.

There were companies that mislead potential clients indicating that they were an authorized Distributor, however they were not and sent formal notices (Exhibit 5 - Notice to Gridnot) to cease all representation of the DyoCore product and notice was given to the CEC (Exhibit 6 - Correspondence from Rick Berry to CEC) that they were not an authorized distributor. We recommended to the CEC that they deny any applications that this company falsely sent in as an authorized representative of our product. This is the only instance known to us of potentially false applications and this was not done on the part or by a representative of DyoCore.

**In response to Complaint point V A (Statement of Facts Upon Which the Complaint is Based (1231(b)(3)))**

DyoCore supplied information on its website to potential clients throughout California that might apply to the use of its product SolAir and is the same information as referenced and available from the CEC directly on the approved ERP listing posted on the Consumer Energy Center website: [http://www.consumerenergycenter.org/cqi-bin/eligible\\_smallwind.cqi](http://www.consumerenergycenter.org/cqi-bin/eligible_smallwind.cqi). All information is factual as it applies to the rebate and SolAir, in some applications the purchase of a complete SolAir system as it applies to the guidelines of the ERP could result in 100% of the total cost of the system covered by an approved rebate. Though this is contention of the current purpose towards redraft of the ERP, it was not a contention when DyoCore applied to the program and was further supported by representatives of the CEC (Exhibit 7 - Email from CEC pertaining changing equipment to max out the rebate allotted)

DyoCore does not sell SolAir direct outside of San Diego CA and provided on its website, [www.dyocore.com](http://www.dyocore.com), a link to qualified DyoCore distributors.

**In response to Complaint point V B (The listing of the DyoCore Turbine)**

During DyoCore's application for CEC ERP inclusion when presented with a power curve by KEMA DyoCore representatives requested that KEMA evaluate if it would be more appropriate for SolAir to be listed at a higher wind speed since all other turbines on the CEC site were listed at substantially higher wind speeds. KEMA agreed and reposted the listing from 12mph to 18mph. During a phone call with KEMA I personally asked KEMA advice on how to list our product and tried to apply it to a listing that was agreed by KEMA to be better suited for wind conditions that might be found at the roof line of a home.

**In response to Complaint point V C (Temporary Suspension of the ERP)**

DyoCore is not in contention with the redraft of the ERP guidebook and supports the CEC in its objectives of applying a fair incentive program that represents the majority of products opposed to a single product. (Exhibit 8 - DyoCore's Response to the CEC ERP suspension). DyoCore and its distributors acted

honorable and within the program guidelines as outlined and management by the CEC. It is understandable that as new technologies emerge, new manufacturing processes reduce costs and as the industry matures there will be a constant need to modify the program to fit the needs of all participants. We are all hopeful towards the reinstatement and continuance of the ERP in accordance with the CEC's objectives.

DyoCore feels statements towards actual reservations are miss-stated:

1. 33 systems using DyoCore turbines have been installed – We only have warranty data for about 12 completed systems. DyoCore directly from these paid reservations has received approximately \$40,000 towards the purchase of SolAir product.
2. 249 approved applications pending – Some of these applications could have been submitted by non-approved and invalid representatives of DyoCore's SolAir. DyoCore has communicated with the CEC on the possible denial of these applications.
3. 1069 applications – it is believed a large portion of these applications were submitted by one company who is not an authorized DyoCore distributor and whereas most if not all of their applications are unqualified and should be denied.

We hope you will take into consideration that DyoCore has not benefited from the ERP program to date. Product is sold near or slightly below costs in some circumstances whereas direct field support is needed. DyoCore distributors can verify that DyoCore has provided exceptional field support for its product beyond the standard industry expectations as the sole cost of DyoCore.

#### **In response to Complaint point V D (The KEMA Report)**

DyoCore has never been notified or contacted by any member of KEMA as to a concern about the power curve data.

Data being evaluated in the statements made by Greentech Media on March 15, 2001, as outlined in the Complaint, were unqualified and referenced Annual Average Wind data opposed to data that qualified under the Betz law that was readily available and clearly posted on the DyoCore website. (Exhibit 9 - Power curve data from DyoCore website).

DyoCore never made statements pertaining TUV power curve testing and has formally asked Greentech to correct its statements. TUV has done field safety and quality evaluations on several SolAir turbines to meet the high standards of local community permitting agencies.

DyoCore in good faith submitted data to KEMA as the CEC assigned authority and professional independent agent in determining the qualification of the applicant towards a rating with the CEC and the ERP. No one at DyoCore was qualified or indicated qualification to make such assertions towards an applicable rating as it was applied to the program nor did anyone at DyoCore know the methodology in how that rating would be qualified.

#### **In response to Complaint point VI.A (DyoCore's Actions Contravene the Purpose of the ERP)**

"The current purpose of the ERP is to incentivize increased sales of small wind systems and fuels cells for on-side generation in California"

DyoCore has become as an applicant of the ERP program the highest demand turbine on the market.

"and thereby encourage manufacturers,"

DyoCore has opened a new factory in IL and grown by 400% since application into the ERP program and at one point DyoCore employed approximately 30 prior to the suspension of the program.

"sellers, and installers to expand their operations,"

DyoCore's SolAir was represented by over 20 new CA distribution companies, representing upwards of approximately 200 jobs in CA all based on the distribution of the SolAir product.

"improve distribution,"

DyoCore's professional Distributors represented the industry with the highest integrity, thorough product knowledge and training, and highest level of customer education and service.

"and reduce system costs for the end-use consumer."

DyoCore's SolAir was amongst the lowest cost turbines available with the highest level of customer service and support making it applicable to the largest user base in CA.

Based on these facts as outlined in the ERP and broken down above DyoCore is the most successful application ever applied to the ERP program.

**In response to Complaint point VI B (DyoCore Violated Appendix 3, Section (A)(2) of the ERP Guidebook by Submitting Operational Data That Does Not Support the Asserted Performance Claims of the DyoCore Turbine)**

DyoCore in good faith submitted summary performance data as evaluated from its Hampshire IL installation. How this data was evaluated and applied by KEMA to the ERP is unknown to DyoCore. DyoCore and its representatives made no assertions that they were qualified in the evaluation of the data or how it applied to a listing with the CEC ERP.

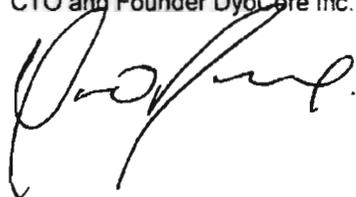
**In response to Complaint point VII (Requested Action (1231(b)(5)))**

DyoCore, its representatives and myself personally request that the facts included herein are taken into consideration towards a fair resolution that applies to all participants that each acted in good faith and to the best intent of the intended program.

The allegation of Fraud on the part of DyoCore has already caused significant and potentially un-survivable damage to the future of DyoCore. DyoCore is a small family owned US company and acted within the highest integrity of the system, constantly striving to grow through education and continued development towards solutions that apply to everyone that has a roof top to place a turbine on at a low cost and the highest obtainable efficiency. I personally request that if a formal complaint is filled and any formal notifications to participants in the ERP are contacted consideration be taken that the alleged intention of fraud be strongly reviewed prior to use of this very damaging allegation whereas no merit to its claim is valid or has been factually presented in the Complaint.

Declaration of Penalty under Perjury. I the undersigned, declare to the best of my knowledge and under penalty of perjury, to the truth and accuracy of all factual allegations contained in this complaint.

David Raine  
CTO and Founder DyoCore Inc.



8/8/2011

**Exhibits and Declarations**

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DyoCore Response to Compliant & Request for Informal Hearing  
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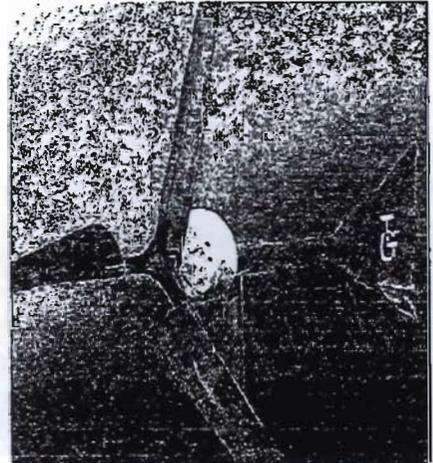
**Exhibit 1: TLG CEC Listing**

DyoCore Response to Compliant & Request for Informal Hearing  
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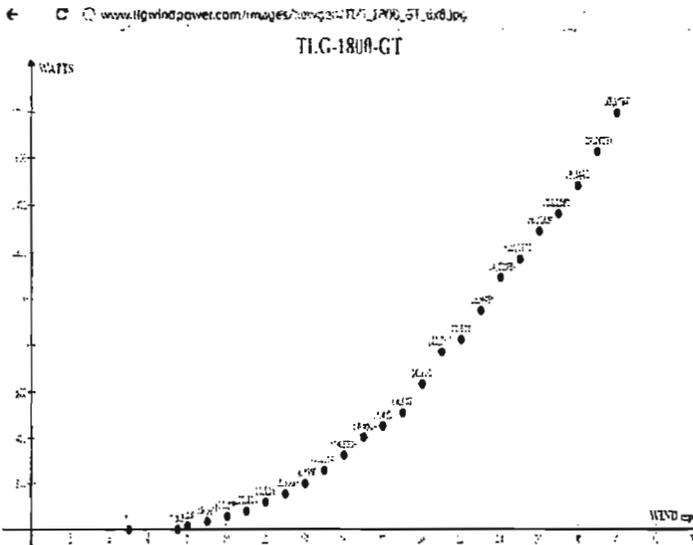
← [www.consumerenergycenter.org/cgi-bin/eligible\\_small/mtd.cgi](http://www.consumerenergycenter.org/cgi-bin/eligible_small/mtd.cgi)

		Turbine		
SWEA USA BV	WN20000	20,000W HAWT Wind Turbine	20,000	Produces rated power at 22 mph.
SWEA USA BV	WN1000	1,000W HAWT Wind Turbine	1,000	Produces rated power at 20 mph.
Synergy Power Corporation	S-5000 / S-B	Survivor 330W Wind Turbine	830	Produces rated power at 29 mph.
Synergy Power Corporation	SLG/S300	Survivor 30,000W Wind Turbine	30,000	N/A
TechnoSpin	ComSpin C2000	2,000W HAWT Wind Turbine for Telecom	2,000	Produces rated power at 25 mph.
TechnoSpin	PowerSpin TSV2000	2,000W HAWT Wind Turbine	2,000	Produces rated power at 25 mph.
TECWIND, LLC	TECWIND 6.0	7,500 Watt HAWT Active Upwind	7,500	Produces rated power at 30 mph
TECWIND, LLC	TECWIND 9.0	30,000 Watt HAWT Active Upwind	30,000	Produces rated power at 33 mph
TECWIND, LLC	TECWIND 8.0	15,000 Watt HAWT Active Upwind	15,000	Produces rated power at 30 mph
TECWIND, LLC	TECWIND 4.6	4,500 Watt HAWT Active Upwind	4,500	Produces rated power at 40 mph
TLG WindPower	TLG-1800-GT	1,800 watt wind turbine, production starts @ 7.5 mph	1,800	Produces rated power at 30 mph
Unitron Energy Pvt. Ltd.	UE 42	4200W Wind Turbine	4,200	Produces rated power at 27 mph.
Unitron Energy Pvt. Ltd.	UE 15	1500W Wind Turbine	1,500	Produces rated power at 23 mph.

TLG – Approved Turbine



TLG – Utilizes the SoIAir PMG



TLG power curve utilizing the DyoCore PMG – Same motor that is utilized on the SoIAir.

← [www.tlgwindpower.com/images/hongkong/TLG\\_1800\\_GT\\_6rdJoy](http://www.tlgwindpower.com/images/hongkong/TLG_1800_GT_6rdJoy)

Wind in MPH	Hourly Production in Watts	Daily Kwh Production 24 hours	Monthly Production in Kwh 30 days	Yearly Production in Kwh 365 days
7.5	1	0.24	7.2	26.2
8.0	16	384	1152	4200
9.0	36	864	2592	9450
10.0	58	1392	4176	15060
11.0	81	1944	5832	21060
12.0	121	2904	8712	31050
13.0	155	3720	11160	40050
14.0	199	4776	14328	51750
15.0	254	6096	18288	66300
16.0	320	7680	23040	84000
17.0	401	9624	28872	105000
18.0	492	11808	35424	128100
19.0	598	14352	43056	154500
20.0	722	17328	51984	184500
21.0	867	20808	62424	223500
22.0	1033	24792	74376	270000
23.0	1221	29304	87912	316500
24.0	1433	34392	103176	373500
25.0	1671	40080	120240	436500
26.0	1937	46488	139464	505500
27.0	2331	55944	167832	606000
28.0	2861	68664	205992	747000
29.0	3537	84888	254664	921000
30.0	4371	104904	314712	1131000
32.0	6135	147240	441720	1590000

TLG – Power Performance Data

DyoCore Response to Compliant & Request for Informal Hearing  
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Exhibit 2: Hampshire IL Summary Data

Table 2. Preliminary Duration Results for the Hampshire IL SolAir Install

Month	Wire	Solar	Hours of production at or above						Wire / Gust Average - Hours				T	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	D	
	kWh production	kWh production	0	5	8	10	12	>12	Max Wind	Average Wind	Max Gusts	Average Gusts	Hours						%
Jan-09	82.60788203	4.894652	N	N	N	N	N	N	N	N	N	N	350	0	32	2			99%
Feb-09	195.3345042	12.721152	0	9	0	18	79	638	4.8	16.8	N	N	744	0	0	1			100%
Mar-09	128.782932	12.786694	1	35	0	40	89	555	53.8	16.7	N	N	720	0	0	0			100%
Apr-09	192.5889154	13.234386	7	10	0	27	80	620	59.5	19.1	N	N	744	0	0	6			99%
May-09	94.00400394	12.508624	0	27	0	23	97	595	56.1	16.7	N	N	754	0	0	3			100%
Jun-09	218.5929992	12.999974	0	28	0	39	90	515	60.7	14.8	N	N	672	0	0	0			100%
Jul-09	251.2554555	13.623136	1	53	0	66	184	420	48	13.7	N	N	744	0	0	0			100%
Aug-09	340.6171748	13.84832	0	59	0	69	185	407	41.3	13.1	N	N	720	0	0	0			100%
Sep-09	226.7815714	13.284678	0	103	0	87	199	355	36.5	11.9	N	N	744	0	0	16			98%
Oct-09	296.5248076	13.224654	0	84	0	65	174	397	50.3	13.3	N	N	720	0	0	0			100%
Nov-09	230.5729028	16.680728	0	23	0	29	126	566	48	15.4	24	20	744	0	24	0			100%
Dec-09	218.7764195	15.512214	0	34	0	19	127	564	44.6	15.7	24	20	744	0	0	0			100%
Jan-10	182.7617497	15.84875	10	30	0	37	102	541	40	18.1	24	20	720	0	0	0			100%
Feb-10	212.153999	10.798912	0	46	0	46	104	438	44.6	15.6	27	21	634	0	0	0			100%
Totals:	2639.4	171.3	19.0	493.0	0.0	521.0	1532.0	6193.0	47.0	14.8	24.5	20.3	9744.0	0.0	24.0	1.9			99%

Hours of Power Production for Hampshire IL:

Table 2. shows the duration results for the SolAir installed in Hampshire IL. This unit has accumulated 9,744 hours of total run time with an operational time fraction of 99%.

The low operational time fraction that occurred in September 2009 was a result of changing out the turbine's bearing from bronze to sealed casted bearings. The majority of the remaining time classified as TN during the test is attributed to the wire being twisted up at the base of the unit requiring manual untwisting. This has been solved for current production models with a free swivel joint connection that allows the wires to turn freely 360°. Wind metering equipment that extended data being recorded from simply wind speeds to include gusts was added in November 2009, this was accompanied by an inspection of the voltage metering equipment and resulted in downtime due to adverse weather conditions that prevented reconnection of the unit until the following day.

Another factor of reliable operation is that the turbine should experience no significant power degradation. Each month the average power is plotted for each wind-speed bin and analyzed for any obvious trends in power production. Examination of power degradation plots indicated no apparent power degradation for either installed location. The dynamic behavior of the turbine is assessed by observing the turbine in a range of operating conditions. The turbine is observed at wind-speed intervals from cut-in wind speed to a maximum experienced wind speed of 53 mph at the Hampshire install site. Tower vibrations, noise, yaw behavior, and tail movement all were periodically documented for evaluations and consideration in reporting the above data.

For the San Marcos install site the following dynamic observations were made. During high winds, the frame will yaw out of the wind between approximately 5 degrees and 30 degrees which was identified as a result of wind blade wash hitting the integrated frame fin assembly. This constant yaw at higher wind speeds allowed the unit to both maintain a lower overall consistent RPM but also prevented the motor from excessive heating. Additionally, it appears that no excessive vibrations are occurring during these conditions. In winds of between 3mph and 15mph both turbines tracked the wind well with no adverse dynamic behavior observations made. No audible noise was detected from either turbine during any of the testing observations.

**Power Performance Testing**

Power performance testing is conducted per IEC standard 61400-12-1, Power Performance Measurements of Electricity Producing Wind Turbines, referencing Annex H for small wind turbines when appropriate. Products of the test include a measured power curve, a power coefficient (CP) curve, and an estimation of annual energy production (AEP). For small turbines, statistical data is collected in 1-minute sets and sorted into 0.5-m/s-wide wind speed bins. Data collection is complete when the wind speed bins between 1 m/s and 14 m/s contain 10 minutes of data each, and the total database consists of at least 60 relevant hours. Wind speed bins are plotted against the corresponding bin power to produce a power curve. Power curves are normalized to sea-level air density; the site-specific air density at the either observed location is relatively low, 1.0 kg/m<sup>3</sup>. The power coefficient is the ratio of power generated by the turbine to the power available in the wind. The power curve for the both turbines show power measurements that are greater than rated power. Preliminary power and CP curves for the San Marcos Install as displayed in Figure 3; Both turbines performed as expected.

The original testing voltage equipment on the San Marcos Install was optimized for power performance and was found un-reliable after several months of operation. After the failure, a production model testing solution, Hobo Equipment, was installed and operated until testing was completed with a backup data recorder on the inverter. The preliminary power and CP curves for both configurations are shown in Figure 4.

Sea-Level Air Density Normalized Power Curve  
SoiAir San Marcos CA

m/s	Kmph	Bin Wind Speed m/s	Bin Power kW	Number Data Points	C <sub>p</sub>
1.6	3.5	1.554	0	0	0.77
2.1	4.6	2.0424	0.01	1340	0.58
2.6	5.8	2.5752	0.12	1134	0.44
3.1	6.9	3.0636	0.14	903	0.37
3.6	8.1	3.5964	0.41	747	0.30
4.1	9.2	4.0848	0.67	476	0.25
4.6	10.4	4.6176	0.79	276	0.22
5.1	11.5	5.106	0.84	161	0.20
5.7	12.7	5.6388	0.99	65	0.18
6.2	13.8	6.1272	1.17	27	0.16
6.7	15	6.66	1.35	29	0.15
7.2	16.1	7.1484	1.42	15	0.14
7.7	17.3	7.6812	1.56	13	0.13
8.2	18.4	8.1696	1.61	12	0.12
8.8	19.6	8.7024	1.6	8	0.12

Figure 3. Preliminary power and CP data for San Marcos CA Install

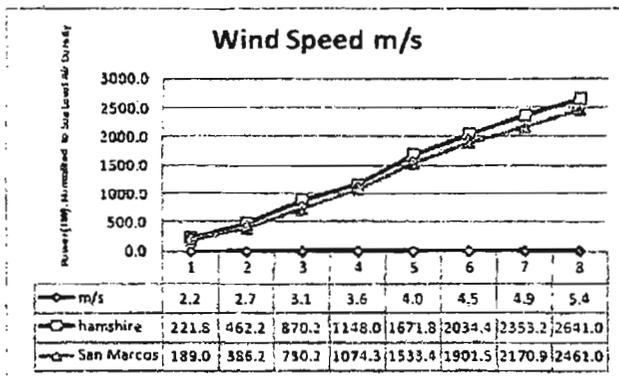


Figure 4. Annual Energy Production (AEP) at sea-level density; 1.225 kg/m<sup>3</sup> for normal power production

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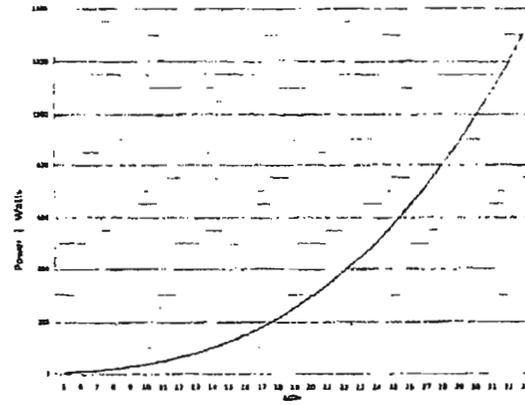
Exhibit 3: Annual Wind vs Real Wind with Betz comparison

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August 8, 2011

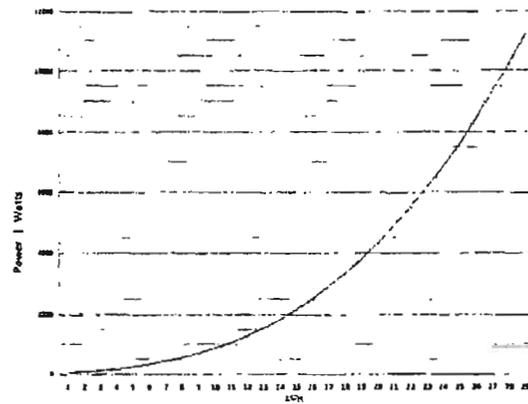
Table showing SolAir expected power vs BETZ limit at constant wind speeds. SolAir is approximately 66% of the BETZ limit at a Cp of 45%.

mph	Watts	m/s	Betz Max @ .592
1	0	0.4	0
2	0	0.9	0
3	1	1.3	1
4	2	1.8	3
5	5	2.2	7
6	8	2.7	12
7	12	3.1	19
8	19	3.6	28
9	26	4.0	40
10	36	4.5	54
11	48	4.9	72
12	63	5.4	94
13	80	5.8	119
14	100	6.3	149
15	123	6.7	183
16	149	7.2	222
17	178	7.6	266
18	212	8.0	316
19	249	8.5	372
20	290	8.9	434
21	336	9.4	502
22	387	9.8	578
23	442	10.3	660
24	502	10.7	750
25	567	11.2	847
26	638	11.6	953
27	715	12.1	1068
28	797	12.5	1191
29	885	13.0	1323
30	980	13.4	1464
31	1081	13.9	1616
32	1190	14.3	1777
33	1305	14.8	1949
34	1427	15.2	2132
35	1556	15.6	2325
36	1694	16.1	2531
37	1839	16.5	2747
38	1992	17.0	2976
39	2153	17.4	3217

SolAir™ Power Curve  
by Wind (mph)



SolAir™ Power Curve  
Estimated Annual Power Production by Wind (mph)



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Exhibit 4: Correspondence with KEMA pertaining rating

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August 8, 2011

From: Baumstark, Pete [mailto:Pete.Baumstark@us.kema.com]  
Sent: Tuesday, February 16, 2010 3:45 PM  
To: David Raine  
Subject: RE: lec data

Looks fine thanks

Pete Baumstark, PE  
Energy Engineer

+1 (510) 251-0448 (office)  
+1 (510) 251-0440 (cell)  
pete.baumstark@kema.com

KEMA  
133 Grand Avenue, Suite 500  
Oakland, CA 94612

Please visit our website [www.kema.com](http://www.kema.com)

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 Please consider the environment before printing this email.

