BEFORE THE PUBLIC UTILITY COMMISSION

OF OREGON

UM 1673

In the Matter of OREGON PUBLIC UTILITY COMMISSION Staff Questions for Parties on the Solar Incentive Program Report under HB 2893.	Comments of Oregonians for Renewable Energy Progress

OREP thanks the Commission and Staff for the opportunity to answer Staff Questions for Parties on the Solar Incentive Program Report under HB 2893.

As a active participant in the workgroup that crafted HB 2893, OREP views the requested study and report as an opportunity to step back, envision the desirable outcome for solar in Oregon, and develop and recommend a policy path forward. OREP believes that the inclusion of the Oregon Department of Energy (with its primary goals including "siting prudent, safe, and environmentally sound energy facilities") as an active participant in crafting the report suggests that the study was intended to take in a broader purview than typically considered by the PUC. We have written our comments cognizant of the PUC's mandate to consider "least cost – least risk" but also with that higher level view in mind. We appreciate the Commissions breadth of questions, particularly those that address motivation, for truly we cannot create cogent recommendations without first articulating the goals.

OREP has taken the liberty of including consideration of solar water heating in answers to several of the questions. While solar water heating is not included in the legislative request, it is of interest in that it can be distributed and locally owned in the same manner as solar PV, creates energy value from the harnessing of sunshine, and has the additional advantages of requiring no integration by the utilities and providing its own storage so that is able to meet load before the sun comes up and after the sun goes down. Solar water heating has a long history in Oregon but, despite being highly efficient and appropriate for our state, has not reached the popularity it enjoys in other parts of the world. As we look ahead to meeting Oregon's energy needs with local resources it behooves us to take another look at solar water heating for the complementary benefits it provides, particularly at higher penetrations of solar PV when the effective mid-day load is may be reduced, leaving strongly bimodal residential demand during the early morning and evening.

Some general themes in OREP's comments are as follows:

a. Drivers for installation of solar fall into the categories of political, environmental protection, economic development, energy security, and risk mitigation. There is immediacy in many of these areas.
b. Installation volume matters in driving down cost (as shown by the German market driving down hard costs globally and soft costs nationally) adding to the benefit of scaling up deployment rapidly.
c. Utilities can and should find a path to shareholder value in the process of deploying and supporting high penetrations of renewable energy.
d. Distributed renewable can and should open the market to participation by many new local investors.
e. Policy solutions for installing solar should be equitable, scalable, robust, flexible (to accommodate continuing decreases in installation costs), and add economic as well as energy value to our state.
f. Ratepayers should pay the price needed for responsibly generated energy, or put another way, rates should not be subsidized by externalization of harms to be borne by all citizens. Low income ratepayers should be protected; all rate payers need not be protected.
g. Equity between classes of ratepayers is important but pales in comparison to intergenerational inequities that will result from business as usual.
h. If we overestimate available reserves of natural gas or underestimate future carbon pricing and/or regulations for the protection of groundwater, there is significant risk in building conventional generation plants that may become expensive to run or become stranded assets
i. Oregon has the resources to provide for a secure energy future, while stimulating jobs, innovation, manufacturing, and export, and providing leadership for our country and beyond.

General Questions

1. **What is the primary goal in promoting solar?** Many goals are important and complementary. OREP considers all of the following to be of great importance.

    a. Meet Oregon's GHG emission goals and move rapidly toward replacement of fossil fuel generation.

    b. Local economic development:

        1. local jobs - primary and induced

        2. increased taxes from job stimulation

        3. use Oregon's bountiful resources to keep energy dollars in state

        4. local innovation, manufacturing, and export

    c. Provide clean electricity for the transportation sector

    d. Energy security – reduce dependence on imported energy

e. Preparation for post peak oil and natural gas and beyond:

1. use cheap energy now to build RE infrastructure for future
2. avoid investments in fossil fuel plants that will become stranded when fossil fuels become expensive
3. prepare for reduced summer stream flow in the Columbia Basin

f. Environmental and health protection:

1. mitigate global climate change
2. mitigate ocean acidification
3. reduce pollution from coal mining and contamination of groundwater by fracking
4. reduce emissions of pollutants from coal-fired generation
5. reduce damaging emissions and wasteful flaring of methane from oil and natural gas fields
6. water savings from avoidance of thermal generation

g. Provide environmental leadership to the country and to the world

2. What is the proper role of the utility in developing solar?

It is appropriate for utilities to participate in ownership of all types of renewable energy generation and storage. OREP is open to utilities owning systems of all sizes, but especially larger scale systems. With the transition to free fuel renewable energy, utility income must come from investments in renewable generation and "smart grid," and from sales of energy and services, such as EV charging, solar integration and storage.