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From: David Raine [mailto:dave@doyocore.com]  
Sent: Tuesday, February 16, 2010 3:27 PM  
To: Baumstark, Pete  
Subject: RE: lec data

Please let me know if this is acceptable:

Manufacturer Name	Model Number	Description	Power Output (Watts)	Notes
DyoCore	S80015dc	SolAir 800W hybrid wind/solar generator	800	Produces rated power at 12 mph.

The 800 W output is based on a 75% load – average load when charging batteries or running a motor or other object in real time plugged directly into an inverter. The output without load at 12mph is approximately 1.5 kW. Most companies rate their products at substantially higher wind speeds. We would like to present a much more realistic rating for the average user of our units. If you have experience in this area it would be helpful in a direction towards correctly labeling our product.

Here are the primary two output tests:

DyoCore Response to Compliant & Request for Informal Hearing  
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SdAV - down v.		WHz					Wind Speed	
RPM	Voltage	RPM	V	A	Qsec	75% Load	mph	cm/s
170	9.9						2.5	1.1
210	11.8						3	1.32
300	17.2						3.5	1.672
400	23.9	450	20.8	0.5	10.25	10.25	5	2.2
510	30.5	600	28.5	3.1	148.35	136.15	8	2.54
612	35.9	600	35.3	16.1	818.63	414.96	8	3.52
700	43.6	700	41.2	22.6	931.12	544.1	8.7	3.828
800	47.8	800	45.4	25.6	1183.2	701.25	8.8	4.312
900	51.8	900	50.1	27.3	1387.73	756.21	10.9	4.789
1000	57	1000	53.1	28.5	1588.45	991.25	12	5.25

Best wishes, David Raine

[dave@dycore.com](mailto:dave@dycore.com)

mobile: 760-807-2135

Desk: 856-404-2428



663 So. Rancho Santa Fe Rd. #610

San Marcos, CA 92078

From: Baumstark, Pete [mailto:Pete.Baumstark@us.kern.com]  
Sent: Tuesday, February 16, 2010 8:46 AM  
To: David Raine  
Cc: rick@dycore.com  
Subject: RE: lec data

So your average wind speed during the tested period is only 6.8 mph?

Pete Baumstark, PE  
Energy Engineer

+1 (714) 631-6442 (office)  
+1 (916) 691-0440 (mob)  
[pete.baumstark@kern.com](mailto:pete.baumstark@kern.com)

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August 8, 2011

KEMA  
151 Grand Avenue, Suite 500  
Oakland, CA 94612

Please visit our website [www.kema.com](http://www.kema.com)

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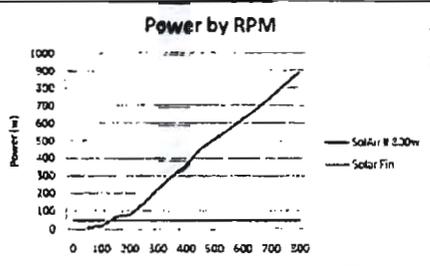
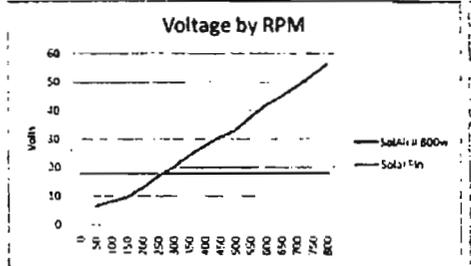
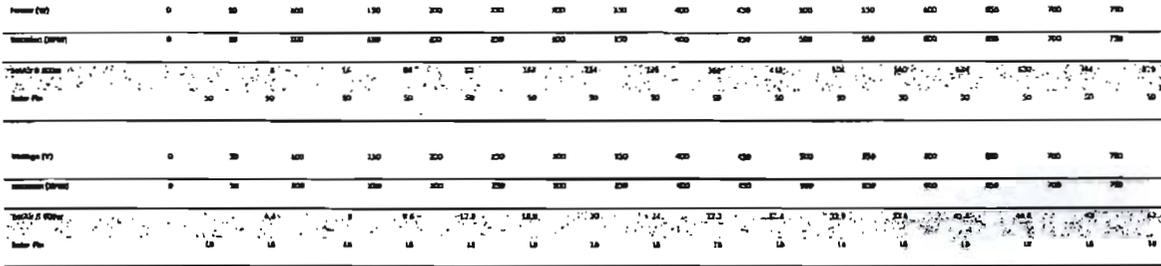
---

From: David Raine (mailto:dave@dyocore.com)  
Sent: Monday, February 15, 2010 9:38 PM  
To: Baumstark, Pete  
Cc: rick@dyocore.com  
Subject: RE: let data

Thank you for your assistance. The units for wind are MPH. I can convert to m/s if preferred.

Here is the performance charts. We are a bit conservative but we wanted to apply to very realistic residential conditions:

DyoCore Response to Compliant & Request for Informal Hearing  
August 8, 2011



Let me know if you have questions. Thank you.

Renewable Energy Production

Best wishes, David Raine

[dave@dyocore.com](mailto:dave@dyocore.com)

mobile: 760-807-2135

Desk: 856-404-2428



663 So. Rancho Santa Fe Rd. #610

San Marcos, CA 92078

DyoCore Response to Compliant & Request for Informal Hearing  
August 8, 2011

From: Baumstark, Pete [mailto:Pete.Baumstark@us.kema.com]  
Sent: Monday, February 15, 2010 12:05 PM  
To: rick@dyocore.com  
Cc: dave@dyocore.com; Mashnik, Daria  
Subject: RE: lec data

Thanks. Please also send a performance curve and also tell me what the units for wind speed are (m/s or mph).

Pete Baumstark, FE  
Energy Engineer  
+1 (916) 891-0048 (office)  
+1 (916) 891-0449 (fax)  
pete.baumstark@kema.com

KEMA  
153 Grand Avenue, Suite 500  
Oakland, CA 94612

Check out our website [www.kema.com](http://www.kema.com)

This message may contain confidential or privileged information. If you are not the addressee, please return the message to its sender and delete it from your files.

 Please consider the environment before printing this email.

From: rick@dyocore.com [mailto:rick@dyocore.com]  
Sent: Monday, February 15, 2010 11:50 AM  
To: Baumstark, Pete  
Cc: dave@dyocore.com  
Subject: Fwd: lec data

Pete Here are the data figures from our tests. The company is Dyocore, the product is a SolAir 800 turbine, David Raine is the CEO of Dyocore and he can answer any questions you may have at 760-807-2135. When I spoke with you regarding the review you told me you could return the results the same day. I could really appreciate your notifying the state immediately if the data is sufficient so we can get listed by March 1, 2010. Our trade show sales in California are extremely successful and we'd like to install into around 45 homes in March. Pete, thanks for any and all assistance. I remain Rick Berry 858-598-5254

—Original Message—  
From: David Raine [mailto:dave@dyocore.com]  
Sent: Monday, February 15, 2010 12:20 AM  
To: rick@dyocore.com  
Subject: lec data

SolAir 800 - Summary Production  
Results

Month	Notes	kWh production	kWh production	Hours of production at the above						Wind / Wind Average - Gusts				Hours	%			
				0	5	8	10	12	>12	Max Wind	Average Wind	Max Gusts	Average Gusts					
Sep-08	L23	82,807,88208	6,431,632	171	103	29	35	12	0	18.4	6.3	N	N	350	72	20	24	91%
Oct-08	4	195,334,5041	14,791,154	342	262	50	66	21	3	20.7	5.8	N	N	744	0	10	8	99%
Nov-08	5	128,782,932	14,158,63	341	273	46	36	16	8	25.3	5.5	N	N	720	0	0	16	98%

DyoCore Response to Compliant & Request for Informal Hearing  
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Dec-08	6	192,588,9154	12,697,7476	274	326	56	48	18	22	36.8	5.3	N	N	744	0	0	0	100	%
Jan-09	7,8	94,004,00394	13,34,5624	344	317	42	32	7	2	18.4	5.8	N	N	744	110	5	48	92%	
Feb-09	9	218,507,29992	13,55,2332	259	251	52	60	28	22	38	7.3	N	N	672	0	0	0	100	%
Mar-09	10	251,255,5455	14,88,2604	270	276	54	90	43	11	24.2	7.4	N	N	744	6	0	48	93%	
Apr-09	11	340,617,1748	14,95,0184	185	273	73	112	45	32	29.8	7.2	N	N	720	0	0	24	97%	
May-09	12	226,781,5714	14,60,4224	246	291	67	113	27	0	19.6	7	N	N	744	0	2	24	97%	
Jun-09	13	296,524,8076	15,70,5282	184	300	67	99	61	9	23	7.2	N	N	720	0	1	0	100	%
Jul-09	14	230,572,9028	17,33,0669	287	234	79	120	24	0	18.4	7.1	N	N	744	0	0	24	97%	
Aug-09	15	218,776,4195	19,26,6376	300	245	63	106	30	0	17.9	5.8	N	N	744	0	0	0	100	%
Sep-09	16,1 7,18	182,781,7497	17,64,2534	319	240	46	92	23	0	21.9	6.3	24	20	720	56	48	86	86%	
Oct-09	19	212,153,999	18,10,679	283	229	59	71	26	16	26.5	6	27	21	744	0	0	0	100	%
Nov-09	20	124,397,8237	16,80,8882	343	273	43	42	13	6	26.5	5.8	25	23	720	1	0	0	100	%
Dec-09	21,2 2	200,982,6557	15,04,2874	289	312	39	54	28	22	42.6	6.7	39	26	744	0	3	0	100	%
Jan-10	23,2 4,25	233,741,1242	13,85,2288	329	274	38	47	15	41	41.4	7.8	43	26	744	4	36	96	86%	
Annual-09		2597.4	191.3	3209	3301	684	991	355	120	25.5	6.6	29.0	22.5	730	0	14.4	4.9	21.2	97%

Just need to now do the data notes and summary content. I should have it done by Wednesday but this might be enough to file with the State right away.

Best wishes, David Raine

[dave@dycocore.com](mailto:dave@dycocore.com)

mobile: 760-807-2135

Desk: 866-404-2428



663 So. Rancho Santa Fe Rd. #510

San Marcos, CA 92078

Exhibit 5: Notice to Gridnot

Formal notice was given by email and verbally to Gridnot to cease all representation of DyoCore and its SolAir product line and remove all reference of such from its website in early 2011. The same notice was communicated to the CEC by Rick Berry.

Gridnot is not an authorized DyoCore Distributor and product obtained and installed by Gridnot will not be eligible for DyoCore warranty.

All applications filed by Gridnot that represent SolAir installations are invalid and do not meet the ERP guidelines for acceptance due to invalid warranty.

DyoCore Response to Compliant & Request for Informal Hearing  
August 8, 2011

Exhibit 6: Correspondence from Rick Berry to CEC

**TO:** David Raine  
CEO Dyocore Inc.

**FROM:** Richard Berry  
Compliance Department  
Dyocore Inc.

---

David: In April 2011 I sent an email to James Lee at the State of California Renewable Energy Department regarding a number of R-2's Dyocore had received over the previous six months and would not be using.

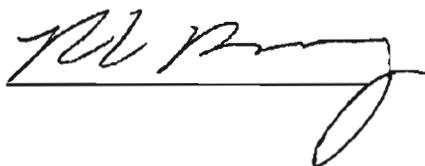
Dyocore applied for these with R-1's signed by clients wishing to purchase a small wind system but for one reason or another were unable or unwilling to wait the time it took Dyocore to open the permitting processes in San Diego County to small wind turbines. This effort took one and a half years and cost Dyocore upwards of \$100,000.00.

Regardless of the reason for refund, Dyocore honored each and every clients request for rebate and refunded their entire deposit while suffering financial loss on each for handling, permit activities (plot plans, one line drawings, meetings with Local Area Planning Groups, etc.).

Mr. Lee received five of these R-2's and cancelled four of them. One R-2 client subsequently asked to have her system installed and paid the full price for the 5 unit roof mounted small wind turbine system.

I am including this signed memo as I feel it further shows our efforts to be a good corporate neighbor and abide by the rules of the Rebate Program.

**SIGNED:**



---

**DATED:**

8/3/10

**TO:** David Raine  
CEO Dyocore Inc.

**FROM:** Richard Berry  
Compliance Department  
Dyocore Inc.

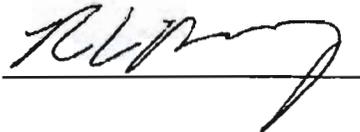
---

David: On February 4, 2011 I received an email from Sarah Taheri, State of California Renewable Energy Department (see attached) asking me (in effect) why we were not taking advantage of the full power of our turbine by using larger inverters.

I responded by saying we had been testing a new line of inverters (Aurora, Power One; 3.0, 4.2, and 6.0) as an alternative to the Ginlong Inverter line. Sarah's email was taken to heart and we have upgraded four or five of our planned installs by replacing the old inverter's with the new Power One equivalent.

This email is important because I believe it shows that Dyocore has attempted to stay within the official guidelines of program and has maintained credible practices that are well with the bounds of the spirit of the program.

**SIGNED:**



---

**DATED:**

8/2/11

**From:** rick@dyocore.com <rick@dyocore.com>

**To:** dave@dyocore.com, rick@dyocore.com

**Cc:**

**Date:** Wednesday, July 27, 2011 02:40 pm

**Subject:** Fwd: More info needed

Dave, the attached email from the state should show that we were not bilking the rebate system, in fact under-requesting rebate amounts. This gal is under James Lee. Rick

-----Original Message-----

**From:** Sarah Taheri [mailto:STaheri@energy.state.ca.us]

**Sent:** Friday, February 4, 2011 05:50 PM

**To:** rick@dyocore.com

**Subject:** More info needed

Hi Rick, Realized there were a few applications that I didn't catch earlier. A few notes and requests: McChesney - utility bill is for address 825 Cape Breton; we need bill for 3030 Overhill. This will receive a rebate of \$4808 (equivalent to total system cost), as rated output is limited to 2000 watts due to inverter (rather than 3200 watt capacity of turbines). Almodovar - need more recent utility bill. This will receive a rebate of \$4904 (equivalent to total system cost), as rated output is limited to 2000 watts due to inverter (rather than 3200 watt capacity of turbines). The total output of these systems could be increased by installing a larger inverter; granted, this would also increase the total cost and potentially increase the rebate. This may be something you could discuss with the clients if you like. If you choose to change the installations, let me know, as we'll need new paperwork.

Thanks, Sarah \_\_\_\_\_ Sarah Taheri California Energy Commission Efficiency & Renewables Division Renewable Energy Office Tel: (916) 654-3929 Email: staheri@energy.state.ca.us

**Attachments:**

**TO:** David Raine  
CEO Dyocore Inc.

**FROM:** Richard Berry  
Compliance Dept.  
Dyocore Inc.

---

David: On February 12, 2011 I spoke by telephone with Mr. James Lee at the State of California Energy Commission to inform him that Dyocore was concerned about one of their "distributors". This company is called Gridnot, they had signed a distributorship agreement with Dyocore but had purchased no units for installation although they were writing contracts for huge numbers of systems.

The manager for the distributor network at Dyocore sent a cancellation letter to Gridnot on February 11, 2011 informing them of our concern with their method of selling units and failure to live up to their agreement to purchase units from Dyocore as specified in the agreement.

Mr. Lee informed me he had a large stack of Gridnot R-1's on his desk that were not properly filled out and he also had a concern. I informed him that we had information that Gridnot was holding meetings (akin to Tupper Ware Parties) with 10 to 15 people at a time and guaranteeing them complete wind turbine systems if they would put one Dollar (\$1.00) down and sign the sales contract and R-1, at no cost to them.

There was no regard or question of wind speeds or even if wind existed in or around the client location. I further informed James that we had cancelled their distributorship agreement and would not renew the agreement.

I am writing this memo and signing it based upon the State's allegation that Gridnot was one of our distributors and has listed it on their complaint to the energy commission. Mr. James Lee can confirm these statements.

In fact Dyocore has filed just 35 R-1's for rebate reservations with the State of California Renewable Energy Program to date and only three of it's clients have received rebate checks.

SIGNED:

DATED:



7/30/11

DyoCore Response to Compliant & Request for Informal Hearing  
August 8, 2011

Exhibit 7: Email from CEC pertaining changing equipment to max out the rebate allotted

DyoCore Response to Compliant & Request for Informal Hearing  
August 8,2011

-----Original Message-----

**From:** Sarah Taheri [mailto:STaheri@energy.state.ca.us]

**Sent:** Friday, February 4, 2011 05:50 PM

**To:** rick@dyocore.com

**Subject:** More info needed

Hi Rick, Realized there were a few applications that I didn't catch earlier. A few notes and requests:  
McChesney - utility bill is for address 825 Cape Breton; we need bill for 3030 Overhill. This will receive a rebate of \$4808 (equivalent to total system cost), as rated output is limited to 2000 watts due to inverter (rather than 3200 watt capacity of turbines). Almodovar - need more recent utility bill. This will receive a rebate of \$4904 (equivalent to total system cost), as rated output is limited to 2000 watts due to inverter (rather than 3200 watt capacity of turbines). The total output of these systems could be increased by installing a larger inverter; granted, this would also increase the total cost and potentially increase the rebate. This may be something you could discuss with the clients if you like. If you choose to change the installations, let me know, as we'll need new paperwork. Thanks, Sarah \_\_\_\_\_ Sarah Taheri  
California Energy Commission Efficiency & Renewables Division Renewable Energy Office Tel: (916) 654-3929 Email: [staheri@energy.state.ca.us](mailto:staheri@energy.state.ca.us)

DyoCore Response to Compliant & Request for Informal Hearing  
August 8, 2011

Exhibit 8: DyoCore's Response to the CEC ERP suspension

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Carlsbad, CA 92010

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California Energy Commission  
1516 Ninth Street  
Sacramento, California 95814

April 18, 2011

California Energy Commission,

Thank you for this opportunity to present and thank you to the committee for your diligent efforts in reinstatement of the ERP.

California created the Renewable Portfolio Standard (RPS). Under the RPS, the Renewable Energy Program's focus is twofold as published;

- To increase, in the near term, the quantity of California's electricity generated by renewable energy resources, while protecting system reliability, fostering resource diversity, and obtaining the greatest environmental benefits for California residents.
- To identify and support emerging renewable energy technologies with the greatest near-term commercial promise that merit targeted assistance.

In 1996 ERP was established as an initiative to promote "wind" but later was re-invested in to promote energy conservation. Then after very few qualified recipients the program evolved into an incentive to promote new technology. This is the current modern direction of the plan. With the recent economy downfall and more direct financial crisis in CA, I think that, now today, the program is also in place to promote jobs and economy within CA.

- Companies like DyoCore are the intended target of the program.
- DyoCore's SolAir is New innovative Technology
- SolAir applies to the largest majority of CA residents who directly funded the program
- DyoCore both as a CA company and through its organization of professional distributors represents 100's of jobs and millions into our economy.
- DyoCore is the forefront company for the momentum created within local communities towards the acceptance and installation of Wind power technology throughout CA and the US.
- SolAir combines wind and solar, this is again the most innovative development of technology towards the ERP's intended objectives.

California Wind Commission Workshop

Docket Number: 02-REN-1038

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#### **Summary concerns with the current ERP:**

On March 4th the CEC sent notice that it suspended the renewables rebate program so it may address deficiencies with the program requirements.

The goal of the ERP is to increase the installation of small wind systems and fuel cells

Though the suspension notice indicated "deficiencies with the program requirements", this does not fit well into the intention of the program as outlined.

The most current intention of the program, the state and our country is to promote the development of new technologies.

The concern is the recent large activity of ERP reservations from a single company whereas only a few months ago only a very few manufacturer products applied to a very few qualified recipients. Additionally these products are priced at significantly higher price points.

Now that products are available to a larger quantity of participating recipients Attention is now being placed on the production of energy at installation sites and the method of rating products qualified for the program.

#### **Solution overview:**

Separation of wind into specific qualification categories. Currently a power/wind rating incentive applies equally to a vague range of installation sites regardless of the wind conditions. A turbine qualified at 2kW @ 25mph and a turbine qualified at 2kW at 35mph apply to the exact same incentive regardless if either are installed in wind conditions substantially less than the rated wind speed.

By defining wind categories and ratings based on qualified installed locations will strengthen the intended benefits of the program. A turbine should be qualified based on its location and based on the projected power production as applied to that location.

Unfortunately wind experienced at a location can change dramatically from day to day less year to year. A qualified site today might not be qualified next week, however, relevance at the time of qualification and good history data should present a foundation for future expectations. we recommend the consideration of wind, product categories (wind zone categories)

Wind zones specific to turbines in size and intended use can be created that build a foundation for qualifying the program as applied to specific expected conditions. Data is readily available for easy separation of these categories.

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- Micro wind – turbines under 500w or under a specific blade size, usually less than 48" (more appropriate) can only produce so much power and intended use is typically at ground level.
- Low or small wind – Turbines again with a blade diameter under 70' and whereas the intended installation is under 50' fall well into this category.
- Medium wind – installation sites well above 50', typically large pole mount, and with blade diameters exceeding 70" typically apply to this category.
- High wind – greater than 5kW and installed on poles exceeding 100'.

Special circumstances can apply to any category whereas local wind conditions at the intended site could be greater or lower than normally anticipated for the original category. A smaller turbine can be applied to a pole mount application and increase it's expected normal applied performance. The solution is a simple application exception request that can be accompanied with supporting data, installation details and wind analysis.

#### **Summary Conclusion:**

The ERP program was designed and is in effect today to:

- make green energy available financially
- create green jobs
- promote green technology
- make CA a green community
- make green products accessible to everyone

Until small wind products like DyoCore the program did not fully accomplish any of these objectives. Manufacturers like DyoCore are the core of the ERP intended results and DyoCore has demonstrated significant success in accomplishing the ERP objectives.

Unfortunately without site qualifications any turbine can be installed in a location that does not meet the intentions of the ERP. If you create site specific guidelines and more specific product categories for incentive qualification you can distinguish between productive and non-productive installations.

An incentive that varies based on the installed location and turbine size creates a powerful tool that maintains the direction of the program as designated.

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**DyoCore notes from ERP workshop**

**Presentation moderator – Anthony NG**

**April 14, 2011**

1. Primary stated barrier and cause to suspension of the ERP; Rebate amounts applied for in reservations covered most and in some all costs of the systems resulting in systems being installed that could possibly have little owner vested interest in the success of the application.

Response:

This is a direct correlation with over inflated Industry pricing / overpriced products. ERP was projected to bring down costs. New tech is less expensive and opens doors for greater deployment. New technology and resources for manufacturers present lower price point advantages and in turn will drive down pricing – this in turn is a benefit to the program and its success.

The program as it is priced today should remain the same and be a tool to reward companies that maintain lower cost margin products and an incentive for larger turbine manufacturers to reduce highly over inflated price points.

Manufacturers already have tremendous pressure to assure the success their products as installed and spend considerable resources to assure installations meet expectations.

2. It was presented that a \$ per kWh produced annually could be applied.

Response:

If backed by an upfront incentive as applied to an annual objective it could be a good solution. However, we caution that any program with a spread out rebate structure will provide barriers to financing for product sales. If banks are unable to provide financing for installation of proposed/qualified systems due to lengthy repayment of their funds the sales agents will not have the resources needed to maintain growth within the market.

A potential solution is the state initiates a direct funding incentive and provides the rebate based on pre-qualified conditions which then apply to a term loan or other method of payback over time that is funded through the existing program.

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3. Bergey presented that they, Bergey, are the only qualified product. Bergey presented that the list should be scrubbed. Mike Bergey is on the SWCC board and has already demonstrated extreme bias towards the industry – specifically towards “small wind”.

Response:

All turbines installed in California by simple permitting standards have to present extensive 3<sup>rd</sup> party engineering, testing and performance proof prior to being issued a permit for installation. Even if a product acquires CEC listing, it will not be able to pull a permit until it can demonstrate it meets all the current applicable standards.

Proper equality in listing should be given to all companies. Manufacturers should not hold positions that allow discrimination against other companies. Any 3<sup>rd</sup> party certification body should be completely independent. To force companies to meet a standard that is enforced and managed by distributors directly is in conflict with the intentions of a fair program.

The ERP does and should encourage tech and its continued development. We cannot simply dismiss new development of tech and remove these tools from the eligibility, this is completely opposite of the ERP program. Without encouragement and resources of new tech there will be no new tech.

4. Listings at fixed wind speeds. It was discussed that turbines have arbitrary wind speed listings.

Response:

This is a valid point. Wind ratings are arbitrary and only effective if a turbine is installed in the rated conditions. This is highly unlikely. Most turbines will never experience the amount of wind they are rated for. 99% of the contributors to the program do not experience winds that most of the qualified products are listed at.

Ratings should be based on realistic expectations as related to the specific install site. A turbine size and intended use is a great indication of its performance.

Breaking up turbines into respective categories that label them for specific expectations and incentive consideration is a key method in the success of the program.

5. Site wind analysis reporting

Response:

Education is a primary solution, a wind turbine needs wind, an unqualified location damages the success of the program, distributors and manufacturers.

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High variable wind conditions make it difficult to do site evaluate in dense areas most applicable to the majority

Simple tools are fairly readily available for local area conditions through accumulated wind data but not always specific to a site. Possibly within several blocks and if specific to turbines than only applicable to 60' poles. Tools like Wind Cad are very expensive and only applicable to larger pole mounted turbines. They have no relevance on low wind and the majority of intended applications in California.

Large costs of formal assessments could be greater than the cost of the power benefit and possibly the cost of the system

Qualified professional installers should be held accountable for bad decisions. Training and certification by the ERP or CEC will provide the resources for distributors to make smart installation decisions.

Great source for residential and small commercial low wind analysis:  
<http://www.wunderground.com/wundermap/>

6. Certification qualification for ERP inclusion

Response:

Limited and expensive resources towards 3rd party testing, standards have not yet been formally accepted towards certification, no current standard exists or is agreed upon within the wind field directly. But readily available professional and recognized 3rd parties exist and are already required prior to a permit or installation being done in California.

Standards for safety already exist, are excepted by state codes and provide a solid foundation for qualification. Safety and quality should be the primary factor IEC standards present a very good guideline and 3rd party NRTL companies have done qualified testing for safety and engineering for years.

The current CEC qualification does not need to be changed. Any CA city or community already has a very stringent installation/permitting process to assure safety and quality standards are met. All of which already highly exceed any state minimums.

7. Combining solutions into the ERP (wind, solar, fuel cells)

Response:

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Carlsbad, CA 92010

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[www.dyocore.com](http://www.dyocore.com)



Simple process for applying Additional Benefits to tie together wind, solar as a combined application.

Separation of fuel cells that could substantially improve wind, solar performance. A direct incentive would encourage important tech development in this direction. Similar to solar now.

8. Add a cost cap based incentive

Response:

Avoid cost cap, this encourages overpricing. Lower cost turbines move the market in the right direction holding manufactures to fair market prices.

We appreciate your consideration in reviewing our comments towards your objectives in reinstatement of the ERP.

Sincerely,

David Raine  
CTO, DyoCore Inc.  
760-580-4271  
[dave@dyocore.com](mailto:dave@dyocore.com)

cc  
Assemblyman Martin Garrick  
1910 Palomar Point Way, #106  
Carlsbad, CA 92008

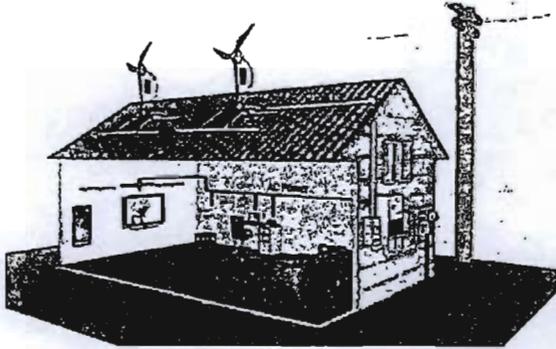
DyoCore Response to Complaint & Request for Informal Hearing  
August 3, 2011

Exhibit 9: Power curve data from DyoCore website

[www.dyocore.com/sphblog\\_0511/index.php?entry=entry110608-120151](http://www.dyocore.com/sphblog_0511/index.php?entry=entry110608-120151)

### Updated power curve / Solar add on overview

AAC-000000, June 8, 2011, P31, P5 Technology



The Aurora has an efficiency curve for conversion. The attached is a fairly close extrapolation of the conversion efficiency percentage – see the last column.

Watts	Number of Solar Units					Approx. RPM	Approx. LPM	Approx. GPM	Conversion Efficiency Curve
	Single Unit	Watts 2	Watts 3	Watts 4	Watts 5				
100	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
110	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
120	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
130	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
140	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
150	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
160	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
170	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
180	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
190	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
200	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
210	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
220	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
230	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
240	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
250	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
260	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
270	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
280	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
290	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
300	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
310	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
320	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
330	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
340	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
350	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
360	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
370	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
380	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
390	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
400	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
410	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
420	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
430	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
440	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
450	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
460	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
470	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
480	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
490	0.00	0.00	0.00	0.00	0.00	0	0	0	0%
500	0.00	0.00	0.00	0.00	0.00	0	0	0	0%

**SolAir and Aurora** [http://www.dyocore.com/sphblog\\_0511/index.php?entry=entry110130-214346](http://www.dyocore.com/sphblog_0511/index.php?entry=entry110130-214346)

Sunday January 30 2011 09:43 PM **Technology**

Power Curve Watts Setting by Number of SolAir Units - Parallel							
voltage	1 Unit	2 Units	3 Units	4 Units	Approx. RPM	Approx. MPH	Conversion Efficiency
30	5	6	8	11	150	4	5%
40	10	11	17	22	192	6	7%
50	20	22	33	44	228	7	12%
60	40	44	66	88	269	9	18%
70	75	83	124	165	336	11	23%
80	160	176	264	352	378	15	35%
90	287	316	474	632	419	18	40%
100	418	459	689	919	467	21	45%
110	552	828	1242	1656	508	23	50%
120	690	1035	1553	2070	555	25	55%
130	847	1271	1906	2541	603	26	60%
150	1228	1842	2763	3684	722	30	70%
160	1468	2203	3304	4405	764	32	75%
170	1676	2514	3771	5029	810	33	80%
180	1820	2730	4095	5460	858	34	85%
190	1940	2909	4364	5819	905	35	90%

DyoCore's SolAir in conjunction with Power One's Aurora Wind line of Inverters provides an out of the box solution for the residential small wind customer. Optimization still needs a bit of work but with current technology it's a very close match.

SolAir produces upwards of 300v DC, the Aurora peak input is 600v (580v max recommended by Aurora) with optimal input for peak conversion at approximately 250v. though a single SolAir still presents barriers due to the wide and quick variance of power created during turbulent wind conditions which are the most common found in low wind residential applications, 3 or more units is optimal and provide for the best connection start up and conversion results.

Having enough wind, approximately 8mph annual conditions or greater, and optimizing the Aurora power curve for the specific install wind conditions is key to the success of efficient energy conversion.

Pulling power from a turbine is like applying the brakes to a car. It will both slow the momentum of the blades and create a delay in momentum to get back to peak rotation. This combined with rapid changing wind conditions is a difficult to manage combination. The aurora will moderately apply the brakes, when pulling power, this causes the turbine to slightly slow, reduce voltage output and allow the aurora to drop to a lower power curve setting then in turn taking off the brakes and allowing the turbine to catch up in momentum. When a power curve is too aggressive or passive it could substantially accentuate the applied brakes or momentum required from brake recovery to catch back up to an optimized power conversion. This is most commonly experienced in the lower voltage/power curve settings.

SolAir begins power conversion, in combination with the Aurora, at about 160rpms or approximately a consistent 11mph wind. applying the brakes too hard in this power range will prevent the SolAir from gaining higher rpm momentum, if the known wind conditions are lower, under 10mph annually, setting the first few power curve settings conservatively will allow the turbine available momentum to build up and maintain higher rpm and higher conversion efficiency.

From our current in house testing we know the following:

1. A single SolAir will start up the Aurora at a constant wind of approximately 11mph or greater. Approximate RPM startup is 160rpm. Approximate voltage startup is 50v
2. Three SolAir Solar Panels wired in Series are sufficient to keep the Aurora on for several hours in daylight. They are not enough to start up the Aurora on their own.
3. Approximately 5 to 6 SolAir Solar panels wired in series are required to provide sufficient power to start up the Aurora.
4. An unlimited amount of SolAir units can be tied to the Aurora in Parallel configuration.
5. Any configuration that has the potential to create more than 700v will damage the inverter. This would indicate that a maximum of two SolAir units can be fed into the inverter in Series configuration.

DyoCore Response to Complaint & Request for Informal Hearing  
August 3, 2011

Exhibit 10 - Kema email pertaining workload

Rick,

Please feel free to call me on my cell with your questions.

Unfortunately we've been kind of snowed under with processing module requests since around June. When I did this job from 2005-2007, we'd maybe get 20 to 30 module requests a month. Now we're getting around 200 per month (mostly from China). So Daria has trouble getting back to everyone individually.

I'll be mostly around through the holidays and if you're working, please feel free to call me any time. I tried calling the number listed below, but got no answer.

Thank you,

Pete Baumstark -  
KEMA, Inc.  
cell: (408) 826-1435

---

**From:** Mashnik, Daria  
**Sent:** Thu 12/24/2009 10:35 AM  
**To:** Baumstark, Pete  
**Subject:** Please get back to this individual. I didn't have a chance yet.

Pete -

Can you follow up with this person from Dyocore? I haven't had a chance yet. He e-mailed me twice. Thanks!

**Best regards,**  
**Daria S. Mashnik**

Energy Engineer  
KEMA Services, Inc

**DyoCore Response to Complaint Against DyoCore, Inc. by the California Energy Commission, Executive Director, Robert P. Oglesby**

Docket no. 11-CAI-03

PROOF OF SERVICE (original sent via Email to all recipients: 8/8/11)

**Respondent**

David Raine, CEO  
DyoCore Inc.  
3125 Tiger Run Court, #104  
Carlsbad, CA 92010

**Response sent to:**

**Applicant**

Robert P. Oglesby  
Executive Director  
California Energy Commission  
1516 Ninth Street  
Sacramento, CA 95814  
[roglesby@energy.state.ca.us](mailto:roglesby@energy.state.ca.us)

Payam Narvand  
Program Manager  
California Energy Commission  
1516 Ninth Street  
Sacramento, CA 95814  
[PNarvand@energy.state.ca.us](mailto:PNarvand@energy.state.ca.us)

**Counsel for Applicant**

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Senior Staff Counsel  
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[gherrera@energy.state.ca.us](mailto:gherrera@energy.state.ca.us)

Jonathan Knapp  
Staff Counsel  
California Energy Commission  
1516 Ninth Street  
Sacramento, CA 95814  
[jknapp@energy.state.ca.us](mailto:jknapp@energy.state.ca.us)

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Chairman  
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Eileen Allen  
Advisor to Commissioner  
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**Energy Commission – Public Adviser**

Jennifer Jennings  
Public Adviser  
[publicadiser@energy.state.ca.us](mailto:publicadiser@energy.state.ca.us)

**Energy Commission Chief Counsel**

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Chief Counsel  
California Energy Commission  
1516 Ninth Street  
Sacramento, CA 95814  
[mlevy@energy.state.ca.us](mailto:mlevy@energy.state.ca.us)

Jennifer Martin-Gallardo  
Staff Counsel  
[jmarting@energy.state.ca.us](mailto:jmarting@energy.state.ca.us)

**DECLARATION OF SERVICE**

I, Ryan Foster declare that on, 8/22/11, I served and filed copies of the attached Dycore Response dated 8/8/11. The original document, filed with the Docket Unit or the Chief Counsel, as required by the applicable regulation, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: [[http://www.energy.ca.gov/renewables/emerging\\_renewables/11-cai-03/index.html](http://www.energy.ca.gov/renewables/emerging_renewables/11-cai-03/index.html)]. The document has been sent to the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit or Chief Counsel, as appropriate, in the following manner:

**(Check all that Apply)**

**For service to all other parties:**

- Served electronically to all email addresses on the Proof of Service list;
- Served by delivering on this date, either personally, or for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses NOT marked "email preferred."

**AND**

**For filing with the Docket Unit at the Energy Commission:**

- by sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (preferred method);

**OR**

\_\_\_\_\_ by depositing in the mail an original and 12 paper copies, as follows:

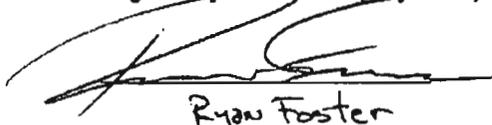
CALIFORNIA ENERGY COMMISSION – DOCKET UNIT  
Attn: Docket No. 11-CAI-03  
1516 Ninth Street, MS-4  
Sacramento, CA 95814-5512  
[docket@energy.state.ca.us](mailto:docket@energy.state.ca.us)

**OR, if filing a Petition for Reconsideration of Decision or Order pursuant to Title 20, § 1720:**

\_\_\_\_\_ Served by delivering on this date one electronic copy by email, and an original paper copy to the Chief Counsel at the following address, either personally, or by depositing in the mail.

California Energy Commission  
Michael J. Levy, Chief Counsel  
1516 Ninth Street MS-14  
Sacramento, CA 95814  
[mlevy@energy.state.ca.us](mailto:mlevy@energy.state.ca.us)

I declare under penalty of perjury that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

  
Ryan Foster

<b>DOCKET</b>	
<b>11-CAI-03</b>	
DATE	SEP 13 2011
RECD.	SEP 13 2011

Raoul A. Renaud  
Hearing Adviser II  
California Energy Commission  
1516 9th Street  
Sacramento, CA 95814

RE: DyoCore inc. Response to Amendment of Complaint against DyoCore, Inc.

Docket # 11-CAI-03

Dear Mr. Renaud,

We request to include the following towards response in respect to the filed Amended Complaint against DyoCore Inc.

**Points requested to be considered by the Commission**

1. Requested Action (§ 1231 (b)(S))

I request this action be removed in its entirety. There is no justifiable cause to remove DyoCore as a qualified ERP participant.

DyoCore submitted data that was taken into consideration by KEMA who then mistakenly published annual performance data opposed to actual wind data. The simple solution would be to post the correct data that is applicable for the intended rating performance listing as it should have been done in the first place. Since all other qualifications, other than a mistake made by KEMA, meet the ERP guidelines there is no cause for removal.

As outlined in the KEMA CEC agreement Work Authorization No. 13, Amendment No. 1 Renewable Energy Program Technical Assistance Contract No. 400-07-030, KEMA was the sole authority on determining the merits of a company/product for inclusion.

DyoCore acted in good faith in working with KEMA for such qualification and inclusion in the ERP. Following inclusion DyoCore and its independent representatives spent considerable financial resources and efforts towards building out SolAir product distribution capabilities to meet the demand of the California applicants as applied to the program. DyoCore, its distributors and California qualified residents and ERP participants depended on the intentions of the CEC and KEMA.

Work Authorization No. 13      Amendment No. 1

<p>2 Review of New Technology Requests</p>	<p>Upon request and/or approval of the Energy Commission Project Manager, the Contractors will review industry representatives' requests to add products to the Eligible Equipment list that are not standard non-concentrating photovoltaic modules, meters/metering providers, inverters, fuel cells or wind turbines. The Contractors will initially determine if the information presented by the industry representative addresses all items necessary to meet the current requirements per the ERP Guidebook Appendix 3, Section E, or SB1 Guidelines on Non-PIV requirements. The Contractors will then advise the Energy Commission Project Manager on whether or not a detailed evaluation should be done. Upon approval by the Energy Commission Project Manager, the Contractors will evaluate the technical merits of the proposal, working with the requesting party to obtain any missing information, and submit an electronic summary of the research results and recommendations to the Energy Commission Project Manager. The Energy Commission will in turn use the recommendation when deciding whether or not the new product is eligible to be added to the Eligible Equipment list.</p>	<p>Written requests, updates, and evaluation summaries</p>	<p>As needed (e.g. when a request is received for listing a new product,) and as approved by the Energy Commission Project Manager</p>
--	--	--	--

9 - value  
8/13/2011 2:48:07 PM

"Contractor will evaluate the technical merits of the proposal, working with the requesting party..."

2. Time is of the Essence

Substantial financial damage is being caused by continued delays to both the reinstatement of the CEC ERP and in the complaint against DyoCore. It is our request that a timely and immediate resolution be sought in moving forward. Further delay is causing significant financial damage to California businesses, some of which have already begun closing their doors and have already reduced staff, and already financially crushed families who have placed deposits down towards renewable energy systems that are being considerably held up by this continued delayed process of reinstating the ERP and release of held funds.

If there is cause against DyoCore it should be identified and DyoCore should be given its opportunity to defend itself formally, if no cause exists other than simply the wrong power curve being posted by KEMA then post the correct power curve so we can all move forward.

3. The Facts

DyoCore at the time of application and inclusion in the ERP could have arbitrarily chosen any point within the correct power curve. The fact is that there was NO standard in place that required a product to qualify at any specific wind speed.

DyoCore's SolAir will produce 1.6 kW in real wind speeds at approximately 38mph. This at the time of listing and still today is an applicable qualification. Other products on the ERP are listing at similar wind speeds that are installed in similar conditions.

As published by Paul Gipe, Testing the Power Curves of Small Wind Turbines – Published in 2000, Summer 2000 (Vol. 13, No. 3) issue. WindStats.

"There are no rules, standards, or norms about what wind speed manufacturers may pick to "rate" their small wind turbines. Often in the United States it's 28 mph (12.5 m/s). But manufacturers may pick any speed they choose. If it's less than 28 mph, the turbine will have a lower "power rating" than a wind turbine with a similar sized rotor but with a higher rated speed. In the 1970s it was easy for unscrupulous manufacturers to manipulate this system to make it appear that their turbines were a better buy than competing products. By pushing "rated power" higher they were able to show lower relative costs in \$/kW of rated power (turbine cost/rated power) or they were able to jack up their price--and profits--proportionally."

"Measuring power curves is not an exact science. There's a lot of room for error and misinterpretation. Most notable is the sheer difficulty of accurately measuring wind speed. It's not as simple as most think."

Paul Gipe concluded by stating: "It's unlikely that a consumer can expect to see the performance promised", then listed companies that are ERP participants.

4. If any notice is to be sent to participants it should be a notice of when to expect their rebates as promised by the program that they and all participating parties invested in.

If the objective of the committee is to delay a hearing to allow further investigation of a resolution to release held funds it is understood that this is a difficult decision, however, the facts have to have a part on that timely decision. The facts do not change in time and they are clearly agreeable. The facts are that approximately 180 turbines are listed on the ERP of which over three quarters if not greater have published power curves that will never be experienced by the consumer and NO set standard was in place for their consideration during publication.

DyoCore, its distributors and its clients are inappropriately being made a target by an already broken system. Had any other company prior to DyoCore had demonstrated the demand that DyoCore has for its products the system would have come to a halt as well. DyoCore should not be victimized because of its success and the success of the ERP as it was intended to apply. If the system is broken then fix it but not at the financial burden and good hard working California companies who all acted in good intentions to the intended purpose of the program. If companies and consumers

DyoCore Response to Amendment of Complaint against DyoCore, Inc.  
Sept 13, 2011

participated in good faith and within the terms of the program then the program should honor those participants as promised and stated.

DyoCore has a qualified physicist reviewing its raw data. DyoCore should have a verified power curve from its 2009-10 Hampshire IL test site within the next week and will immediately forward this qualified data to KEMA for its review and modification of the SolAir published power curve. Since no current requirement is in place for a required wind speed, DyoCore will be seeking a qualification at 1.6 kW at the respective correlating wind speed if applicable.

DyoCore has also been accepted for testing by SWCC and expects to begin testing within the month to meet the anticipated new playbook standards and a new published rating that applies to the applicable standard in place at that time as it would apply to all other qualified ERP products/companies.

Sincerely,



David Raine,  
CEO DyoCore, Inc.  
3125 Tiger Run Court, #104  
Carlsbad, CA 92010

www.dyocore.com  
dave@dyocore.com  
Phone and Fax: 866-404-2428  
Direct: (760) 580-4271

DECLARATION OF SERVICE

I, David Raine, declare that on, 9/13, 2011, I served and filed copies of the attached Amendment Response, dated 9/13, 2011. The original document, filed with the Docket Unit or the Chief Counsel, as required by the applicable regulation, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at:

[[http://www.energy.ca.gov/renewables/emerging\\_renewables/11-cai-03/](http://www.energy.ca.gov/renewables/emerging_renewables/11-cai-03/)].

The document has been sent to the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit or Chief Counsel, as appropriate, in the following manner:

**(Check all that Apply)**

**For service to all other parties:**

- Served electronically to all e-mail addresses on the Proof of Service list;
- Served by delivering on this date, either personally, or for mailing with the U.S. Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses NOT marked "e-mail service preferred."

**AND**

**For filing with the Docket Unit at the Energy Commission:**

- by sending an original paper copy and one electronic copy, mailed with the U.S. Postal Service with first class postage thereon fully prepaid and e-mailed respectively, to the address below (preferred method); **OR**
- by depositing an original and 12 paper copies in the mail with the U.S. Postal Service with first class postage thereon fully prepaid, as follows:

**CALIFORNIA ENERGY COMMISSION – DOCKET UNIT**

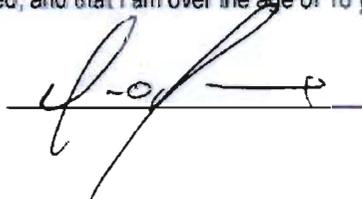
Attn: Docket No. 11-CAI-03  
1516 Ninth Street, MS-4  
Sacramento, CA 95814-5512  
[docket@energy.state.ca.us](mailto:docket@energy.state.ca.us)

**OR, if filing a Petition for Reconsideration of Decision or Order pursuant to Title 20, § 1720:**

- Served by delivering on this date one electronic copy by e-mail, and an original paper copy to the Chief Counsel at the following address, either personally, or for mailing with the U.S. Postal Service with first class postage thereon fully prepaid:

California Energy Commission  
Michael J. Levy, Chief Counsel  
1516 Ninth Street MS-14  
Sacramento, CA 95814  
[mlevy@energy.state.ca.us](mailto:mlevy@energy.state.ca.us)

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.





BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT  
 COMMISSION OF THE STATE OF CALIFORNIA  
 1516 NINTH STREET, SACRAMENTO, CA 95814  
 1-800-822-6228 – WWW.ENERGY.CA.GOV

**IN THE MATTER OF THE COMPLAINT AGAINST  
 DYO CORE, INC. BROUGHT BY  
 ENERGY COMMISSION STAFF**

**Docket No. 11-CAI-03**  
 (Revised 9/6/2011)

**COMPLAINANT**

California Energy Commission  
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 Executive Director  
 1516 Ninth Street  
 Sacramento, CA 95814  
*e-mail service preferred*  
[roglesby@energy.state.ca.us](mailto:roglesby@energy.state.ca.us)

California Energy Commission  
 Payam Narvand  
 Program Manager  
 1516 Ninth Street  
 Sacramento, CA 95814  
*e-mail service preferred*  
[pnarvand@energy.state.ca.us](mailto:pnarvand@energy.state.ca.us)

**COUNSEL FOR COMPLAINANT**

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 Senior Staff Counsel  
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California Energy Commission  
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 1516 Ninth Street  
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**RESPONDENT**

DyoCore, Inc.  
 Ralph Bettencourt, CEO  
 David Raine, CTO  
 3125 Tiger run Court, #104  
 Carlsbad, CA 92010  
[ralph@dyocore.com](mailto:ralph@dyocore.com)  
[dave@dyocore.com](mailto:dave@dyocore.com)

**INTERVENORS**

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 Stephen J. Meyer  
 Downey Brand, LLP  
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**INTERESTED  
 ENTITIES/AGENCIES**

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 1326 Marsten Road  
 Burlingame, CA 94010  
[www.bayenergy.com](http://www.bayenergy.com)

California Solar Systems  
 1411 Rusch Court  
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My Wind Power  
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 Phelan, CA 92371  
[www.info@mywindpower.biz](http://www.info@mywindpower.biz)

Solar Point Resources  
 P.O. Box 4761  
 San Jose, CA 95150

Energy Pros  
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 Rocklin, CA 95765  
[brian@energyprosilc.com](mailto:brian@energyprosilc.com)

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\*CA Green Team  
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 Ridgecrest, CA 93555  
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[rayw@cagreenteam.com](mailto:rayw@cagreenteam.com)

Prevailing Wind Power  
 324 N Gertruda  
 Redondo Beach, CA 90277  
[bob@prevailingwindpower.com](mailto:bob@prevailingwindpower.com)

\*Indicates change

**INTERESTED ENTITIES/AGENCIES  
(cont.)**

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Canyon Lakes, CA 92587  
[greensolarsolutions@yahoo.com](mailto:greensolarsolutions@yahoo.com)

Desert Power, Inc.  
77380 Michigan Dr.  
Palm Desert, CA 92211

San Diego Small Wind  
3125 Tiger Run Ct. #103  
San Marcos, CA 92009

Apple Acres, Inc. DBA Gridnot  
P.O. Box 645  
Lucerne Valley, CA 92356  
[info@gridnot.com](mailto:info@gridnot.com)

**ENERGY COMMISSION –  
DECISIONMAKERS**

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Commissioner and Presiding  
Member  
[cpeterman@energy.state.ca.us](mailto:cpeterman@energy.state.ca.us)

James D. Boyd  
Vice Chair and Associate  
Member  
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Raoul Renaud  
Hearing Officer  
[rrenaud@energy.state.ca.us](mailto:rrenaud@energy.state.ca.us)

**ENERGY COMMISSION -  
CHIEF COUNSEL**

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[mlevy@energy.state.ca.us](mailto:mlevy@energy.state.ca.us)

Jennifer Martin-Gallardo  
Staff Counsel  
*e-mail service preferred*  
[jmarting@energy.state.ca.us](mailto:jmarting@energy.state.ca.us)

**ENERGY COMMISSION -  
PUBLIC ADVISER**

Jennifer Jennings  
Public Adviser  
*e-mail service preferred*  
[publicadviser@energy.state.ca.us](mailto:publicadviser@energy.state.ca.us)

From: <rick@dyocore.com>  
To: KSI-CA Equipment <Equipmentus.kema.com@kema.com>  
Date: 12/8/2009 10:20 AM

Ms. Daria Mashnik; My name is Rick Berry I work for Dyocore Inc. in San Diego, Ca. we wish to have a wind turbine product of ours certified in the state of Ca., please advise. My home phone is 858-598-5254  
best Rick

Exhibit 6

**From:** <rick@dyocore.com>  
**To:** KSI-CA Equipment <Equipmentus.kema.com@kema.com>  
**Date:** 12/16/2009 8:49 AM  
**Subject:** 2nd REQUEST FOR ASSISTANCE

To: Daria Mashnik, this is my second email request for assistance to you. We are a California based company attempting to have our product certified with the state, I have spoken w/Mr. Lee at the state and he tells me that you should help me and if not I should get back to him and he w/get with you. I prefer doing my own work, Kindly contact me; Rick Berry 858-598-5254

From: rick@dyocore.com [mailto:rick@dyocore.com]  
 Sent: Monday, February 15, 2010 11:50 AM  
 To: Baumstark, Pete  
 Cc: dave@dyocore.com  
 Subject: Fwd: iec data

Pete Here are the data figures from our tests. The company is Dyocore, the product is a SolAir 800 turbine, David Raine is the CEO of Dyocore and he can answer any questions you may have at 760-807-2135. When I spoke with you regarding the review you told me you could return the results the same day. I could really appreciate your notifying the state immediately if the data is sufficient so we can get listed by March 1, 2010. Our trade show sales in California are extremely successful and we'd like to install into around 45 homes in March. Pete, thanks for any and all assistance. I remain Rick Berry 858-598-5254

-----Original Message-----  
 From: David Raine [mailto:dave@dyocore.com]  
 Sent: Monday, February 15, 2010 12:20 AM  
 To: rick@dyocore.com  
 Subject: iec data

Solar 800 - Summary Production Results

Month	Notes	Wind KWh production	Solar KWH production	Hours of production at w/s above												Wind / Gust Average - limits				Hours					
				0	6	8	10	12	>12	Max Wind	Average Wind	Max Gusts	Average Gusts	T <sub>1</sub>	T <sub>0</sub>	T <sub>E</sub>	T <sub>H</sub>	%							
Sep-08	1,2,3	82,807/88208	6,431,632	171	103	29	35	12	0	18.4	6.3	N	N	350	72	20	24	91%							
Oct-08	4	195,334,504	14,791,154	342	262	50	66	21	3	20.7	5.8	N	N	744	0	10	8	99%							
Nov-08	5	128,782,932	14,158,63	341	273	46	36	16	8	25.3	5.5	N	N	720	0	0	16	98%							
Dec-08	6	192,588,915	12,697,476	274	326	56	48	18	22	36.8	5.3	N	N	744	0	0	0	100%							
Jan-09	7,8	94,004,039	13,345,624	344	317	42	32	7	2	18.4	5.8	N	N	744	110	5	48	92%							
Feb-09	9	218,592,992	13,552,332	259	251	52	60	28	22	38	7.3	N	N	672	0	0	0	100%							
Mar-09	10	251,255,545	14,882,604	270	276	54	90	43	11	24.2	7.4	N	N	744	6	0	48	93%							
Apr-09	11	340,617,174	14,950,184	185	273	73	112	45	32	29.9	7.2	N	N	720	0	0	24	97%							
May-09	12	226,781,571	14,604,224	246	291	67	113	27	0	19.6	7	N	N	744	0	2	24	97%							
Jun-09	13	296,524,807	15,705,282	184	300	67	99	61	9	23	7.2	N	N	720	0	1	0	100%							
Jul-09	14	230,572,902	17,390,69	287	234	79	120	24	0	18.4	7.1	N	N	744	0	0	24	97%							
Aug-09	15	218,776,419	19,266,376	300	245	63	106	30	0	17.3	5.8	N	N	744	0	0	0	100%							
Sep-09	16,17,18	182,761,747	17,642,534	319	240	46	92	23	0	21.9	6.3	N	N	720	56	48	86	86%							
Oct-09	19	212,153,999	18,106,79	283	289	59	71	26	16	26.5	6	27	21	744	0	0	0	100%							
Nov-09	20	124,397,827	16,808,882	343	273	43	42	13	6	26.5	5.8	26	23	720	1	0	0	100%							
Dec-09	21,22	200,982,867	15,042,874	289	312	39	54	28	22	42.6	6.7	39	26	744	4	3	0	100%							
* Jan-10	23,24,25	233,741,124	13,852,288	329	274	38	47	15	41	41.4	7.8	43	26	744	4	36	96	86%							
Annual - 09		2597.4	191.3	3309.0	3301.0	684.0	991.0	355.0	120.0	25.5	6.6	29.0	22.5	730.0	14.4	4.9	21.2	97%							

Just need to now do the data notes and summary content. I should have it done by Wednesday but this might be enough to file with the State right away.

Best wishes, David Raine  
 dave@dyocore.com  
 mobile: 760-807-2135  
 Desk: 858-404-2428



663 So. Rancho Santa Fe Rd. #610  
 San Marcos, CA 92078

From: "Baumstark, Pete" <JMCEAEX-0=KEMA+20CONSULTING\_OU=KCG\_CN=KEMA+20CONSULTING+20GROUP\_CN=OAKLAND\_CN=ACCOUNTS\_CN=PBALUMSTARK@kema.com>  
To: <rick@dyocore.com>  
Date: 2/15/2010 12:04 PM  
Subject: RE: tec data  
CC: <dave@dyocore.com>, "Mashnik, Daria" <Daria.Mashnik@us.kema.com>  
Attachments: image001.jpg

Thanks. Please also send a performance curve and also tell me what the units for wind speed are (m/s or mph).

Pete Baumstark, PE  
Energy Engineer

+1 (510) 891-0446 (office)  
+1 (510) 891-0440 (fax)  
pete.baumstark@kema.com

KEMA  
155 Grand Avenue, Suite 500  
Oakland, CA 94612

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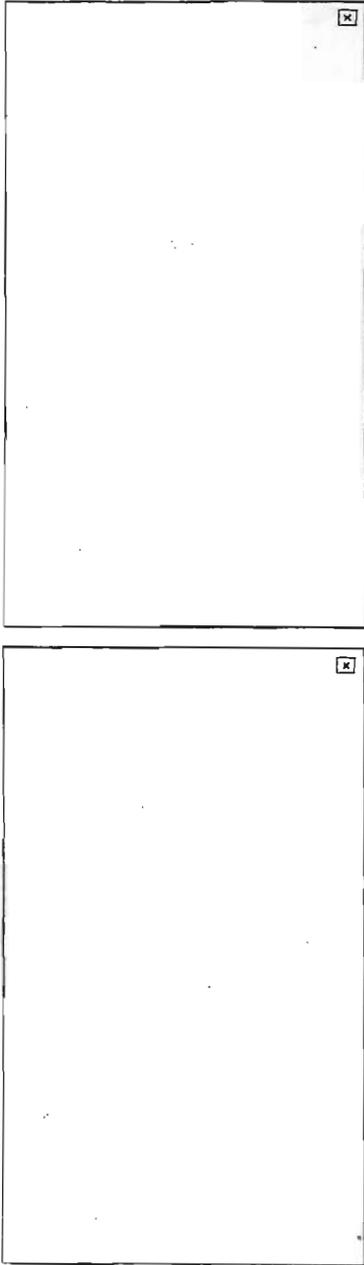
From: David Raine [mailto:dave@dyocore.com]  
 Sent: Monday, February 15, 2010 9:38 PM  
 To: Baumstark, Pete  
 Cc: rick@dyocore.com  
 Subject: RE: lec data

Thank you for your assistance. The units for wind our MPH. I can convert to m/s if preferred.

Here is the performance charts. We are a bit conservative but we wanted to apply to very realistic residential conditions:

Power (W)	0	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750
Rotation (RPM)	0	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750
Solar II 800W	8	16	64	80	144	224	296	360	448	504	560	624	680	744	816	
Solar Fin	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Voltage (V)	0	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750
Rotation (RPM)	0	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750
Solar II 800W	6.4	8	9.6	12.8	16.8	20	24	27.2	30.4	32.8	37.6	41.6	44.8	48	52	
Solar Fin	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18

\*Solar fin represents Solar Output during normal indirect sunlight conditions.



Let me know if you have questions. Thank you!

Annual Energy Production

Average Wind Sp	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
Solar I 800w	0	200	400	900	1500	2100	2600	3200	3800	4000	4200	4250	4300	4350	4400	4450

From: Baumstark, Pete [mailto:Pete.Baumstark@us.kema.com]

Sent: Tuesday, February 16, 2010 8:46 AM

To: David Raine

Cc: rick@dyocore.com

Subject: RE: lec data

So your average wind speed during the tested period is only 6.6 mph?

Pete Baumstark, PE

Energy Engineer

+1 (610) 891-0446 (office)

+1 (610) 891-0440 (fax)

[Pete.Baumstark@kema.com](mailto:Pete.Baumstark@kema.com)

**KEMA**

155 Grand Avenue, Suite 500

Oakland, CA 94612

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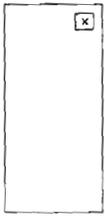
 Please consider the environment before printing this email.

Sent: Tuesday, February 16, 2010 3:04 PM  
 To: Baumstark, Pete  
 Cc: rick@dyocore.com  
 Subject: RE: tec data

Thank you Pete for your consideration and assistance. Here is the data summary for our single unit installed in Hampshire IL. A little less sun but a lot more wind!  
 Solar 800 - Summary Production Results  
 Hampshire, IL 60140

Month	Notes	Wind / Gust Average - limits			
		Max Wind	Average Wind		
Jan-09	1,2	82,807,88208	4,894652	N	N
Feb-09	1	195,3345042	12,722152	N	N
Mar-09	3	128,782932	12,786694	N	N
Apr-09	4	192,5889154	13,336386	N	N
May-09	5	94,00400394	12,508624	56.1	16.7
Jun-09	6	218,5929992	12,999974	60.7	14.8
Jul-09	7	251,2555455	13,623136	48	13.7
Aug-09	8	340,6171748	13,84892	41.1	13.1
Sep-09	9	226,7815714	13,284678	36.5	11.9
Oct-09	10	296,5248076	13,225654	50.3	13.3
Nov-09	11	230,5729028	16,680728	48	15.4
Dec-09	12	218,7764195	15,512214	44.6	15.7
Jan-10	13	182,7617497	15,84875	40	18.1
Feb-10	14	212,153999	10,798912	44.6	15.6
Annual - 09		2659,4	171,3	47,0	14,8

Best wishes, David Rahne  
 dave@dyocore.com  
 mobile: 760-807-2135  
 Desk: 866-404-2428



From: David Raine [mailto:dave@dyocore.com]  
 Sent: Tuesday, February 16, 2010 3:27 PM  
 To: Baumstark, Pete  
 Subject: RE: iec data

Please let me know if this is acceptable:

Manufacturer Name	Model Number	Description	Power Output (Watts)	Notes
DyoCore	S80015dc	SolAir 800W hybrid wind/solar generator	800	Produces rated power at 12 mph.

The 800 W output is based on a 75% load – average load when charging batteries or running a motor or other object in real time plugged directly into an inverter. The output without load at 12mph is approximately 1.5 kW. Most companies rate their products at substantially higher wind speeds. We would like to present a much more realistic rating for the average user of our units. If you have experience in this area it would be helpful in a direction towards correctly labeling our product.

Here are the primary two output tests:

SolAir - open v.				Watts				Wind Speed	
RPM	Voltage	RPM	V	A	Open	75% Load	mph	m/s	
173	9.9						2.5	1.1	
213	11.8						3	1.32	
300	17.2						3.8	1.672	
400	23.9	450	20.5	0.5	10.25	10.25	5	2.2	
519	30.5	500	28.5	5.1	145.35	135.15	6	2.64	
612	35.9	600	38.3	16.1	616.63	414.96	8	3.52	
700	40.6	700	41.2	22.6	931.12	644.1	8.7	3.828	
800	47.6	800	46.4	25.5	1183.2	701.25	9.8	4.312	
900	51.6	900	50.1	27.3	1367.73	756.21	10.9	4.796	
1000	57	1000	53.1	29.5	1566.45	811.25	12	5.28	

Best wishes, David Raine  
 dave@dyocore.com  
 mobile: 760-807-2135  
 Desk: 866-404-2428



663 So. Rancho Santa Fe Rd. #610  
 San Marcos, CA 92078

**From:** <rick@dyocore.com>  
**To:** "Baumstark, Pete" <Pete.Baumstark@us.kema.com>  
**CC:** <dave@dyocore.com>  
**Date:** 2/17/2010 9:53 AM  
**Subject:** Dyocore Inverter  
**Attachments:** EMC\_GCI-2k[2].pdf; GCI\_UL\_1741[2].pdf; LVD\_GCI-2k[2].pdf; V09111237[1] test .pdf

Hello Pete, thank you for your rapid response on the turbine cert. I am enclosing information on the Ginlong GCI-2k Inverter we want to use with the turbine. It has undergone extensive tests as the attached Declarations of Conformity (s) will verify. Kindly respond with any additional information you may need. This inverter is used widely in Asia and Europe and is just now breaking into the US market.  
Best Rick Berry

**From:** "Baumstark, Pete" <IMCEAEX-  
\_O=KEMA+20CONSULTING\_OU=KCG\_CN=KEMA+20CONSULTING+20GROUP\_CN=OAKLAND\_CN=  
ACCOUNTS\_CN=PBAUMSTARK@kema.com>  
**To:** <rick@dyocore.com>  
**CC:** <dave@dyocore.com>, "Mashnik, Daria" <Daria.Mashnik@us.kema.com>, BillBr...  
**Date:** 2/17/2010 10:31 AM  
**Subject:** RE: Dyocore Inverter  
**Attachments:** Dyocore Inverter

Rick,

Here's the inverter eligibility procedure:

[http://www.gosolarcalifornia.ca.gov/equipment/documents/INVERTER\\_ELIGIBILITY\\_PROCEDURE.PDF](http://www.gosolarcalifornia.ca.gov/equipment/documents/INVERTER_ELIGIBILITY_PROCEDURE.PDF)

It looks like everything is in order to add this product except the performance testing as defined in this document. I don't know if Ginlong has had Intertek perform this testing or not. I didn't see them on our approved inverter listing and I'm not the one who performs the inverter reviews (Bill Brooks performs that review, copied on this e-mail).

Thank you,

Pete Baumstark, PE

Energy Engineer

+1 (510) 891-0446 (office)  
+1 (510) 891-0440 (fax)  
pete.baumstark@kema.com

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Oakland, CA 94612

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From: "Baumstark, Pete" <IMCEAEX-O=KEMA+20CONSULTING\_OU=KCG\_CN=KEMA+20CONSULTING+20GROUP\_CN=OAKLAND\_CN=ACCOUNTS\_CN=PBAUMSTARK@kema.Mashnk, Darta" <Darta.Mashnk@us.kema.com>  
To: "Mashnk, Darta" <Darta.Mashnk@us.kema.com>  
Date: 2/17/2010 10:38 AM  
Subject: FW: tec data  
Attachments: image002.png; image009.png; image012.png; image003.jpg; image004.gif; image005.gif; image006.gif; image008.png; image010.png; image013.png; image014.jpg

Darta,

We can add this product to the wind turbine listing.

They've given me 12 months of output data, but only had their anemometer installed for 10 of those months. But in looking at the power output for the two months missing the wind speed data, it looks like the wind speed was good enough to not significantly reduce the average wind speed for the year.

Pete Baumstark, PE  
Energy Engineer

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To: "Mashnik, Daria" <Daria.Mashnik@us.kema.com>  
Date: 2/17/2010 10:38 AM  
Subject: FW: iec data  
Attachments: image002.png; image004.png; image006.png; image008.gif; image009.gif; image010.gif; image001.jpg; image003.png; image005.png; image007.png

Here's the description they want to add to the ERP listing.

Pete Baumstark, PE  
Energy Engineer

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From: rick@dyocore.com [mailto:rick@dyocore.com]

Sent: Saturday, February 20, 2010 11:35 AM

To: Baumstark, Pete

Cc: dave@dyocore.com

Subject: Inverter

Hello Pete, I finally spoke w/Bill Brooks, he called me late Friday afternoon after two phone calls and two emails. Once he got on the phone he informed me that he was leaving the country for 12 days beginning Sunday. I tried to explain the importance of getting the inverter approved and on the state list by 3/1 but he cut me short and said "oh, everybody is in a rush". Waiting seven days for contact and another twelve days for him to get back isn't acceptable, do you have an alternative. Your operation at Kema is right on the money, timely and professional, got a twin to handle the inverter? Rick Berry  
rick@dyocore.com  
707.539.1500

**From:** "Baumstark, Pete" <IMCEAEX-  
\_O=KEMA+20CONSULTING\_OU=KCG\_CN=KEMA+20CONSULTING+20GROUP\_CN=OAKLAND\_CN=  
ACCOUNTS\_CN=PBAUMSTARK@kema.com>  
**To:** Patrick Saxton <psaxton@energy.state.ca.us>, "Tong, Nellie" <Nellie.Tong...  
**CC:** "Mashnik, Daria" <Daria.Mashnik@us.kema.com>  
**Date:** 2/21/2010 10:05 AM  
**Subject:** FW: Inverter

FYI. As far as I know, they haven't done the performance testing yet.  
I'll get with Rick on that.

Pete Baumstark, PE

Energy Engineer

+1 (510) 891-0446 (office)  
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pete.baumstark@kema.com

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P Please consider the environment before printing this email.

From: Mashnik, Daria [mailto:Daria.Mashnik@US.KEMA.com]  
Sent: Monday, March 01, 2010 11:43 AM  
To: dave@dyocore.com  
Subject: CEC listing

Dave -

I wanted to let you know that I have added your hybrid solar/wind generator product to our wind turbine update and will be submitting it to CEC shortly. I would guess that your product should appear on the website sometime tomorrow or Wednesday.

Have a good day,

Daria S. Mashnik  
Energy Engineer

KEMA Services, Inc.  
150 Grand Avenue, Suite 500  
Oakland, CA 94612  
Tel: 510-891-0446

**From:** David Raine <dave@dyocore.com>  
**To:** "Mashnik, Daria" <Daria.Mashnik@US.KEMA.com>  
**Date:** 3/1/2010 11:45 AM  
**Subject:** RE: CEC listing  
**Attachments:** image001.png

Thank you! Do you have any information as to how the listing will appear?

Best wishes, David Raine

dave@dyocore.com

mobile: 760-807-2135

Desk: 866-404-2428

<[http://www.agentsestaff.com/mymedia/uploads/3576/images/David\\_Raine.msg](http://www.agentsestaff.com/mymedia/uploads/3576/images/David_Raine.msg)> v-card link

<<http://www.dyocore.com/>>

**663 So. Rancho Santa Fe Rd. #610**

San Marcos, CA 92078

---

**From:** rick@dyocore.com [mailto:rick@dyocore.com]  
**Sent:** Friday, April 09, 2010 2:32 PM  
**To:** Mashnik, Daria  
**Cc:** dave@dyocore.com  
**Subject:**

Daria, per our conversation today, here is my contact email 858-598-5254 is the phone Dyocore the company SolAir 800 the product and 1000 watts the actual output of the unit per our office. Thanks for your help Rick

**From:** Mashnik, Daria [mailto:Daria.Mashnik@US.KEMA.com]  
**Sent:** Friday, April 09, 2010 2:33 PM  
**To:** rick@dyocore.com  
**Cc:** dave@dyocore.com  
**Subject:** RE:

Thanks, Rick.

I'll get to this once our contract has been renewed. I hope this will happen shortly.

I'll be in touch if I have any further questions.

Best regards,

Daria S. Mashnik

Energy Engineer  
KEMA Services, Inc.