Possible paths to shareholder value include:

a. Simple utility ownership of medium and large scale DG.

> "A utility owns distributed solar assets in its own territory and earns a return as it would on other investments. The utility has a low cost of capital and is a trusted and known brand compared to solar installers or financiers.**"**[1]

b. Wholesale purchase of energy from independent power producers.

> **"**The utility could purchase solar from an independent power producer and resell it to the consumer at a profit" in some cases, according to Clean Power Finance. . . . This could also help meet renewable portfolio standards."[2]

[1] http://www.greentechmedia.com/articles/read/the-case-for-utilities-and-distributed-solar

c. Partnerships with community members where community members invest in medium and large scale projects. Community investors get payments on their investment for 20 years (like a reverse mortgage, possibly as a tariff related to generation) as the utility buys back the asset. After 20 years the investment has been repaid with interest and the solar asset belongs to the utility providing very low cost generation. This is a win-win for the local investors and for ratepayers down the road. The utility may be the tax equity partner in this arrangement.

d. Utility as tax equity partner in system owned by community - can provide access to low interest financing and take the tax credits in partnership with community-owned system.

> *Medium-term investment* — The utility offers its low-cost balance sheet to provide traditional tax equity through the 5-year "clawback period" during which the tax benefits are still required to be held by the entity claiming them. After the clawback period, the investment is recapitalized through "take-out" financing, essentially selling off the interest to an entity interested in the remaining cash flows, which is also potentially available as a sale into structured secondary markets. As the tax credits can be realized immediately for market activities outside utility service territories, perhaps IOUs can arrange mutual investment agreements with neighboring utilities or a similar cooperative mechanism.[3]

e. Utilities own distributed battery storage (such as at substations) to facilitate integration and meet summer evening and winter morning peak loads as solar penetration levels increase. (Opportunity for frequency response, voltage control, and reactive power.)

f. Utilities own and control the smart inverters for privately owned solar DG systems and get reactive control benefits for the grid.

g. Utilities provide lease model installations for residences and businesses as per the "Solar City" model. They would have a huge advantage in this because they enjoy high levels of trust from their customers.

> "Lyndon Rive, the CEO of solar installer SolarCity, said that utilities can participate in distributed solar in a similar way to how they do business now -- that is, investing in power assets and earning a return on equity. But it needs to be done on the deregulated side of the business for that to work. Utilities could invest profits from the regulated side of the business to expand into distributed solar and take on new customers"[4]
>
> *Long-term investment* — The utility invests and holds the asset over the expected life for purposes of traditional depreciation and regulated return application. These assets can provide long-term rate-base and shareholder return benefits. The equipment is placed at customer sites similar to common equipment lease arrangements. Under certain conditions of solar resource and customer load profile, PV/storage combinations may be able to provide discounts to the customer's usual demand and energy charges. The utility and the customer split the savings, thus ensuring customer continuity to repay the overall rate base. Perhaps the total payment to the

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[2] http://www.greentechmedia.com/articles/read/the-case-for-utilities-and-distributed-solar

[3] https://financere.nrel.gov/finance/content/where-all-utility-investment-are-utilities-missing-opportunity-finance-solar-and-storage

[4] http://www.greentechmedia.com/articles/read/the-case-for-utilities-and-distributed-solar

utility declines, but the utility can "bank" the ancillary benefits, including the reduced emissions of greenhouse gases and other pollutants, avoided T&D, grid resiliency benefits, and avoided loss of critical customers."[5]

h. Utilities own EV charging stations and sell electricity for transportation

i. Utilities own and lease electric vehicles while contracting with the lessees for services of storage and integration from the parked and plugged-in vehicles.

j. Utilities own and maintain solar water heaters for their customers receiving a monthly fee or a volumetric payment for the water heated.

k. Utilities develop fresh, innovative ideas about other ways to capitalize on their existing knowledge and infrastructure to create new products, services or sales-markets.