**From:** David Raine [mailto:dave@dyocore.com]  
**Sent:** Friday, April 09, 2010 2:51 PM  
**To:** Mashnik, Daria; rick@dyocore.com  
**Subject:** power curve output data for SolAir - 1.6 kW

I'm sorry about the confusion. Here's the formal material for our rated output:

Model	SolAir
Orientation	Downwind
Rated Output	1.6 kW
Output Voltage (V)	130v @ 800 rpm
Applications	Stand Alone (combined wind/solar DC output), Grid Connection, Direct Heating, and Pumping
Controller Type	Griding
Overspeed Protection	Occultates mechanically in high winds for auto speed control
Blade Material	Aluminum
# of Blades	3
Rotor Diameter (m)	1.2
Swept Area (m <sup>2</sup> )	1.13
Windspeed (m/s)	
Rated	2
Cut-in	2
Cut-out	16.5
Survival	54 - known
Head Weight (kg)	20
Tower Type	Surface mount
Tower Height (m)	1.4m - 58"
Product Life (years)	15
Warranty (years)	10
Units sold	450
Years on the market	0.5
Price (USD)	MSRP: \$1700 SolAir 800 hybrid wind/solar turbine. Includes turbine, rectifier, and surface mounting hardware.
Additional Info	SolAir is a dynamic hybrid vertical mill that combines wind/solar integrated into a single balanced frame/in design. SolAir is designed so versatile it can be mounted on any flat horizontal, vertical or pitched surface and can be either bolted or ballasted down.

AT 18mph our output is 1.6 kW. This should be the posted data or applied output.

Sea-Level Air Density Normalized Power Curve  
 SolAir San Marcos CA

Wind Speed m/s	Wind Speed mph	Bin Wind speed m/s	Bin Power kW	Data Points	Tip Speed Ratio	Tip Speed C <sub>t</sub>
1.6	3.6	1.554	0	0	0.77	
2.1	4.6	2.0424	0.01	1340	0.58	
2.6	5.8	2.5792	0.12	1134	0.44	
3.1	6.9	3.0636	0.14	903	0.37	
3.6	8.1	3.5864	0.01	707	0.30	
4.1	9.2	4.0948	0.67	478	0.25	
4.6	10.4	4.6176	0.79	278	0.22	
5.1	11.5	5.105	0.84	161	0.20	
5.7	12.7	5.6368	0.99	68	0.18	
6.2	13.8	6.1272	1.17	47	0.16	
6.7	15	6.66	1.35	29	0.15	
7.2	16.3	7.146	1.62	15	0.14	
7.7	17.3	7.6812	1.96	13	0.13	
8.2	18.4	8.1696	1.61	12	0.12	
8.8	19.6	8.7024	1.6	8	0.12	

Best wishes, David Raine  
 dave@dyocore.com  
 mobile: 760-807-2135  
 Desk: 866-404-2428  
 v-card link



663 So. Rancho Santa Fe Rd. #610  
 San Marcos, CA 92078

**From:** <rick@dyocore.com>  
**To:** "Mashnik, Daria" <daria.mashnik@kema.com>  
**CC:** <dave@dyocore.com>  
**Date:** 4/22/2010 9:57 AM  
**Subject:** Editing the Dyocore Watt Listing

Hello Daria, our CEO Dave Raine sent you the info to upgrade our state listing on 4/14/2010 from 800 watts which was my mistake to the actual watts per the curve of 1600 watts. This is causing some problems with people purchasing the units. I just wanted to remind you of this as I know you have alot going on. I believe you update the first of the month. If you need anything else let me know, and have a great day. Rick Berry

**From:** "Mashnik, Daria" <IMCEAEX-  
\_O=KEMA+20CONSULTING\_OU=KCG\_CN=RECIPIENTS\_CN=DMASHNIK@kema.com>  
**To:** <rick@dyocore.com>  
**Date:** 4/22/2010 10:28 AM  
**Subject:** RE: Editing the Dyocore Watt Listing

Thanks, Ricky.

I will include this change with our next update.

Best regards,  
Daria S. Mashnik

Energy Engineer  
KEMA Services, Inc.

**From:** "Mashnik, Daria" <IMCEAEX-  
\_O=KEMA+20CONSULTING\_OU=KCG\_CN=RECIPIENTS\_CN=DMASHNIK@kema.com>  
**To:** David Raine <dave@dyocore.com>  
**Date:** 4/22/2010 11:29 AM  
**Subject:** RE: power curve output data for SolAir - 1.6 kW  
**Attachments:** image006.jpg; image007.jpg; image005.png

Thanks David -

We are currently experiencing delays in processing applications because our work contract with California Energy Commission has been expired and is currently being renewed.

I will go ahead and have a closer look once the contract gets renewed for our next update.

Best regards,  
Daria S. Mashnik

Energy Engineer  
KEMA Services, Inc.

**From:** <rick@dyocore.com>  
**To:** "Mashnik, Daria" <Daria.Mashnik@US.KEMA.com>  
**Date:** 5/5/2010 1:26 PM  
**Subject:** Re: Editing the Dyocore Watt Listing

Hi, I hope you remembered to update our product on the list. I know you're busy, thanks Rick

**From:** "Mashnik, Daria" <IMCEAEX-  
\_O=KEMA+20CONSULTING\_OU=KCG\_CN=RECIPIENTS\_CN=DMASHNIK@kema.com>  
**To:** <rick@dyocore.com>  
**Date:** 5/7/2010 1:07 PM  
**Subject:** RE: Editing the Dyocore Watt Listing

Hi Rick -

As you can see from the red note on the CEC website (<http://www.gosolarcalifornia.ca.gov/equipment/>) currently we are experiencing a delay in processing of all applications because our funding contract with CEC is currently undergoing renewal. The contract expired right before 1st of April and we cannot do any work without it being back in place. CEC promised to have it in place by next Tuesday but I cannot promise anything.

Once the contract is renewed, I'll submit an update to CEC and it will include your products.

Best regards,  
Daria S. Mashnik

Energy Engineer  
KEMA Services, Inc.

**From:** "Mashnik, Daria" <IMCEAEX-  
\_O=KEMA+20CONSULTING\_OU=KCG\_CN=RECIPIENTS\_CN=DMASHNIK@kema.com>  
**To:** David Raine <dave@dyocore.com>, <rick@dyocore.com>  
**Date:** 5/26/2010 5:12 AM  
**Subject:** RE: power curve output data for SolAir - 1.6 kW  
**CC:** "Steele, Elizabeth" <Elizabeth.Steele@kema.com>  
**Attachments:** image006.jpg; image007.jpg; image005.png

---

David -

As you know our contract with California Energy Commission was expired for about a month and a half and it finally got finalized this past week. We are working through the back log of applications and I am currently working on your inquiry to change the output of your SolAir 800 product.

A couple of things:

1. Firstly, I only see different types of power curves in our files under your name. Did you ever submit your IEC 61400 certification or one year of operating data for your turbine? Those are requirements as per CEC guidelines. If yes, can you please send that documentation my way one more time.

2. Secondly, do you have a power curve available of Watt Output vs. Wind Speed for this product?

As your product is advertised as SolAir 800W Hybrid Wind Solar Generator on your website, your watts output of 800 Watts makes sense.

I look forward to your clarifications. I need some sort of documentation linking your turbine model number (S80015dc) with wattage output. I also need a Watt vs. Wind Speed performance curve for your product. If I am missing something, please let me know -

**Best regards,**  
**Daria S. Mashnik**

Energy Engineer  
**KEMA Services, Inc.**

**From:** <rick@dyocore.com>  
**To:** "Mashnik, Daria" <Daria.Mashnik@US.KEMA.com>  
**CC:** <dave@dyocore.com>  
**Date:** 5/26/2010 7:18 AM  
**Subject:** Re: power curve output data for SolAir - 1.6 kW  
**Attachments:** image006.jpg; image007.jpg; image005.png; IEC\_Standard\_61400[1].doc

Daria, kindly find requested data attached, Rick

From: David Raine [mailto:dave@dyocore.com]  
 Sent: Wednesday, May 26, 2010 7:23 AM  
 To: Mashnik, Daria; rick@dyocore.com  
 Cc: Steele, Elizabeth  
 Subject: RE: power curve output data for SolAir - 1.6 kW

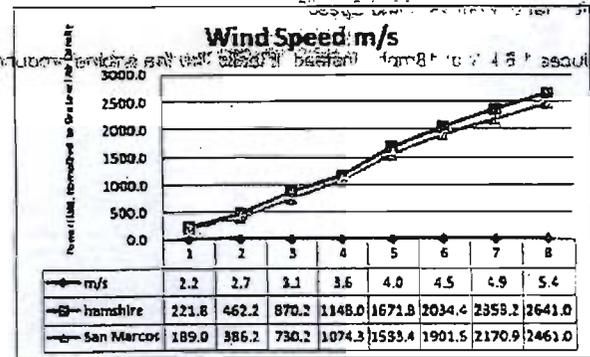
Hi Darah,

Thank you for your assistance. The name ?800? for our product came from an initial prototype test about 3 years ago. It had no reference to power performance, power curve or rating. At the time we didn't even know what a power curve was unfortunately. It just happened the day we tested we have 8mph winds and on our bench test produced about 800 watts at about 800 rpm ? though the numbers weren't perfect they were close enough to call the product ?800?.

However, since that point we have had a lot of formal testing done including a few years collecting operational data. Below are out formal power curve and annual production data:

Sea-Level Air Density Normalized Power Curve  
 SolAir San Marcos CA

m/s	Mph	Bin Wind Speed m/s	Bin Power kW	Number Data Points	C <sub>p</sub>
1.6	2.5	1.594	0	0	0.77
2.1	4.6	2.0424	0.01	1340	0.58
2.6	5.8	2.5752	0.12	1134	0.44
3.1	6.9	3.0636	0.14	903	0.37
3.6	8.1	3.5984	0.41	747	0.30
4.1	9.2	4.0848	0.67	478	0.23
4.6	10.4	4.6176	0.79	276	0.22
5.1	11.5	5.106	0.84	161	0.20
5.7	12.7	5.6388	0.99	65	0.18
6.2	13.8	6.1272	1.17	47	0.16
6.7	15	6.66	1.35	29	0.15
7.2	16.1	7.2484	1.42	15	0.14
7.7	17.3	7.6812	1.56	13	0.13
8.2	18.4	8.3896	1.61	12	0.12
8.8	19.6	8.7024	1.8	8	0.12



Hub Height Annual	San Marcos				Hampshire IL		
	Average Wind Speed (Rayleigh)		Standard		Average Wind Speed (Rayleigh)		Standard
	mph	m/s	kWh	kWh %	kWh	kWh %	kWh %
5	2.2	189.0	117.2	62%	221.8	157.5	71%
6	2.7	386.2	104.3	27%	462.2	152.5	33%
7	3.1	730.2	131.4	18%	870.2	208.9	24%
8	3.6	1074.3	182.6	17%	1148.0	206.6	18%
9	4.0	1533.4	214.7	14%	1671.8	284.2	17%
10	4.5	1901.5	209.2	11%	2034.4	305.2	15%
11	4.9	2170.9	238.8	11%	2353.2	329.4	14%
12	5.4	2461.0	246.1	10%	2641.0	369.7	14%

I apologize when we originally submitted our data to you Rick did not understand the listing terms. Thank you for your consideration in correcting our listing.

David Raine  
 DyoCore  
 www.dyocore.com  
 p&f. 866-404-2428  
 c. 760-580-4271  
 dave@dyocore.com

**From:** Mashnik, Daria [mailto:Daria.Mashnik@US.KEMA.com]  
**Sent:** Wednesday, May 26, 2010 9:25 AM  
**To:** David Raine; rick@dyocore.com  
**Cc:** Steele, Elizabeth  
**Subject:** RE: power curve output data for SolAir - 1.6 kW

Hi Dave -

Thanks for the explanation.

So yes, the requirements for a wind turbine to appear on the CEC Eligibility List is:

1. IEC 61400 Certification or continual 1 year operational data (monthly average power output Watts vs. monthly average wind speed).

I see from Rick's e-mail that your turbine was certified to IEC 61400. Can you send me a copy of your certificate? It has to be a document issued by the certifying body.

If you don't have that, do you have annual operating data by month in the format of Watt vs. Wind Speed?

2. From the power curve that you sent, I cannot see how your turbine produces 1.6 kW at 18mph. Instead, it looks like the turbine produce 1.6 kW at about 4 m/s which is a wind speed below the CEC requirement.

Please verify -

Best regards,  
Daria S. Mashnik

Energy Engineer  
KEMA Services, Inc.

**From:** David Raine <dave@dyocore.com>  
**To:** "Mashnik, Daria" <Daria.Mashnik@US.KEMA.com>, <rick@dyocore.com>  
**CC:** "Steele, Elizabeth" <Elizabeth.Steele@kema.com>  
**Date:** 5/26/2010 10:08 AM  
**Subject:** RE: power curve output data for SolAir - 1.6 kW  
**Attachments:** image001.jpg; image002.jpg; image003.jpg; image004.jpg; image005.jpg; image006.png; rawdata09\_hampshireIL.xlsx

Hi,

Our qualifying data was from our Hampshire IL testing facility. Were the average wind speeds exceeded the standard. I've attached the data.

David Raine

DyoCore  
www.dyocore.com

p&f. 866-404-2428

c. 760-580-4271

dave@dyocore.com

**From:** David Raine <dave@dyocore.com>  
**To:** "Mashnik, Daria" <Daria.Mashnik@US.KEMA.com>, <rick@dyocore.com>  
**CC:** "Steele, Elizabeth" <Elizabeth.Steele@kema.com>  
**Date:** 5/26/2010 10:19 AM  
**Subject:** RE: power curve output data for SolAir - 1.6 kW  
**Attachments:** image001.jpg; image002.jpg; image003.jpg; image004.jpg; image005.jpg; image006.png; Dyocore\_Hamshire\_IL\_compiled\_raw\_ginlong\_1\_hr.xlsx

The attached is the actual 1 hour production data from the GinLong inverter as attached to the system in Hampshire IL. The previous email was the BIN data. I think the Raw data is what you are looking for.

David Raine

DyoCore  
www.dyocore.com

p&f. 866-404-2428

c. 760-580-4271

dave@dyocore.com

**From:** David Raine <dave@dyocore.com>  
**To:** "Mashnik, Daria" <Daria.Mashnik@US.KEMA.com>  
**Date:** 5/26/2010 11:19 AM  
**Subject:** RE: power curve output data for SolAir - 1.6 kW  
**Attachments:** image001.png; image003.png; image011.png; image012.png; image005.jpg; image006.jpg; image007.jpg; image008.jpg; image009.jpg; image010.png

Extrapolated from the raw data – Actual Ginlong kWh production numbers:

Average wind: 15.12713  
 Max wind: 60.7  
 Average kWh 0.293259  
 Total Hours: 9744  
 hours per year: 8765.813  
 Total Annual Average: 2570.656 kWh  
 Total kWh - data: 2857.518 kWh

wind	kWh	Annual
5.4	0.007448	65.28593
8.9	0.100219	878.4975
10	0.148838	1304.69
11.2	0.166564	1460.069
12.3	0.193887	1699.58
13.5	0.244124	2139.941
14.6	0.297101	2604.331
15.8	0.33248	2914.46
16.9	0.3719	3260.005
18.1	0.424166	3718.161
19.2	0.411789	3609.662
20.4	0.453231	3972.94
21.5	0.476322	4175.352
22.7	0.524	4593.284
23.8	0.536366	4701.688
25	0.552031	4839.003
26.1	0.562683	4932.378
27.3	0.582527	5106.324
28.4	0.605514	5307.819
29.6	0.61424	5384.31
30.7	0.624132	5471.025
31.9	0.641911	5626.873
33	0.620148	5436.098
34.2	0.641176	5620.431
35.3	0.643837	5643.755
37.6	0.6972	6111.524

Outlook Release

**From:** <rick@dyocore.com>  
**To:** "Mashnik, Daria" <Daria.Mashnik@US.KEMA.com>  
**Date:** 5/26/2010 5:01 PM  
**Subject:** Re: power curve output data for SolAir - 1.6 kW  
**Attachments:** image010.jpg; image011.jpg; image012.jpg; image001.jpg; image002.jpg; image003.png

Daria, I just wanted to reach out and make sure you got all the info you needed today, I am sorry I wasn't available, but I have been fighting the permitting battles with cities all week and it's a slugfest. Hope all is well, If you need any other items, kindly let me know, Best Rick

**From:** <rick@dyocore.com>  
**To:** "Mashnik, Daria" <Daria.Mashnik@US.KEMA.com>  
**Date:** 5/27/2010 2:50 PM  
**Subject:** Re: power curve output data for SolAir - 1.6 kW  
**Attachments:** image010.jpg; image011.jpg; image012.jpg; image001.jpg; image002.jpg; image003.png

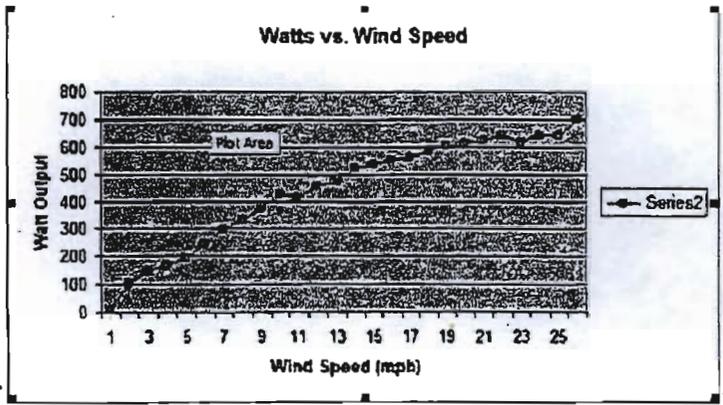
Hi Daria, we're real interested in knowing if you got everything you needed, Best Rick

**From:** Mashnik, Daria [mailto:Daria.Mashnik@US.KEMA.com]  
**Sent:** Friday, May 28, 2010 11:59 AM  
**To:** David Raine  
**Cc:** rick@dyocore.com  
**Subject:** RE: power curve output data for SolAir - 1.6 kW

Hello David!  
Thank you for getting that information to me. I just left you a quick message on your answering machine and had a quick talk with Rick over the phone.

My question (and what needs to be verified by you) is as follows:

I graphed the data that you sent me below to get the following Performance Curve for your product (same as the one you sent me below). You would like your product to be rated at 1,600 Watts, however based on the curve the output only goes up to 700 Watts which happens at ~ 26 mph. Please clarify.



**From:** <rick@dyocore.com>  
**To:** "Mashnik, Daria" <Daria.Mashnik@US.KEMA.com>  
**Date:** 5/28/2010 12:49 PM  
**Subject:** Re: power curve output data for SolAir - 1.6 kW  
**Attachments:** image011.png; image012.png; image005.jpg; image006.jpg; image007.jpg; image008.jpg; image009.jpg; image010.png; atte2ef4.jpg

Daria, I believe Dave is headed towards Catalina Islands for the long weekend (I hate him), I have left a message, but probably Tuesday due to the Holiday. Thank you for all your efforts, you have a nice weekend also, Best Rick

**From:** David Raine <dave@dyocore.com>  
**To:** "Mashnik, Daria" <Daria.Mashnik@US.KEMA.com>  
**CC:** <rick@dyocore.com>  
**Date:** 6/1/2010 8:21 AM  
**Subject:** RE: power curve output data for SolAir - 1.6 kW  
**Attachments:** image001.jpg; image002.jpg; image003.jpg; image004.jpg; image005.jpg; image006.jpg; image007.png

Hi Daria,

That data is directly related to the "bin" wind speeds. It has no direct relevance to turbines production in "Average" winds. It was only pulled from one location and wind speeds indicated at top speeds recorded at that hours interval. The average could have been a bit less. Unfortunately our wind equipment only recorded top winds and top gusts hourly.

Here's is actual data tested at specific wind speeds.

Watts	75% Load	Wind Speed mph
		2.5
		3
		3.8
10.25	10.25	5
145.35	135.15	6
616.63	414.96	8
931.12	644.1	8.7
1183.2	701.25	9.8
1367.73	756.21	10.9
1566.45	811.25	12
1659.409	962	13
1901.496	1104	14
2148.467	1290	15
2213.29	1378	16
2313.536	1471	17
2495.703	1589	18
2465.487	1623	19
2254.078	1692	20
2261.958	1781	21
2336.245	1877	22
2420.014	1945	23
2371.244	1962	24
2314.733	1958	25
2315.756	1961	26
2268.327	1937	27
2238.208	1933	28
2238.258	1935	29
2179.412	1934	30

2152.959	1911	31
2089.219	1879	32
2043.612	1878	33
1991.838	1854	34
1989.34	1862	35
1945.406	1859	36

David Raine  
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dave@dyocore.com

**From:** "Mashnik, Daria" <IMCEAEX-  
\_O=KEMA+20CONSULTING\_OU=KCG\_CN=RECIPIENTS\_CN=DMASHNIK@kema.com>  
**To:** David Raine <dave@dyocore.com>  
**Date:** 6/1/2010 10:08 AM  
**Subject:** RE: power curve output data for SolAir - 1.6 kW  
**Attachments:** image001.jpg; image002.jpg; image003.jpg; image004.jpg; image005.jpg; image  
006.jpg; image007.png

David -

Thanks for that note. Can you give me a quick call in the office when  
you have a chance?

510.891.0446.

Thanks -

Best regards,  
Daria S. Mashnik

Energy Engineer  
KEMA Services, Inc.

SolAir - IEC standard 61400-12-1  
 DyoCore  
 March 1<sup>st</sup>, 2010

**Abstract**

In 2006 DyoCore, a California manufacturing company, began development of its small wind/solar hybrid turbine – SolAir™. Over the past few years DyoCore has collected information that relates to power performance, power quality, noise, safety and function, and endurance tests that meet or exceed the standards established by the DOE’s National Renewable Energy Laboratory (NREL) established in 2008 and now part of the International Electrotechnical Commission (IEC) standards. These results are being provided to state and federal agencies for their consideration in allowing SolAir as an eligible alternative energy product for state incentives.

The following reports the results of SolAir actual on location installed testing to date, and puts the test results in perspective for the average consumer. Other topics addressed include independent testing results, and a discussion of SolAir’s support resources.

**Introduction**

The basis for DyoCore’s presented data was established at the National Renewable Energy Laboratory to help reduce the barriers of wind energy expansion and qualify SolAir under the IEC Standard 61400. Among these barriers is a lack of independent testing resources for small turbines and guidelines for their manufacturers. Testing results established by the NREL provide turbine manufacturers with a portion of the requirements for turbine certification and use. Turbines that meet these guidelines give consumers confidence in small turbine technology and will separate reliable turbines from those that do not perform as advertised.

Figure 1 shows the SolAir installed in San Marcos, CA. and Hampshire IL, Power performance, duration, noise, and safety and function tests were performed on both turbines presented herein. Power quality testing was performed only on single-phase applications. The available preliminary results of those tests to date are presented below and are subject to change.

	Install		cut out			Avg annual	
	Date	Data Hours	cut in wind sp	wind sp	hub height	wind sp	
			m/s	m/s	site AEP	m/s	
San Marcos, CA	16-Sep-08	12062	2.1	16.7	27'	1674.7	2.9
Hampshire, IL	13-Jan-09	9744	2	17.1	22'	2293.3	6.3



## DyoCore™ (USA)

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 #610 San Marcos,  
 Ca US 92078

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 E-mail: sales@dyocore.com  
 Contact: David Raine

Domestic and international distribution  
 Turbines also available direct from factory



Model	SolAir
Orientation	Downwind
Rated Output	1.6 kW
Output Voltage (V)	130v @ 800 rpm
Applications	Stand Alone (combined wind/solar DC output), Grid Connection, Direct Heating, and Pumping
Controller Type	Ginlong
Overspeed Protection	Osculates mechanically in high winds for auto speed control
Blade Material	Aluminum
# of Blades	3
Rotor Diameter (m)	1.2
Swept Area (m <sup>2</sup> )	1.13
Windspeed (m/s)	
Rated	8
Cut-in	2
Cut-out	16.5
Survival	54 - known
Head Weight (kg)	20
Tower Type	Surface mount
Tower Height (m)	1.4m - 58"
Product Life (years)	15
Warranty (years)	10
Units sold	450
Years on the market	0.5
Price (USD)	MSRP: \$1700 SolAir 800 hybrid wind/solar turbine. Includes turbine, rectifier, and surface mounting hardware.
Additional Info	SolAir is a dynamic hybrid vertical mill that combines wind/solar integrated into a single balanced frame/fin design. SolAir is designed so versatile it can be mounted on any flat horizontal, vertical or pitched surface and can be either bolted or ballasted down.

### The SolAir wind/solar Hybrid Generator

DyoCore's SolAir in San Marcos CA was installed on September 16th, 2008. It combines is a 120 VAC, single-phase, grid-connected, permanent-magnet generator wind turbine rated at 1.6 kW and a 36 VDC Solar panel rated at 30 W. SolAir is a horizontal-axis turbine mounted on a flat roof surface, and has a rotor height of 59" above the mounted surface and a rotor area of 54". The Second SolAir unit was installed on September 28<sup>th</sup>, 2008 in Hampshire IL. At the time of this publication IEC Standard 61400 data collection for duration, safety and function, power performance testing and power quality and acoustic noise testing was complete.



SolAir, Hampshire IL



SolAir San Marcos CA

### Duration Testing

The duration test is conducted according to section 9.4 of the IEC Standard 61400-2: Design Requirements for Small Wind Turbines. Duration testing provides information about the turbine's structural integrity, quality of environmental protection, and dynamic behavior. The test requires a minimum of 6 months of operation, 2,500 hours of power production in winds of any velocity, 250 hours of power production in winds of 1.2 Vave and greater, and 25 hours of power production in wind of 1.8 Vave and greater. Section 6.2 of IEC Standard 61400-2 defines Vave, which depends on the small wind turbine class as identified by the manufacturer and based on the wind speeds in which the turbine was designed to operate. The turbine must not experience any major failures during the test period and must achieve an operational time fraction of 90% or greater. The operational time fraction is defined by the following.

$$O = \frac{T_T - T_N - T_U - T_E}{T_T - T_N - T_E} \times 100\%$$

Where TT is the total test time, TN is the time attributed to turbine faults and manufacturer-mandated inspections and maintenance, TU is the time during which the turbine status is unknown due to lost data or data-acquisition failure and maintenance, and TE is the time that is excluded from analysis due to grid faults and laboratory-mandated inspections or stops.

Part of the reliable-operation requirement for the duration test includes no significant wear, corrosion, or damage to turbine components. The structural integrity and material degradation are investigated through inspections of the turbine before, during, and after the testing period. Blades, welds, and other turbine components were visually inspected and photographed before the test and any apparent abnormalities

documented. After the required test data is collected, the turbine is lowered and disassembled for inspection of all individual components. Routine inspections of both units during the tests have not revealed any abnormalities. Post-test inspections for the units presented have not occurred.

Duration testing on both units are still in progress. The turbines have experienced minimal and normal operational problems and none of which resulted in complete failure or termination of the testing. Both SolAir units tested were in original condition without modification at the term of the presented testing results. Problems and/or noted downtime that occurred included wrapping of the wires at the base of the unit at the IL location which required manual untwisting, test equipment failure and replacement at the CA location, and movement of unit in CA to a new location for the placement of the online live Camera.

Table 1. Preliminary Duration Results for the San Marcos CA SolAir Install

Month	Wind	Solar	Hours of production at ws above						Wind/Gust Average - limits				T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	O
	kWh production	kWh production	0	6	8	10	12	>12	Max Wind	Average Wind	Max Gusts	Average Gusts	Hours				
Sep-08	82.80788208	6.431632	171	103	29	35	12	0	18.4	6.3	N	N	350	72	20	24	91%
Oct-08	195.3345042	14.791154	342	262	50	66	21	3	20.7	5.8	N	N	744	0	10	8	99%
Nov-08	128.782932	14.15863	341	273	46	36	16	8	25.3	5.5	N	N	720	0	0	16	98%
Dec-08	192.5889154	12.697476	274	326	56	48	18	22	36.8	5.3	N	N	744	0	0	0	100%
Jan-09	94.00400394	13.345624	344	317	42	32	7	2	18.4	5.8	N	N	744	110	5	48	92%
Feb-09	218.5929992	13.552332	259	251	52	60	28	22	38	7.3	N	N	672	0	0	0	100%
Mar-09	251.255455	14.882604	270	276	54	90	43	11	24.2	7.4	N	N	744	6	0	48	93%
Apr-09	340.6171748	14.950184	185	273	73	112	45	32	29.9	7.2	N	N	720	0	0	24	97%
May-09	226.7815714	14.604224	246	291	67	113	27	0	19.6	7	N	N	744	0	2	24	97%
Jun-09	296.5248076	15.705282	184	300	67	99	61	9	23	7.2	N	N	720	0	1	0	100%
Jul-09	230.5729028	17.39069	287	294	79	120	24	0	18.4	7.1	N	N	744	0	0	24	97%
Aug-09	218.7764195	19.266376	300	245	63	106	30	0	17.3	5.8	N	N	744	0	0	0	100%
Sep-09	182.7617497	17.642534	319	240	46	92	23	0	21.9	6.3	24	20	720	56	48	86	86%
Oct-09	212.153999	18.10679	283	289	59	71	26	16	26.5	6	17	21	744	0	0	0	100%
Nov-09	124.3978237	16.808882	343	273	43	42	13	6	26.5	5.8	16	23	720	1	0	0	100%
Dec-09	200.982867	15.042874	289	312	39	54	28	22	42.6	6.7	39	26	744	0	3	0	100%
* Jan-10	233.7411242	13.852288	329	274	38	47	15	41	41.4	7.8	43	26	744	4	36	96	86%
Annual - 09	2597.4	191.3	3309.0	3301.0	684.0	991.0	355.0	120.0	25.5	6.6	29.0	22.5	730.0	14.4	4.9	21.2	97%

Hours of Power Production for San Marcos CA:

Table 1 shows the preliminary duration results for the San Marcos SolAir installation. The turbine accumulated 12,062 hours of total run time with an operational time fraction of 97%.

The low operational time fraction for January of 2009 was caused by the failure of testing equipment, Data Logger failed and had to be replaced. Investigations suggest that high output amps caused the logger to fail. The Aemc L261 Data Logger was used to log voltage utilizing two 10 k Voltage dividers combined with an inspeed anemometer and WindWare software.

Since the replacement of the Aemc L261 Data Logger with the Hobo U-30 Data Logger, the turbine has run with a high operational time fraction. The majority of the other time classified as TN during the test is attributed to recording equipment time faults, and general maintenance whereas often the generator during excessively high winds/gusts would create amps that would burn out the 10k resistors. In September 2009 both units were removed to replace the bronze bearings with sealed casted bearings. Both turbines have run without vibration, mechanical errors or operational modifications since September 2009 through the end of the testing data period.

Table 2. Preliminary Duration Results for the Hampshire IL SolAir Install

Month	Wind	Solar	Hours of production at ws above					Wind / Gust Average - limits				T <sub>r</sub>	T <sub>c</sub>	T <sub>i</sub>	T <sub>o</sub>	O	
	kWh production	kWh production	0	6	8	10	12	>12	Max Wind	Average Wind	Max Gusts	Average Gusts	Hours				
Jan-09	82.80788208	4.894652	N	N	N	N	N	N	N	N	N	N	350	0	32	2	99%
Feb-09	195.3345042	12.722152	0	9	0	18	79	638	48	16.8	N	N	744	0	0	1	100%
Mar-09	128.782932	12.786694	1	35	0	40	89	555	53.8	16.7	N	N	720	0	0	0	100%
Apr-09	192.5889154	13.336386	7	10	0	27	80	620	59.5	19.1	N	N	744	0	0	6	99%
May-09	94.00400394	12.508624	0	27	0	25	97	595	56.1	16.7	N	N	744	0	0	3	100%
Jun-09	218.5929992	12.999974	0	28	0	39	90	515	60.7	14.8	N	N	672	0	0	0	100%
Jul-09	251.2555455	13.623136	1	53	0	66	184	440	48	13.7	N	N	744	0	0	0	100%
Aug-09	340.6171748	13.84832	0	59	0	69	185	407	41.1	13.1	N	N	720	0	0	0	100%
Sep-09	226.7815714	13.284678	0	103	0	87	199	355	36.5	11.9	N	N	744	0	0	16	98%
Oct-09	296.5248076	13.225654	0	84	0	65	174	397	50.3	13.3	N	N	720	0	0	0	100%
Nov-09	230.5729028	16.680728	0	23	0	29	126	566	48	15.4	24	20	744	0	24	0	100%
Dec-09	218.7764195	15.512214	0	34	0	19	127	564	44.6	15.7	24	20	744	0	0	0	100%
Jan-10	182.7617497	15.84875	10	30	0	37	102	541	40	18.1	24	20	720	0	0	0	100%
Feb-10	212.153999	10.798912	0	46	0	46	104	438	44.6	15.6	27	21	634	0	0	0	100%
<b>Totals:</b>	<b>2659.4</b>	<b>171.3</b>	<b>19.0</b>	<b>495.0</b>	<b>0.0</b>	<b>521.0</b>	<b>1532.0</b>	<b>6193.0</b>	<b>47.0</b>	<b>14.8</b>	<b>24.8</b>	<b>20.3</b>	<b>9744.0</b>	<b>0.0</b>	<b>2.4</b>	<b>1.9</b>	<b>99%</b>

Hours of Power Production for Hampshire IL:

Table 2. shows the duration results for the SolAir installed in Hamshire IL. This unit has accumulated 9,744 hours of total run time with an operational time fraction of 99%.

The low operational time fraction that occurred in September 2009 was a result of changing out the turbine's bearing from bronze to sealed casted bearings. The majority of the remaining time classified as TN during the test is attributed to the wire being twisted up at the base of the unit requiring manual untwisting. This has been solved for current production models with a free swivel joint connection that allows the wires to turn freely 360°. Wind metering equipment that extended data being recorded from simply wind speeds to include gusts was added in November 2009, this was accompanied by an inspection of the voltage metering equipment and resulted in downtime due to adverse weather conditions that prevented reconnection of the unit until the following day.

Another factor of reliable operation is that the turbine should experience no significant power degradation. Each month the average power is plotted for each wind-speed bin and analyzed for any obvious trends in power production. Examination of power degradation plots indicated no apparent power degradation for either installed location. The dynamic behavior of the turbine is assessed by observing the turbine in a range of operating conditions. The turbine is observed at wind-speed intervals from cut-in wind speed to a maximum experienced wind speed of 53 mph at the Hampshire install site. Tower vibrations, noise, yaw behavior, and tail movement all were periodically documented for evaluations and consideration in reporting the above data.

For the San Marcos install site the following dynamic observations were made. During high winds, the frame will yaw out of the wind between approximately 5 degrees and 30 degrees which was identified as a result of wind blade wash hitting the integrated frame fin assembly. This constant yaw at higher wind speeds allowed the unit to both maintain a lower overall consistent RPM but also prevented the motor from excessive heating. Additionally, it appears that no excessive vibrations are occurring during these conditions. In winds of between 3mph and 15mph both turbines tracked the wind well with no adverse dynamic behavior observations made. No audible noise was detected from either turbine during any of the testing observations.

## Power Performance Testing

Power performance testing is conducted per IEC standard 61400-12-1, Power Performance Measurements of Electricity Producing Wind Turbines, referencing Annex H for small wind turbines when appropriate. Products of the test include a measured power curve, a power coefficient (CP) curve, and an estimation of annual energy production (AEP). For small turbines, statistical data is collected in 1-minute sets and sorted into 0.5-m/s-wide wind speed bins. Data collection is complete when the wind speed bins between 1 m/s and 14 m/s contain 10 minutes of data each, and the total database consists of at least 60 relevant hours. Wind speed bins are plotted against the corresponding bin power to produce a power curve. Power curves are normalized to sea-level air density; the site-specific air density at the either observed location is relatively low, 1.0 kg/m<sup>3</sup>. The power coefficient is the ratio of power generated by the turbine to the power available in the wind. The power curve for the both turbines show power measurements that are greater than rated power. Preliminary power and CP curves for the San Marcos Install as displayed in Figure 3; Both turbines performed as expected.

The original testing voltage equipment on the San Marcos Install was optimized for power performance and was found un-reliable after several months of operation. After the failure, a production model testing solution, Hobo Equipment, was installed and operated until testing was completed with a backup data recorder on the inverter. The preliminary power and CP curves for both configurations are shown in Figure 4.

Sea-Level Air Density Normalized Power Curve					
SolAir San Marcos CA					
		Bin Wind	Bin Power	Number	
m/s	Mph	Speed m/s	kW	Data Points	C <sub>p</sub>
1.6	3.5	1.554	0	0	0.77
2.1	4.6	2.0424	0.01	1340	0.58
2.6	5.8	2.5752	0.12	1134	0.44
3.1	6.9	3.0636	0.14	903	0.37
3.6	8.1	3.5964	0.41	747	0.30
4.1	9.2	4.0848	0.67	476	0.25
4.6	10.4	4.6176	0.79	276	0.22
5.1	11.5	5.106	0.84	161	0.20
5.7	12.7	5.6388	0.99	65	0.18
6.2	13.8	6.1272	1.17	47	0.16
6.7	15	6.66	1.35	29	0.15
7.2	16.1	7.1484	1.42	15	0.14
7.7	17.3	7.6812	1.56	13	0.13
8.2	18.4	8.1696	1.61	12	0.12
8.8	19.6	8.7024	1.6	8	0.12

Figure 3. Preliminary power and CP data for San Marcos CA Install

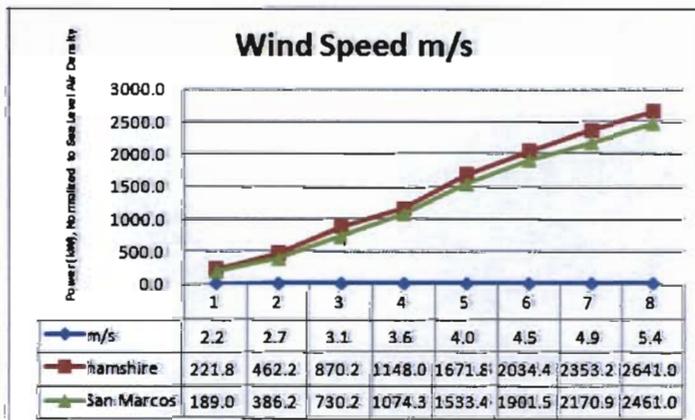


Figure 4. Annual Energy Production (AEP) at sea-level density; 1.225 kg/m<sup>3</sup> for normal power production

Figure 4. San Marcos CA Install preliminary power and Cp curves for the power production GinLong inverter (Inverter 1) and the Hampshire IL location shows preliminary testing inverter install (Inverter 2)

Annual energy production is estimated by applying the power curve generated from power performance testing to a Rayleigh distribution. The AEP is given for annual average wind speeds at hub height for 6.6mph to 19mph. The measurements reported below assume no energy production beyond the highest filled bin in the power performance test.

Hub Height Annual Average Wind Speed (Rayleigh) mph - m/s		San Marcos			Hampshire IL		
		AEP Measured	Standard Uncertainty		AEP Measured	Standard Uncertainty	
mph	m/s	kWh	kWh	%	kWh	kWh	%
5	2.2	189.0	117.2	62%	221.8	157.5	71%
6	2.7	386.2	104.3	27%	462.2	152.5	33%
7	3.1	730.2	131.4	18%	870.2	208.9	24%
8	3.6	1074.3	182.6	17%	1148.0	206.6	18%
9	4.0	1533.4	214.7	14%	1671.8	284.2	17%
10	4.5	1901.5	209.2	11%	2034.4	305.2	15%
11	4.9	2170.9	238.8	11%	2353.2	329.4	14%
12	5.4	2461.0	246.1	10%	2641.0	369.7	14%

Table 3. Preliminary Measured AEP for both units

Table 3 shows the preliminary AEP as measured based on power performance data for both locations.

### SolAir – Ginlong Grid Tie Electrical Diagram

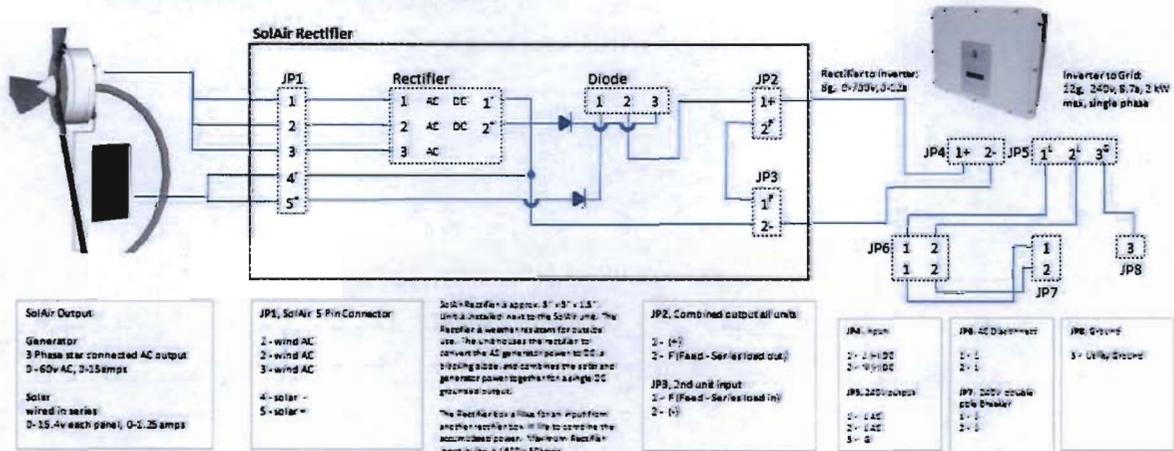


Figure 5. SolAir Electrical Overview as connected to the GinLong inverter and Grid Tied.

7

## Sound Testing

### Dyocore SolAir Unit Noise Level Measurements

5110 Leicester, San Diego

30-Mar-10

	Ambient only	Ambient only	Unit+other	Unit+other	Unit+other	Unit+other	Unit+other		
DataFile	22	24	18	19	20	21	23		
Start Time	14:53:50	14:56:49	14:47:38	14:48:07	14:49:22	14:52:50	14:54:49		
Run Time:	00:04.0	00:16.2	00:16.5	00:25.0	00:32.7	00:19.7	00:11.0		Immission spectra
Leq:	47.7 dBA	47.6 dBA	47.2 dBA	54.4 dBA	53.7 dBA	48.2 dBA	48.9 dBA		imbalance (C - A < 20)
Freq Hz	Leq 1/3 Oct	Leq 1/3 Oct	Leq 1/3 Oct	Leq 1/3 Oct	Leq 1/3 Oct	Leq 1/3 Oct	Leq 1/3 Oct		
50	55.9	50.9	59.3	69.1	66.9	62.7	64.3	TRUE	16.06
63	53.6	45.6	56.1	66.8	65	59.4	61.3	TRUE	17.12
80	48.8	45.9	52.4	64.4	62.3	56.2	57.8	TRUE	16.27
100	46	44.5	48.8	60.5	58.9	52.3	53.8	TRUE	14.61
125	43.6	43	46	57.6	56	49.1	49.7	TRUE	13.38
160	42.5	41.5	43.4	54.3	53.3	46.7	46.8	TRUE	11.9
200	42.5	40.3	43.3	51	50.3	44.6	45.3	TRUE	10.5
250	41	39.7	42.4	48	47.8	43.2	43.4	TRUE	9.61
315	40.1	39.4	39.6	45.6	45.4	46.6	43.3	TRUE	9.35
400	39.6	38.5	42	45.9	47.9	43.4	43.4	TRUE	10.47
500	37.6	39.1	37.6	44.8	45.1	39.2	38.7	TRUE	7.73
630	40.6	40	37.6	52	48.3	38.5	39	TRUE	7.78
800	40	41.2	38.9	43.5	43.5	37.6	39.2	TRUE	4.94
1000	40	39.6	38.4	43.7	43.5	36.4	38.9	TRUE	5.38
1250	37.2	37.9	36.2	42.9	44.2	35	38.5	TRUE	6.81
1600	35.8	34.2	34	39	39.8	33.2	33.9	TRUE	5.98
2000	32.4	31.1	30.8	35.3	35.9	29.7	30.8	TRUE	5.75
2500	29.6	29.8	29.5	33.8	34.8	27.6	27.8	TRUE	6
3150	29.3	32.3	31.1	34	33.9	26.7	26.8	TRUE	4.7
4000	27.6	32	25.2	32.9	32.1	25.6	27.9	TRUE	3.94
5000	25.3	24.6	23.3	30.7	31	23.5	24.1	TRUE	6.57
6300	24.2	19.7	22.1	28.8	29.1	22.5	22.2	TRUE	7.99
8000	23.5	19.4	21.5	26.3	27.9	21.9	21.6	TRUE	7.39
10000	23.6	23.6	21.2	24.8	26.3	21.7	21.4	TRUE	4.48

Eilar Associates, Inc.  
Job B00301N2

#### Notes:

Immission spectrum testing was applied per the IEC 61400-11 standard in the last two columns. 1st column was to indicate Pass (true) or failure (false), second column is the data applied. Data was pooled by average results given during each testing stage. Both in average and as stand alone our turbine falls within allowable limits as outlined in the 2008 G.W. Kamperman and R.R. James sound testing standards overview.

Calculation used: L<sub>Ceq</sub> (immission) minus (L<sub>A90</sub> (background) +5 dB) ± 20 dB

The above outline also states that testing should be done at the property line. Our testing data was obtained at the location of install or base of equipment. Any testing greater than 10 feet of the SolAir resulted in no usable noise changes to the ambient noise level.

Testing at this location experienced wind gusts of approximately 15 mph.

### Safety and Function Testing

Safety and function testing is conducted per IEC Standard 61400-2, section 9.6, and seeks to test the essential functions of the turbine system. However, NREL does not limit testing to the scope of the standard; other features that are not required by the standard also are inspected and tested. For each turbine, NREL collects data to characterize the turbine's power control, rotor-speed control, behavior upon loss of load, normal start-up, normal shutdown, and emergency shutdown. Additionally, NREL 8 performs turbine specific tests to verify the turbine controller's function and predicted behavior. Although safety and function testing examines the essential functions of the turbine, it does not certify whether a turbine is safe to operate.

Table 4 shows the preliminary safety and function data summary for San Marcos SolAir Install. The turbine performed as designed with one exception. When the inverter was shut down manually using the disconnect switch and then was restarted, an over-load error was present on the Inverter. The error had to be reset before the turbine could be started again.