3. What are the solar incentive programs under evaluation?

a. Programs currently in place in Oregon?

1. BETC – expired, but relevant as comparison as large scale program for commercial side

2. ODOE grant program for commercial side – how effective is this program. How much RE is being installed? What is the scale relative to the BETC before it? What incentives are actually available to businesses and nonprofits beyond the SPP? (Note that tax credit auctions are not selling out) Is it filling the need for the commercial side?

3. Oregon Solar Pilot Program

4. RETC/ETO

5. RETC/ETO solar water heating – this program has not been included in the previous reports to the legislature on the Solar Pilot Program but should be included as we look at the larger picture of solar energy in Oregon. Direct heating of water by the sun is extremely efficient; works well in Oregon, and can be very cost effective. Solar water heating avoids all issues of integration, provides its own storage, and helps to lower the early morning and post sunset peaks in residential electrical demand. Solar water heating has been included on the conservation side in the past but should be considered as a renewable resource with storage. Some jurisdictions internationally now offer feed-in tariffs for solar hot water.[6]

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[5] https://financere.nrel.gov/finance/content/where-all-utility-investment-are-utilities-missing-opportunity-finance-solar-and-storage

[6] Feed-in tariffs for solar heating panels are available to home and business owners: http://www.heatmyhome.co.uk/solar-heating-panels-feed-in-tariffs.php#.UrB1AeIej4Y; Italy: Law 28 lays Foundation

6. State Energy Loan Program (SELP)

b. Programs outside of Oregon that may be worth examining?

1. Austin Texas – value of solar tariff
2. MN – value of solar tariff plus additional pot of money
3. HI – 20 year feed in tariff contracts
4. CA – Los Angeles Dept. of Water and Power (LADWP)
5. MA – Dept. of Energy - study in July 2013 on a Comparative Evaluation of Current Carve-out Policy to Other Policy Alternatives that could offer insight to the OR process
6. GA – value of solar tariff
7. CO – Solar Gardens
8. Ontario, Canada feed-in tariff
9. Nova Scotia, Canada Com-FIT – FIT for community owned installations
10. NY – Long Island Power and Light – FIT with adders for locations that are especially useful to grid
11. German FIT
12. MD – market for SRECs from Solar Water Heaters
13. FL – Solar Water Heating for low income customers

4. How should solar incentive programs be evaluated?

a. What evaluation criteria should be used (e.g. cost per kwh, cost per installed KW, cost per unit of carbon displaced, other)?

1. Cost per kWh over the production life of the system. Analyses done to date of the costs and benefits of solar programs have suffered from a lack of "apples to apples" valuation in comparisons with the costs and benefits of "business as usual" fossil electricity. Net cost of solar has been calculated on the basis of 15 years production for the Solar Pilot Program installations despite the fact that the costs of the system are front loaded within the first

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for Renewable Heat Feed-in Tariff http://solarthermalworld.org/content/italy-law-28-lays-foundation-renewable-heat-feed-tariff

15years while the benefits of low cost energy will extend another 15years. This is comparable to levelizing the cost of a new combined gas turbine over 15years. The second 15 years is when solar installation really creates value because their fuel is free compared to escalating prices for fossil fuels.

2. Cost per installed kW – One would expect all PV systems of a given scale at a given time to be installed for about the same cost, regardless of the incentive program. This will be difficult to pin down for comparison of BETC to FIT projects as costs have dropped so rapidly. Solar water heating systems would be expected to have their own cost per kW equivalent.

3. Cost per unit of carbon displaced – This is a very useful metric in comparing solar PV to solar water heating systems. The avoided carbon will depend on which utility would otherwise have provided the heating energy (PacifiCorps, PGE, or NW Natural).

4. How easily the program can scale to meet the demand for rapid deployment of solar of all scales throughout the state.

5. How easily the program can adapt to the ongoing reduction in installation costs.

6. How robust the program is in the face of fluctuations in the state economy so as to provide a stable environment for continued growth of solar infrastructure and the solar industry.