Table 4. Preliminary Safety and Function Test Summary for the San Marcos SolAir Install

Test Method	Comment	Complies with Design
Power control	Turbine controls power output per design	Yes
Rotor speed control	Turbine controls rpm to 2100, per design	Yes
Normal start-up	Turbine starts at indicated cut-in wind speed and above, and below cut-out; over-speed error control operates as indicated	Yes
Normal shutdown	Turbine shuts down normally in winds less than cut-in and greater than cut-out	Yes
Emergency stop	Turbine when positioned out of the wind stops within 2 to 3 seconds.	Yes
Loss of grid	Inverter shuts off immediately upon grid loss	Yes
Undervoltage / overvoltage	In an overvoltage simulation the Inverter cuts off immediately	Yes
High wind speed shutdown	Turbine through mechanical rotation corrects in winds greater than 8 m/s to maintain lower rpm.	Yes
Rotor overspeed	Turbine by mechanical design self brakes preventing overspeed.	Yes
Generator overcharge	Inverter shuts down immediately in simulated generator overcharge	Yes
Excessive vibration	No vibration was detected	Yes
Cable twist	Swivel base wiring connection prevents twisting.	Yes



**DyoCore™**

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San Marcos, CA 92078

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866-404-2428

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[www.dyocore.com](http://www.dyocore.com)

**Copyright 2010 DyoCore**

## DyoCore SolAir Wind Pit

Monday, February 7, 2011, 09:40 AM **Technology**

February 2011 DyoCore completes the setup of its testing facility in Carlsbad CA. Now called the SolAir Wind Pit, DyoCore will expand testing and further development of its unique low turbulent wind solution called SolAir.

The wind pit can create simulated winds up to 30mph and DyoCore techs indicate with a little modification wind simulation tests can reach upwards of 60 or 70mph!

DyoCore's new facility is one of only a small handful of wind simulation testing facilities nationwide and demonstrates our commitment to making SolAir the best solution for the homeowner, said David Raine, founder of DyoCore. within this new facility we can simulate, within reason, actual conditions in a controlled environment on demand to further test and develop our product to optimal performance. We will additionally make this facility available to our industry to assist in the continued momentum to make small wind power obtainable, efficient and affordable for the average home owner.

Testing begins this week and guests are welcomed. Over the next few months DyoCore expects to log hundreds of simulation hours and continue to add on new testing tools to its facility. For more information about the SolAir Wind Pit email [testing@dyocore.com](mailto:testing@dyocore.com).



### Administrator (David Raine)

Monday, April 11, 2011, 08:30 AM

This is the most accurate reference to estimated power production based on wind conditions. Though this does not account for gusts or rapid changes it can provide a basis for your production expectations at specific constant wind speeds:

[http://www.dyocore.com/images/power\\_curve.JPG](http://www.dyocore.com/images/power_curve.JPG)

**Exhibit 44**

## Administrator (David Raine)

Monday, April 11, 2011, 07:21 AM

we will have to simply agree to disagree. I feel our IEC data was specific to our application and the intended use of our turbine. That is the most accurate and applicable data available about our turbines performance.

However, our distributors are doing many pole mount applications and recently a company posted it's data and CEC listing acceptance utilizing our exact same motor on a pole mounted turbine.

I appreciate your experience and consideration in providing us some guidance. I will do my best in applying your information to our future testing and continued improvement of information for our potential consumers. But most, if not all and then some, of this information we already provide everyone. We are very specific about the low power created from our turbine in the wrong conditions. All of which can be found right on this site. Our IEC data is a very small part of that and very rarely referenced, if ever, to a consumer.

I'm not sure how we can be more diligent than we already are but I'm open to suggestions to make our product better and our consumers more aware of the low power creation and conversion barriers associated with roof mount turbines.

## Administrator (David Raine)

Monday, February 14, 2011, 11:05 AM

Wind Tunnel vs Betz law

I recently had an inquiry with questions about our Wind Tunnel and our objectives. These were great comments and posted on another site. It's a bit long but I think if you are an engineer it might be a good read and give you a better understanding our our direction in building the wind tunnel. here are the comments;

Posted by Mike Klemen to me. If you would like to contact Mike: [wind4energy@yahoo.com](mailto:wind4energy@yahoo.com)

David,

Regarding the WindPit, DyoCore has a lot to learn about what would produce a reasonable result in a wind tunnel. The wind tunnel blockage is too high. Power performance as measured in this wind tunnel with the turbine pictured will be higher than anybody will experience when the turbine is place is free and clear wind. Energy production will be overstated if power data is used from this setup.

If any data is published from the WindPit, it will be in error, negligent, and incorrect.

Regarding the Power Curve that is on the DyoCore web site, it is clear that whoever created it does not understand the standards and how to acquire data. The data has absolutely nothing to do with Betz.

Sincerely,  
Mike

Hi Michael,

Yes the "Wind Pit" is a great learning experience for us and for the industry. Not many companies get to actually test their products in a controlled environment.

I can understand your assumptions and initially would have thought the same myself, however, it turns out quite the opposite.

1. Exact volume – Betz's law (60" wind tunnel – 60" blade diameter) will create lower results than could be experienced in the real world. <http://www.symscape.com/blog/virtual-wind-tunnel-betz-law>
2. Betz's law is the basis for most turbine power curves
3. Our tunnel does not produce exact volume, though I appreciate your assumption we are not engineers and did not create a "perfect" volume tunnel.
4. We have found at a lower wind speeds that that we do get better results in the tunnel due to "constant" wind, has nothing to do with volume.
5. At higher wind speeds in the tunnel we get lower results than in the real world, has everything to do with volume.
6. Creating a power curve from any one piece of data is negligent and we are not utilizing the tunnel to create power curves, the purpose of our tunnel is to develop the best solution with the resources we have today.

In the real world a 10mph average wind is a very misleading number. The accelerated increase in energy production and conversion efficiency as the wind speed increases is so great that the difference between 10mph and 11mph could be almost doubled. Understanding this then applying it to trying to get a range of wind vs power in "average" conditions almost becomes impossible. An average wind speed of 10mph really means varying wind between maybe 5mph and 15mph, this would indicate that 50% of your energy production was greater than 10mph and at the accelerated power production your gross production is going to be greater than a wind tunnel test at 10mph. This is unfortunately how we applied our original power curve data and learned later that the "real world" can NOT be duplicated in a wind tunnel.

Unfortunately where we disagree is in I feel Betz, though a good starting point, does not represent a real world power curve. But we are striving to find a nice medium.

You appear to be very angry about our direction and development of a solution. I hope we have not offended you in our objectives to solve for what we feel is a very important solution. Are you a manufacturer of a product? Are you an engineer developing a solution for the average homeowner? Maybe if I understood your position within the industry I could better answer your comments.

I welcome your comments and appreciate your time to take such an interest in what we are doing.

Thanks for your input!

David Raine  
DyoCore Inc.

[www.dyocore.com](http://www.dyocore.com)  
p&f. 866-404-2428  
c. 760-580-4271  
[dave@dyocore.com](mailto:dave@dyocore.com)

## Comments

### Add Comment

Fill out the form below to add your own comments.

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Email:

URL:

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Comment: \_\_\_\_\_

Anti-Spam: Enter

Moderation is turned on for this blog. Your comment will require the administrators approval before it will be visible.

**Subject:** Re: [s-w-h] Solar verses wind efficiency  
**From:** David Raine (dave@dyocore.com)  
**To:** daryl\_solar@yahoo.com;  
**Cc:** wb4apr@amsat.org; small-wind-home@yahoogroups.com;  
**Date:** Sunday, February 6, 2011 11:43 PM

I will try to address your responses directly below,

David Raine  
760-580-4271

On Feb 6, 2011, at 7:16 PM, Darryl Thayer <daryl\_solar@yahoo.com> wrote:

> Very well said, thanks Bob, you said it much better than I ever could. I love  
> wind, but what you said.

>  
> Darryl

>  
> \_\_\_\_\_  
> From: Bob Bruninga <wb4apr@amsat.org>  
> To: small-wind-home@yahoogroups.com  
> Sent: Sun, February 6, 2011 7:08:06 PM  
> Subject: Re: [s-w-h] Solar verses wind efficiency

>  
>  
>> Solar is a multibillion dollar industry with  
>> tremendous resource funding, comparing this  
>> to small wind and a handful of true "small  
>> wind" products with less than maybe 20 million  
>> in development capital amongst all of them  
>> is quite a stretch.

>  
> I don't think that has anything to do with it. The comparison is simply based on  
> the old Real estate trueism: LOCATION, LOCATION, LOCATION.

>  
> Good wind sites are fantastic for wind power. Bad wind sites (the vast majority  
> of all other sites) are useless.

**Exhibit 45**

>

Wind can be leveraged in almost any condition, but buying the wrong product for the wrong application will never work. Applying turbines to simply "location" is as simple to applying solar to sun. Neither are relative when compared together in generic test environment.

"vast majority" is meaningless when applied to a generic test that doesn't account for all possible available products.

>

> So comparing the two is meaningless. The point is that the average homeowner is  
> much more likely to live where there is good sun, than where there is good wind.  
> But same goes for solar. If you are surrounded by shade trees, forget it.

>

>> You cannot at this point simply compare the  
>> two without the bias towards the better  
>> funded and equipped product.

>

> Again, has nothing to do with it. If there is no wind on a property, then no  
> amount of \$\$\$ will change that.

>

How do you know there was "no wind", I feel maybe the product choice was poorly made for the conditions present. Additionally, buying the right product at the right price would absolutely affect the outcome. \$\$\$. Makes ALL the difference.

>

>> Wind is on those coat tails and moving fast  
>> towards the same objective.

>

> Not really possible. Only 1% of the property in Maryland has any potential for  
> even the minimum average wind speed. Yet probably 50% of all property owners  
> have sun.

>

So based on your assumption if the same test was done in Seattle then hands down wind is better, does this mean that wind is better everywhere?

Over 56% of the US experience wind conditions greater than 6mph annually, these are in my opinion great wind areas making the US much more practical for wind resource and development.

- >
- > > I would like to hope to see more direction in
- > > creating resources for alternative energy
- > > needs and the improvement of the existing
- > > technology towards making Small Wind for
- > > the average home practical.
- >
- > Again, I think that is impossible. The \*average\* home has no wind! I think what
- > you meant was "for the average home in a high-wind area, practical".
- >
- > Leaving off that kind of disclaimer is what causes wind to be oversold to the
- > average consumer (who slept through high school science)...
- >

The average home less than 10 years ago wasn't practical for solar. Solar is still expensive and substantially inefficient today. It is complete ignorance to dismiss wind as a potential solution. Solar is still in the innovator stages. In less than a few years wind will pass solar 3 to 1 and move to demand market. This has nothing to do with high school science, it's more towards college economics.

- >
- > Bob, WB4APR
- >
- > [Non-text portions of this message have been removed]
- >
- >

[Non-text portions of this message have been removed]

-----

=====

THANK YOU FOR PARTICIPATING IN THE HOME ENERGY LIST.

-----

. Please feel free to send your input to:

[small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)

. Join the list by sending a blank e-mail to:

[small-wind-home-subscribe@yahoogroups.com](mailto:small-wind-home-subscribe@yahoogroups.com)

. To view previous messages from the list,

subscribe to a daily digest of the list,

or stop receiving the list by e-mail

(and read it on the Web), go to

<http://www.yahoogroups.com/list/small-wind-home> .

. An FAQ on small wind systems is located at

<http://www.ndsu.nodak.edu/ndsu/klemen> .

---

### Yahoo! Groups Links

<\*> To visit your group on the web, go to:

<http://groups.yahoo.com/group/small-wind-home/>

<\*> Your email settings:

Individual Email | Traditional

<\*> To change settings online go to:

<http://groups.yahoo.com/group/small-wind-home/join>

(Yahoo! ID required)

<\*> To change settings via email:

[small-wind-home-digest@yahoogroups.com](mailto:small-wind-home-digest@yahoogroups.com)

[small-wind-home-fullfeatured@yahoogroups.com](mailto:small-wind-home-fullfeatured@yahoogroups.com)

<\*> To unsubscribe from this group, send an email to:

[small-wind-home-unsubscribe@yahoogroups.com](mailto:small-wind-home-unsubscribe@yahoogroups.com)

<\*> Your use of Yahoo! Groups is subject to:

<http://docs.yahoo.com/info/terms/>

---

**Subject:** RE: [s-w-h] b Solar verses wind efficiency

**From:** David Raine (dave@dyocore.com)

**To:** freedomev@yahoo.com; small-wind-home@yahoogroups.com;

---

**Date:** Monday, February 7, 2011 11:11 AM

---

SolAir SMRP \$1,800,

CEC rated at 1.6 kW at 18mph. Nominal production in average installed locations is about 1 kW.

We have designed SolAir specifically for Small Wind conditions. Unfortunately "Small Wind" is quite a broad category that encompasses everything from rooftop to industrial 160' pole mount devices.

Roof top is a very difficult sector to pull usable wind energy from if not in the right conditions. We are working hard to create solutions that make "Small Wind" affordable and efficient for the average homeowner.

DyoCore wind tunnel

February 1st, 2011 DyoCore completes the setup of its testing facility in Carlsbad CA. Now called the SolAir Wind Pit, DyoCore will expand testing and further development of its unique low turbulent wind solution called SolAir.

**Exhibit 46**

The wind pit can create simulated winds up to 30mph and DyoCore techs indicate with a little modification wind simulation tests can reach upwards of 60 or 70mph!

DyoCore's new facility is one of only a small handful of wind simulation testing facilities nationwide and demonstrates our commitment to making SolAir the best solution for the homeowner, said David Raine, founder of DyoCore. within this new facility we can simulate, within reason, actual conditions in a controlled environment on demand to further test and develop our product to optimal performance. we will additionally make this facility available to our industry to assist in the continued momentum to make small wind power obtainable, efficient and affordable for the average home owner.

Testing begins this week and guests are welcomed. Over the next few months DyoCore expects to log hundreds of simulation hours and continue to add on new testing tools to its facility. For more information about the SolAir Wind Pit email [testing@dyocore.com](mailto:testing@dyocore.com).

David Raine

DyoCore  
[www.dyocore.com](http://www.dyocore.com)

p&f. 866-404-2428

c. 760-580-4271

[dave@dyocore.com](mailto:dave@dyocore.com)

From: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
[mailto:[small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)] On Behalf Of jerry freedomev

Sent: Monday, February 07, 2011 8:39 AM  
To: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
Subject: Re: [s-w-h] b Solar verses wind efficiency

Hi David and All,

Nice looking WT but I have problems with your website facts. Little power is available under 7mph and yours is just interesting looking old tech. Not that anything is wrong with older tech, 1930's, since in most cases it's better than 'new' tech. So stop dissing the old tech and make your specs at lower wind speeds more honest. And higher is better than lower to catch more wind, power.

But there is no reason WT's can't be built at a more reasonable price that can't pay for itself in under 3 yrs in most places. Nor do you need exceptional wind resources, just design for lower speeds if that's what you have. Sadly for most that means building your own as most WT's companies way overcharge for their units. Just what is the price for your unit?

In the Wind vs solar wind in most cases will put out 3x's or more power/\$ if well shopped. Though PV panels can now be had for under \$2/wt. But WT's shouldn't cost anymore than that and they work over 24hrs vs 8-10 for PV.

----- Original Message -----

From: David Raine <[dave@dyocore.com](mailto:dave@dyocore.com) <<mailto:dave%40dyocore.com>> >

To: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
<<mailto:small-wind-home%40yahoogroups.com>>  
Sent: Sun, February 6, 2011 1:07:32 PM  
Subject: [s-w-h] Solar verses wind efficiency

Solar is a multibillion dollar industry with tremendous resource funding, comparing this to small wind and a handful of true "small wind" products with less than maybe 20 million in development capital amongst all of them is quite a stretch. You cannot at this point simply compare the two without the bias towards the better funded and equipped product. Solar is a great product today and getting better but just less than 10 years ago it was a very poor and expensive solution. Solar has come a long way. Wind is on those coat tails and moving fast towards the same objective.

In the next few years we might come a bit closer to a side by side comparison but my thought is both and possibly other solutions will serve as a complete system in combination. Finding ways to leverage solutions based on the resources, site review, available will be the only way to indicate if any solution is a good one.

At DyoCore We have already solved the financial barrier. We have not quite concurred small wind power conversions but we're working hard towards it and see light at the end of the tunnel with the help of several industry leaders.

I would like to hope to see more direction in creating resources for alternative energy needs and the improvement of the existing technology towards making Small Wind for the average home practical. At what point does that occur? Beating Solar or simply making energy at a reasonable cost with little or no maintenance?

I think this thread is a little pre-mature and bias towards a industry with an open check book.

David Raine

DyoCore  
[www.dyocore.com](http://www.dyocore.com)

p&f. 866-404-2428

c. 760-580-4271

[dave@dyocore.com](mailto:dave@dyocore.com) <mailto:dave%40dyocore.com>

[Non-text portions of this message have been removed]

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or stop receiving the list by e-mail  
(and read it on the Web), go to  
<http://www.yahoo.com/list/small-wind-home> .

. An FAQ on small wind systems is located at  
<http://www.ndsu.nodak.edu/ndsu/klemen> .

-----

Yahoo! Groups Links

[Non-text portions of this message have been removed]

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- . An FAQ on small wind systems is located at  
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<http://groups.yahoo.com/group/small-wind-home/join>  
(Yahoo! ID required)
- <\*> To change settings via email:  
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<http://docs.yahoo.com/info/terms/>

---

**Subject:** RE: [s-w-h] b Solar verses wind efficiency

---

**From:** Michael Klemen (wind4energy@yahoo.com)

---

**To:** small-wind-home@yahoogroups.com;

---

**Date:** Monday, February 7, 2011 12:58 PM

---

Dave,

I find your take fascinating.

Can you provide details of DyoCore's wind tunnel arrangements?

Also, on DyoCore's web site, there is a link to IEC testing data. In this document:

[http://www.dyocore.com/material/IEC\\_Standard\\_61400-SolAir.pdf](http://www.dyocore.com/material/IEC_Standard_61400-SolAir.pdf)

DyoCore states: "Over the past few years DyoCore has collected information that relates to power performance, power quality, noise, safety and function, and endurance tests that meet or exceed the standards established by the DOE's National Renewable Energy Laboratory (NREL) established in 2008 and now part of the International Electrotechnical Commission (IEC) standards."

The turbine installations at both sides are on a rooftop. That does not comply with the requirements of the IEC standards (or AWEA standards) for small turbine testing. The basis for everything else presented in the document that relates to IEC testing is flawed on this basis alone. It seems devious at best to even mention the standards, since nothing was done to comply with them!

Can DyoCore explain how the Hampshire, IL site, with a 6.3 m/s average wind speed didn't seriously outdo the performance of the San Marcos site? More than doubling the wind speed ought to have more than doubled energy output. Instead, there's just a 36% improvement in output for a 117% increase in wind speed. That doesn't account for the fact that the

**Exhibit 47**

energy in the wind is proportional to velocity cubed.

Looking at my page for a "Perfect Turbine":

[http://www.ndsu.edu/ndsu/klemen/Perfect\\_Turbine.htm](http://www.ndsu.edu/ndsu/klemen/Perfect_Turbine.htm)

You can see that for an ideal real life wind turbine ("good turbine") the increase in energy production should be on the order of 5.75 times (575%) the output on the 6.3 m/s site compared to the 2.9 m/s site.

Can you also explain, in that same document how some of these numbers pan out? DyoCore states that the turbine has a  $1.13 \text{ m}^2$  turbine. That document states that rated power is at 8 m/s and is 1.6 kW (I also note that you stated previously that nominal output on a site is just 1kW, not the 1.6kW in this document).

That is rather odd, given the swept area of this turbine, there are only about 350 Watts of attainable energy in the wind at that wind speed! So basically, the output and power performance of this turbine as presented cannot be used for any useful purpose.

I would love to be shown otherwise, but this is misleading at best, if not outright .....

Sincerely,  
Mike Klemen

--- On Mon, 2/7/11, David Raine <dave@dyocore.com> wrote:

> From: David Raine <dave@dyocore.com>  
> Subject: RE: [s-w-h] b Solar verses wind efficiency  
> To: "jerry freedomev" <freedomev@yahoo.com>, small-wind-home@yahoogroups.com  
> Date: Monday, February 7, 2011, 11:11 AM

- > SolAir SMRP \$1,800,
- >
- >
- >
- > CEC rated at 1.6 kW at 18mph. Nominal production in
- > average installed
- > locations is about 1 kW.
- >
- >
- >
- > We have designed SolAir specifically for Small Wind
- > conditions.
- > Unfortunately "Small Wind" is quite a broad category that
- > encompasses
- > everything from rooftop to industrial 160' pole mount
- > devices.
- >
- >
- >
- > Roof top is a very difficult sector to pull usable wind
- > energy from if not
- > in the right conditions. We are working hard to create
- > solutions that make
- > "Small Wind" affordable and efficient for the average
- > homeowner.
- >
- >
- >
- > DyoCore wind tunnel
- >
- >
- >
- > February 1st, 2011 DyoCore completes the setup of its
- > testing facility in
- > Carlsbad CA. Now called the SolAir Wind Pit, DyoCore will
- > expand testing and
- > further development of its unique low turbulent wind
- > solution called SolAir.
- >
- >
- >

- >
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- > indicate with a little modification wind simulation tests
- > can reach upwards
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- >
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- > SolAir the best solution for the homeowner, said David
- > Raine, founder of
- > DyoCore. within this new facility we can simulate,
- > within reason, actual
- > conditions in a controlled environment on demand to further
- > test and develop
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- > additionally make this facility
- > available to our industry to assist in the continued
- > momentum to make small
- > wind power obtainable, efficient and affordable for the
- > average home owner.
- >
- >
- >
- > Testing begins this week and guests are welcomed.
- > Over the next few months
- > DyoCore expects to log hundreds of simulation hours and
- > continue to add on
- > new testing tools to its facility. For more
- > information about the SolAir
- > Wind Pit email [testing@dyocore.com](mailto:testing@dyocore.com).
- >
- >
- >
- >
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>  
> But there is no  
> reason WT's can't be built at a  
> more  
> reasonable price that can't pay for itself in under 3 yrs  
> in most places.  
> Nor  
> do you need exceptional wind resources, just design for  
> lower speeds if  
> that's  
> what you have. Sadly for most that means building your own  
> as most WT's  
> companies way overcharge for their units. Just what is the  
> price for your  
> unit?

>  
>  
> In the Wind vs solar wind  
> in most cases will put  
> out  
> 3x's or more power/\$ if well shopped. Though PV panels can  
> now be had for  
> under  
> \$2/wt. But WT's shouldn't cost anymore than that and they  
> work over 24hrs vs  
>  
> 8-10 for PV.

>  
>  
>  
>  
>  
> ----- Original Message -----  
> From: David Raine <dave@dyocore.com  
> <mailto:dave%40dyocore.com> >  
> To: small-wind-home@yahoogroups.com  
> <mailto:small-wind-home%40yahoogroups.com>  
> Sent: Sun, February 6, 2011 1:07:32 PM  
> Subject: [s-w-h] Solar verses wind efficiency  
>  
> Solar is a multibillion dollar industry with tremendous

- > resource funding,
- > comparing this to small wind and a handful of true "small
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- > with less than maybe 20 million in development capital
- > amongst all of them
- > is quite a stretch. You cannot at this point simply
- > compare the two without
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- > I think this thread is a little pre-mature and bias towards
- > a industry with
- > an open check book.

> David Raine

>

> DyoCore

> [www.dyocore.com](http://www.dyocore.com)

>

> p&f. 866-404-2428

>

> c. 760-580-4271

>

> [dave@dyocore.com](mailto:dave@dyocore.com)

> <<mailto:dave%40dyocore.com>>

>

> [Non-text portions of this message have been removed]

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>

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>

> . An FAQ on small wind systems is located at

> <http://www.ndsu.nodak.edu/ndsu/klemen> .

>

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---

**Subject:** Re: [s-w-h] Solar verses wind efficiency

---

**From:** Cory Arnold (coryarnold@mcwindenergy.com)

---

**To:** small-wind-home@yahoogroups.com;

---

**Date:** Wednesday, February 9, 2011 10:59 AM

---

To all,

This conversation could have ended in the one sentence that Mike Bergey stated. There is a place for solar and a place for small wind. Sadly David you are going against the grain of this industry. The only people who have really stood the test of time are the ones who stop trying to bend the rules and followed them. Giving realistic numbers for a given wind resource, and get that Pig in the AIR! If you are installing on roof tops or smaller towers, then the customer has the right to know the effects it will have on production. Not to mention the additional wear and tear the turbine will have so close to the ground.

I would say that my life in this industry has been a lot like 70% of small wind dealers. I started selling small turbine on small towers. They had a good price tag, they worked(most of the time) and I made money. That was the goal right? To make money and provide for my family. Except I saw lots of unhappy customers. We had turbine issues, but mostly they just didn't produce close to the numbers they were supposed to. Then there was a shift, I got educated. I started being a advocate for the industry. Doing local seminars and educating people. Business slowed way down. I got away from selling toys, and stopped selling anything under a 5 kW. Then something happened, Instead of doing sites surveys with a sales pitch, I did site surveys with wind education. Sales ramped up and we started rocking. Wind is one of the most awesome forces on this earth. It is highly unpredictable and the fact that turbines can handle consistent 60+ winds is amazing to me. Education is the key to small wind. Customers will buy what they can understand. Thats why companies like Proven, Bergey, and Jacobs are seeing huge growth right now. Their products are simple and they function. Customers can see how they work and understand their concepts. Ducted, high tech(people cramming megawatt unit technology into small wind turbines), or giving claims of production that dont map out on paper. Will do

**Exhibit 48**

nothing but push customers away. I am in the field with dealers on almost a daily basis. Educated customers are happy customers, so if it is hard to educate the customer on a certain product it is a hard sale.

I do agree there are many ways to improve the small wind industry. However, every time someone tries to approach this industry , with what I see as obnoxious claims for untested products, everyone gets hurt. Re-inventing the wheel, instead of just trying to improve it is causing investors and potential customers to shy away from good products. Because of the bad ones. The positive side of this, is that I believe there has been enough of this happening that new companies are learning from others past mistakes. With the inception of the SWCC and DWEA's code of conduct etc... New companies now have people to talk to about bringing new product to the table, and the order of things. We are all excited to see both organizations evolve and bring control to the industry.

Small wind is growing very fast, I feel that we are only seeing the tip of the iceberg. In fact RE Industry as whole is growing even faster. The Ag and micro grid market for small wind turbines are exploding. They both have seen their power rates double in the last 5-7 years. In the next 5-6 years there will be a shift in the average homeowner market, that is already starting in the markets I just talked about. Farmers and people on micro grid utilities(or the utilities themselves) are realizing that some day generating your own electricity will no longer be something you do to save money, or go green. It will be a necessity. I believe firmly that this is a Fact. The AG and micro-grid markets are already seeing this shift and its causing for lucrative amounts of RE to be installed. In 5-6 years I believe that the average home owner will realize that in 10-12 years it will also be a necessity for them to produce electricity where it is consumed to get away from high power rates. When this happens. it will be a storm that I do not think anyone will be ready for.

It takes almost 10 years for a Nuclear plant to go from permitting to operational. Some even 15 years. We obviously wont be drilling for enough energy to slow power rates from going up. Its going to happen. The amount of years I stated might be off a little, but the end result will be the same.

David, I think what you are trying to do is great. There will be a niche at some point for a way to produce energy at every location. Most will

need to be hybrid systems. Even if the wind is terrible, a wind turbine will most likely be needed. I truly believe that everyone who puts their time and finances into a new product, or idea, deserves the respect of the industry. I have a deep respect for everyone who is trying to take a new product and introduce it into this industry. I talked to many manufacturers in Portland this year, most of the products I had previously sold when I was a dealer, however you could tell the passion and the love they have for their products. To me this is admirable. Please keep in mind my thoughts are not focused to anyone specifically, I just thought I would throw in my two cents. It is also a little off topic from the main thread, but I got caught ranting a little.

Cory Arnold  
Director of Business Development  
MC Energy LLC  
C: 208.360.3788  
F: 509.892.0609  
CoryArnold@MCWindEnergy.com

On 2/7/2011 2:17 PM, David Raine wrote:

- >
- > My objective within this blog is to learn and participate in the further
- > research and resources put forth to create efficiencies for the use of
- > small
- > wind products. It was not my intention to insult anyone and surely would
- > hope that no one spends all day slinging mud when there is no end
- > advantage
- > other than hearing yourself speak. We can all argue our points to no
- > end on
- > our "feelings" towards small wind vs solar but it was my hope that this
- > group would be more positive towards the continued development and
- > optimization of solutions for the average homeowner.
- >
- > I hope some participants are open to learn and I would be very happy
- > to show
- > you products that can produce useable energy in very low wind
- > conditions and
- > the technology we are working on to create real solutions. It might take
- > years to get to a point of efficiency but none the less we are

- > committed to
- > move forward and currently "not in theory" but in the real world having
- > success.
- >
- > My company and our industry needs intelligent resources that can
- > contribute
- > to the continued development of smart solutions for the use of alternative
- > energy products within the average homeowners space. A turbine on a 50
- > foot
- > pole is a useless piece of equipment to the majority of homeowners. Solar
- > is still too expensive and have very similar conversion problems as
- > wind but
- > is only one possible solution. Wind is difficult to convert energy from at
- > lower, more common, winds speeds found around the average home. It makes
- > sense that a combination of optimized technology could be a solution.
- >
- > We can continue to argue, small wind does not work, I would prefer to find
- > out how to fix that. The response "it simply won't work" is not
- > acceptable.
- > Maybe it won't work today, but many products started at this point and
- > have
- > substantially out done expectations.
- >
- > I would be happy to share our resources and development with anyone and
- > physically demonstrate our product. I think you will be surprised at
- > how far
- > we have come.
- >
- > This appears to be a bash session for the industry, I regret it lacks
- > professional participation and optimism towards small wind.
- >
- > Please contact me directly at anytime . I'll withdraw from this bitch
- > session and get back to work.
- >
- > David Raine
- >
- > DyoCore
- > [www.dyocore.com](http://www.dyocore.com)
- >
- > p&f. 866-404-2428
- >

> c. 760-580-4271  
>  
> dave@dyocore.com <mailto:dave%40dyocore.com>  
>  
> From: small-wind-home@yahoogroups.com  
> <mailto:small-wind-home%40yahoogroups.com>  
> [mailto:small-wind-home@yahoogroups.com  
> <mailto:small-wind-home%40yahoogroups.com>] On Behalf Of Ian Woofenden  
> Sent: Monday, February 07, 2011 1:11 PM  
> To: small-wind-home@yahoogroups.com  
> <mailto:small-wind-home%40yahoogroups.com>  
> Subject: Re: [s-w-h] Solar verses wind efficiency  
>  
> At 9:43 PM -0800 2/6/11, David Raine wrote:  
> >Wind can be leveraged in almost any condition, but buying the wrong  
> >product for the wrong application will never work.  
>  
> Wow, do I ever disagree. I'm with Darryl -- most homeowners don't  
> have good wind sites. And if you put a very small machine on a very  
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>  
> >Over 56% of the US experience wind conditions greater than 6mph  
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>  
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>  
> >Solar is still expensive and substantially inefficient today.  
>  
> Solar electricity is a bargain today. You can buy 40 years of  
> electricity at a fixed price. It's very reliable. With common  
> incentives, simple return can run in the 5-10% range, which is better  
> than most other things we spend our money on.

>  
> Efficiency is a red herring when it comes to renewables -- we're  
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> to space on the roof. A house that has done efficiency work has no  
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>  
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>> Solar is still in the innovator stages. In less than a few years  
>> wind will pass solar 3 to 1 and move to demand market. This has  
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>  
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> thermal. It's very appropriate in some cases, and it's a lot of fun  
> (especially if you enjoy challenges). But I'm not holding my breath  
> for it to push PV out of the market -- I've lived with both for too  
> long, and know the relative reliability and cost.  
>  
> Regards,  
>  
> Ian  
>  
> [Non-text portions of this message have been removed]  
>  
>

[Non-text portions of this message have been removed]

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=====

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. Please feel free to send your input to:

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[small-wind-home-subscribe@yahoogroups.com](mailto:small-wind-home-subscribe@yahoogroups.com)

. To view previous messages from the list,

subscribe to a daily digest of the list,

or stop receiving the list by e-mail

(and read it on the Web), go to

<http://www.yahoogroups.com/list/small-wind-home> .

. An FAQ on small wind systems is located at

<http://www.ndsu.nodak.edu/ndsu/klemen> .

---

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<http://groups.yahoo.com/group/small-wind-home/>

<\*> Your email settings:

[Individual Email](#) | [Traditional](#)

<\*> To change settings online go to:

<http://groups.yahoo.com/group/small-wind-home/join>  
(Yahoo! ID required)

<\*> To change settings via email:

[small-wind-home-digest@yahoogroups.com](mailto:small-wind-home-digest@yahoogroups.com)

[small-wind-home-fullfeatured@yahoogroups.com](mailto:small-wind-home-fullfeatured@yahoogroups.com)

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---

**Subject:** RE: [s-w-h] Solar verses wind efficiency

---

**From:** David Raine (dave@dyocore.com)

---

**To:** roger.dixon@att.net; coryarnold@mcwindenergy.com; small-wind-home@yahoogroups.com;

---

**Date:** Thursday, February 10, 2011 10:35 AM

---

Thank you for your comments Cory, I appreciate your passion and experience.

I regret the industry in which I am very passionate about is so negative towards the advancement of such important alternative energy solutions. I hear a lot of argument on "it will not work" from a lot of people who claim to be professionals but none of which have spend a even a moment in our testing facility, who have actually tested our product or who have spoken to our clients and more importantly who have vested energy towards create efficiencies. I have purchased, tested an tried to return other products, specifically one of the members of the group, I ended up selling it on ebay for \$10. I think this might have pissed Mr. B off a bit because the header was "junk for sale".

I believe strongly low wind conversion can be accomplished. Maybe not today but very soon. I invite this group to think a bit more about that flying pig. We are not geniuses, there aren't many out there but in their own minds, we are innovators driven to create useful energy for the average homeowner. I find to our benefit we are not engineers because it appears from this group they are first to give up.

We are very open and forward about the development and barriers of our product, additionally our turbine is amongst the lowest cost turbine on the market, just about 1/3 that of similar products and 1/10 that of Bergy. We stand behind our product 100%! We accept returns NO QUESTIONS ASKED full refund if our customers feel SolAir will not fit their needs, we have had

**Exhibit 49**

only 3 turbines returned in the past year. Our distributors are very well educated on low wind barriers and they spend considerable time and efforts making sure a SolAir end user is aware of low wind conversion barriers.

DyoCore is not getting rich off SolAir. We pour every dollar back into the further development and advancement of the efficiency in lower wind conversion. We are most likely the only turbine manufacture with an in-house wind tunnel for testing. We can easily stop development over inflate our prices similar to that of Bergy but we have a completely different market direction in mind, one that is built on integrity and our passion.

Our partners are Aurora, Xantrex, Zahn Electronics, Ginlong, TUV, DC Power and several more in efforts to create solutions. We are humbled to be in the spotlight within our industry and hope that maybe our product and our ideas help drive others to continue to bend the rules and maybe look for a few flying pigs.

David Raine

DyoCore  
[www.dyocore.com](http://www.dyocore.com)

p&f. 866-404-2428

c. 760-580-4271

[dave@dyocore.com](mailto:dave@dyocore.com)

From: [small-wind-home@yahoogroups.com](mailto:small-wind-home@yahoogroups.com)  
[<mailto:small-wind-home@yahoogroups.com>] On Behalf Of roger dixon

Sent: Thursday, February 10, 2011 4:55 AM  
To: 'Cory Arnold'; 'SWH'  
Subject: RE: [s-w-h] Solar verses wind efficiency

Well said Cory. Thanks.

Roger Dixon

Skylands Renewable Energy, LLC

Certified Wind Site Assessor

ASME/IACET Certified Rigging Instructor

NJ CEP (Clean Energy Program) Approved Wind Turbine Installer

NYSERDA Approved Wind Turbine Installer

Distributor & Installer of Solar & Wind Energy Systems

908.337.2057 cell

908.730.6474 fax

roger.dixon@skylandsre.com <mailto:roger.dixon%40skylandsre.com>

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From: small-wind-home@yahoogroups.com  
<mailto:small-wind-home%40yahoogroups.com>  
[mailto:small-wind-home@yahoogroups.com  
<mailto:small-wind-home%40yahoogroups.com> ] On Behalf Of Cory Arnold  
Sent: Wednesday, February 09, 2011 11:59 AM  
To: SWH  
Subject: Re: [s-w-h] Solar verses wind efficiency

To all,

This conversation could have ended in the one sentence that Mike Bergey stated. There is a place for solar and a place for small wind. Sadly David you are going against the grain of this industry. The only people who have really stood the test of time are the ones who stop trying to bend the rules and followed them. Giving realistic numbers for a given wind resource, and get that Pig in the AIR! If you are installing on roof tops or smaller towers, then the customer has the right to know the effects it will have on production. Not to mention the additional wear and tear the turbine will have so close to the ground.

I would say that my life in this industry has been a lot like 70% of small wind dealers. I started selling small turbine on small towers. They had a good price tag, they worked(most of the time) and I made money. That was the goal right? To make money and provide for my family. Except I saw lots of unhappy customers. We had turbine issues, but mostly they just didn't produce close to the numbers they were supposed to. Then there was a shift, I got educated. I started being an advocate for the industry. Doing local seminars and educating people. Business slowed way down. I got away from selling toys, and stopped selling anything under a 5 kW. Then something happened, Instead of doing sites surveys with a sales pitch, I did site surveys with wind education. Sales ramped up and we started rocking. Wind is one of the most awesome forces on this earth. It is highly unpredictable and the fact that

turbines can handle consistent 60+ winds is amazing to me. Education is the key to small wind. Customers will buy what they can understand. That's why companies like Proven, Bergey, and Jacobs are seeing huge growth right now. Their products are simple and they function. Customers can see how they work and understand their concepts. Ducted, high tech (people cramming megawatt unit technology into small wind turbines), or giving claims of production that don't map out on paper. Will do nothing but push customers away. I am in the field with dealers on almost a daily basis. Educated customers are happy customers, so if it is hard to educate the customer on a certain product it is a hard sale.

I do agree there are many ways to improve the small wind industry. However, every time someone tries to approach this industry, with what I see as obnoxious claims for untested products, everyone gets hurt. Re-inventing the wheel, instead of just trying to improve it is causing investors and potential customers to shy away from good products. Because of the bad ones. The positive side of this, is that I believe there has been enough of this happening that new companies are learning from others' past mistakes. With the inception of the SWCC and DWEA's code of conduct etc... New companies now have people to talk to about bringing new product to the table, and the order of things. We are all excited to see both organizations evolve and bring control to the industry.

Small wind is growing very fast, I feel that we are only seeing the tip of the iceberg. In fact RE Industry as a whole is growing even faster. The Ag and micro grid market for small wind turbines are exploding. They both have seen their power rates double in the last 5-7 years. In the next 5-6 years there will be a shift in the average homeowner market, that is already starting in the markets I just talked about. Farmers and people on micro grid utilities (or the utilities themselves) are realizing that some day generating your own electricity will no longer be something you do to save money, or go green. It will be a necessity. I believe firmly that this is a fact. The AG and micro-grid markets are already seeing this shift and it's causing for lucrative amounts of RE to be installed. In 5-6 years I believe that the average home owner will realize that in 10-12 years it will also be a necessity for them to produce electricity where it is consumed to get away from high power rates. When this happens, it will be a storm that I do not think anyone will be ready for.

It takes almost 10 years for a Nuclear plant to go from permitting to

operational. Some even 15 years. We obviously wont be drilling for enough energy to slow power rates from going up. Its going to happen. The amount of years I stated might be off a little, but the end result will be the same.

David, I think what you are trying to do is great. There will be a niche at some point for a way to produce energy at every location. Most will need to be hybrid systems. Even if the wind is terrible, a wind turbine will most likely be needed. I truly believe that everyone who puts their time and finances into a new product, or idea, deserves the respect of the industry. I have a deep respect for everyone who is trying to take a new product and introduce it into this industry. I talked to many manufacturers in Portland this year, most of the products I had previously sold when I was a dealer, however you could tell the passion and the love they have for their products. To me this is admirable. Please keep in mind my thoughts are not focused to anyone specifically, I just thought I would throw in my two cents. It is also a little off topic from the main thread, but I got caught ranting a little.

Cory Arnold

Director of Business Development

MC Energy LLC

C: 208.360.3788

F: 509.892.0609

CoryArnold@MCWindEnergy.com <mailto:CoryArnold%40MCWindEnergy.com>  
<mailto:CoryArnold%40MCWindEnergy.com>

On 2/7/2011 2:17 PM, David Raine wrote:

>

> My objective within this blog is to learn and participate in the further  
> research and resources put forth to create efficiencies for the use of  
> small  
> wind products. It was not my intention to insult anyone and surely would  
> hope that no one spends all day slinging mud when there is no end  
> advantage  
> other than hearing yourself speak. We can all argue our points to no  
> end on  
> our "feelings" towards small wind vs solar but it was my hope that this  
> group would be more positive towards the continued development and  
> optimization of solutions for the average homeowner.  
>

- > I hope some participants are open to learn and I would be very happy
- > to show
- > you products that can produce useable energy in very low wind
- > conditions and
- > the technology we are working on to create real solutions. It might take
- > years to get to a point of efficiency but none the less we are
- > committed to
- > move forward and currently "not in theory" but in the real world having
- > success.
- >
- > My company and our industry needs intelligent resources that can
- > contribute
- > to the continued development of smart solutions for the use of alternative
- > energy products within the average homeowners space. A turbine on a 50
- > foot
- > pole is a useless piece of equipment to the majority of homeowners. Solar
- > is still too expensive and have very similar conversion problems as
- > wind but
- > is only one possible solution. Wind is difficult to convert energy from at
- > lower, more common, winds speeds found around the average home. It makes
- > sense that a combination of optimized technology could be a solution.
- >
- > We can continue to argue, small wind does not work, I would prefer to find
- > out how to fix that. The response "it simply won't work" is not
- > acceptable.
- > Maybe it won't work today, but many products started at this point and
- > have
- > substantially out done expectations.
- >
- > I would be happy to share our resources and development with anyone and
- > physically demonstrate our product. I think you will be surprised at
- > how far
- > we have come.
- >
- > This appears to be a bash session for the industry, I regret it lacks
- > professional participation and optimism towards small wind.
- >
- > Please contact me directly at anytime . I'll withdraw from this bitch
- > session and get back to work.
- >
- > David Raine

>  
> DyoCore  
> www.dyocore.com  
>  
> p&f. 866-404-2428  
>  
> c. 760-580-4271  
>  
> dave@dyocore.com <mailto:dave%40dyocore.com> <mailto:dave%40dyocore.com>  
<mailto:dave%40dyocore.com>  
>  
> From: small-wind-home@yahoogroups.com  
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> [mailto:small-wind-home@yahoogroups.com  
<mailto:small-wind-home%40yahoogroups.com>  
<mailto:small-wind-home%40yahoogroups.com>  
> <mailto:small-wind-home%40yahoogroups.com>] On Behalf Of Ian Woofenden  
> Sent: Monday, February 07, 2011 1:11 PM  
> To: small-wind-home@yahoogroups.com  
<mailto:small-wind-home%40yahoogroups.com>  
<mailto:small-wind-home%40yahoogroups.com>  
> <mailto:small-wind-home%40yahoogroups.com>  
> Subject: Re: [s-w-h] Solar verses wind efficiency  
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>  
> Regards,  
>  
> Ian  
>  
> [Non-text portions of this message have been removed]  
>

>

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No virus found in this message.  
Checked by AVG - [www.avg.com](http://www.avg.com)  
Version: 10.0.1204 / Virus Database: 1435/3431 - Release Date: 02/08/11

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- 
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  - . To view previous messages from the list,  
subscribe to a daily digest of the list,  
or stop receiving the list by e-mail  
(and read it on the Web), go to  
<http://www.yahoogroups.com/list/small-wind-home> .
  - . An FAQ on small wind systems is located at  
<http://www.ndsu.nodak.edu/ndsu/klemen> .

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[Individual Email](#) | [Traditional](#)

<\*> To change settings online go to:

<http://groups.yahoo.com/group/small-wind-home/join>  
(Yahoo! ID required)

<\*> To change settings via email:

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[small-wind-home-fullfeatured@yahoogroups.com](mailto:small-wind-home-fullfeatured@yahoogroups.com)

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**Subject:** RE: [s-w-h] Solar verses wind efficiency  
**From:** Michael Klemen (wind4energy@yahoo.com)  
**To:** small-wind-home@yahoogroups.com; dave@dyocore.com;  
**Date:** Thursday, February 10, 2011 8:43 PM

---

David,

I appreciate passion for something that is good and responsible!

It is hard to ignore some of the obvious things you mentioned.

"Professionals" don't have to do as you suggest. People with experience such as Mike Bergey do not need to spend a moment in your testing facility or test your turbine to know that what information that is publicly available tells us that the claims are totally impossible. It is physically impossible to capture energy that doesn't exist.

I do note that you haven't talked about what Mike Bergey or myself said about the product. We weren't talking about a sales pitch or feelings.

Testing a wind turbine in a wind tunnel can be useful for a manufacturer, but cannot be used for any type of energy or performance information for public consumption.

Low speed wind conversion can be accomplished, but at what cost? If you refer to my Perfect Turbine page (which I sent in my prior post), you'll see that at a 35% conversion efficiency, you will only get 4.74 kWh per month per square meter of capture area. That assumes a Rayleigh distribution.

Do the math. The DyoCore turbine is just over 1 square meter. The installed cost of a turbine to generate 75 cents of electricity per month (15 c/kwh) has got to be cheaper than dirt! I recall that you previously claimed that 6 mph was a decent wind site for installing a wind turbine. A single nominal 100 watt solar

**Exhibit 50**

panel for 4 sun hours/day would yield .4 kWh/day or 12 kWh/month.  
At \$2/watt, that would be a \$200 investment plus an inverter.  
That would generate 3 times the energy at 1/8 the cost!

I'm just trying to keep your statements in perspective.

There just isn't enough energy in the wind at that average wind speed to make it worthwhile. At 10 mph, the energy available for harvest is 5 times higher than 6 mph. Now generating 25 kWh per month per m<sup>2</sup>, this gets to be more credible. Compared to the PV, that's now twice the energy than the PV at 8 times the cost.

- > I believe strongly low wind conversion can be
- > accomplished. Maybe not today but very soon. I invite
- > this group to think a bit more about that flying
- > pig.

So, given the physics, what kind of a flying pig is it?  
You can't capture energy that doesn't exist. That's just reality.

- > We stand behind our product 100%! We accept returns NO
- > QUESTIONS ASKED full refund if our customers feel SolAir
- > will not fit their needs

But do you also refund installation costs when the turbine doesn't perform as expected? You cannot refund the faith that people had in a product when it disappoints. You cannot refund the faith and hope people had in wind energy when it doesn't deliver. That's why we're asking these questions.

- > We are most likely the only turbine manufacture with an
- > in-house wind tunnel for testing.

Nope. Southwest Wind Power has a wind tunnel for research.  
I bet there are more.

Sincerely,  
Mike Klemen