7. Equity of installation opportunity – geographic, income level, demographic

8. Number of local jobs produced per kW installed and extent of broader economic development

    a. Multiplier effect and recirculating of tax dollars (this will be important in comparing utility scale installations with small scale, as the utility scale installations may use out of state contractors and transient installers.)
    b. Is the capital being sourced locally or is interest and ROI being funneled out of state?

b. How can the evaluation criteria be selected so that different programs are compared on an apples to apples basis?

1. Carbon avoided per $ public investment (where public investment is the cost minus financial benefit over life of system). Note that this will be different for comparable systems in the different utility districts because of the carbon intensity of electricity generation for each utility.

2. Jobs created per $ public investment

3. In consideration of administrative cost, take into account all the agencies involved in a given program and also how administrative costs will scale with program size.

c. What data is needed and how should it be gathered?

1. Projected life times of systems and forecast annual energy production rates
2. $ public investment/kWh produced for each incentive program over expected lifetime of system
3. Carbon intensity of electricity from PacifiCorps, PGE, and of Natural Gas from NW Natural.
4. Efficiencies water heaters (electric and gas).

Questions related to Resource Value (HB 2893 (4)(1)(a))

5. In UM 1559, the Commission chose not to require utilities to report certain elements of Resource Value, such as avoided CO_2, fuel price volatility, integration, and transmission and distribution costs.[7] Should we calculate them now? If so, how should we do so with the data available?

Please see the Joint UM 1673 Core Principles.

6. How does the resource value of distributed solar compare with utility scale solar? To make this comparison, what factors do we take into account, and what data would be needed?

Depending on the location and local load centers, utility scale solar may not reap the benefits of reduced T and D losses and costs, may require T and D system upgrades, and may be and subject to greater integration costs as utility scale solar does not benefit from reduction in total production variability accrued by dispersed collectors with uncorrelated shading from passing clouds.[8]

On the other hand, relative to natural gas turbines, DG and large scale solar both may provide benefit from significantly reduced lead times.

> "Such reduced lead time might produce savings in the utility's total power production costs, by permitting utilities to avoid the "lumpiness," and temporary excess capacity associated therewith, which normally occur when utilities bring online large generating units. In addition, reduced lead-time provides the utility with greater flexibility with which it can accommodate changes in forecasts of peak demand." [9]

This is a benefit that does not show up in many solar valuation methodologies but could be significant.

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[7] *See* Oregon PUC Order 12-396 at 5.

[8] Modeling PV Fleet Output Variability. Hoff and Perez, 2010 http://www.cleanpower.com/wp-content/uploads/2012/02/071_ModelingPVFleetOutputVariability.pdf

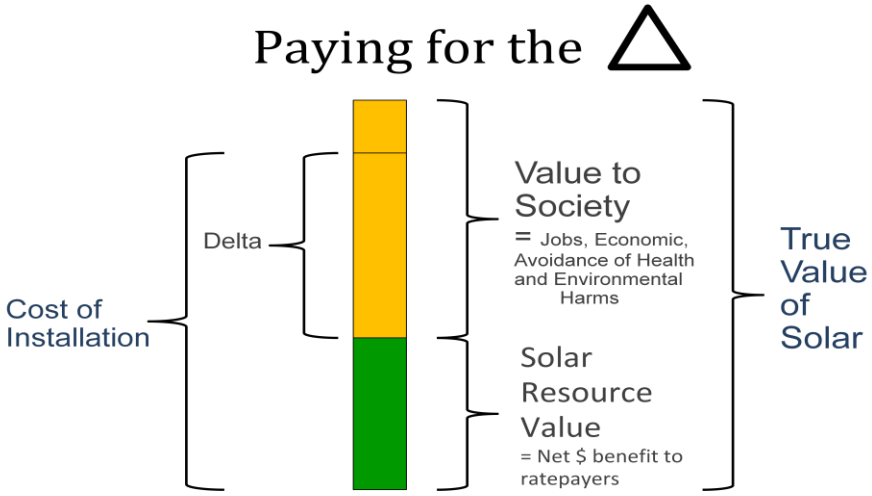
[9] From FERC Order No. 69, 45 Fed. Reg.12214 at 12227 reported in Unlocking DG Value**:** A PURPA-based approach to promoting DG growth. Keyes, Fox & Wiedman LLP May, 2013 http://www.irecusa.org/wp-content/uploads/2013/05/Unlocking-DG-Value.pdf

In consideration of job creation, it is more likely that larger systems will sporadically employ transient workers from out of state rather than supporting a thriving, consistent local workforce as with smaller installations.

Questions related to Costs and Benefits of Programs and their Distribution among retail electricity customers (HB 2893 (4)(1)(b))

7. How does cost effectiveness match up with the overall goal of promoting solar energy in question 1?

The costs and benefits of solar energy can be depicted graphically as in the figure below, where the units would be $/kWh:



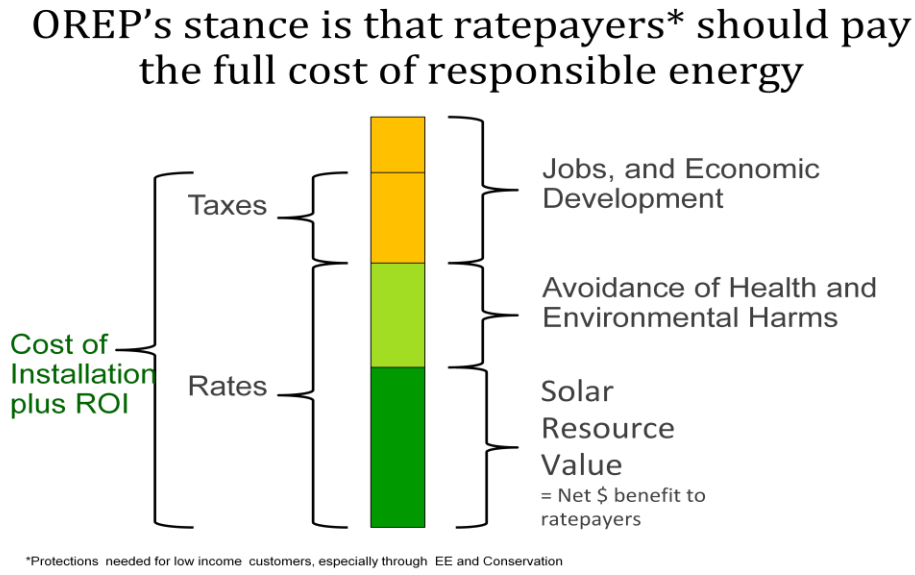
The Solar Resource Value (SRV) is the average value to the utility of energy produced by a solar installation– ie, what would it cost the utility to get that energy to a typical location at the times of day that solar is producing. We believe that there is consensus among all stakeholders that a solar installation is cost effective in the narrowest sense if it costs less than or equal to the SRV to install and therefore provides a financial benefit or costs nothing to ratepayers.

Note that the size of the different component bars and brackets in the conceptual diagram is arbitrary and does not reflect actual magnitudes. For example, in some cases nationally, the cost of installation for large-scale systems has already proven lower than the SRV (ie GA). There is good evidence that, when the costs and benefits are calculated over the appropriate time frame, this is also already the case for utility scale systems in Oregon.[10] Experience with the Solar Pilot Program (SSP) suggests that the cost of installation of smaller (residential and commercial) systems in Oregon is currently higher than the SRV. Under these circumstances, the question is how to pay for the "delta" or the difference between the SRV and the Cost of Installation.

OREP considers it appropriate to break the remaining benefits of solar (Value to Society) into two components as shown in the figure below, and to include all environmental benefits (ie avoidance of costs of hitherto

[10] *Vision to Integrate Solar in Oregon* (VISOR), Chris Robertson & Associates, LLC http://chrisrobertsonassociates.files.wordpress.com/2013/04/visor-2013_04.pdf

externalized harms) in the amount to be paid by rate payers. This amounts to ratepayers paying the price for responsible energy that does not shift costs onto all current and future citizens.



In situations where the cost of installation may exceed the value after accounting for avoidance of health and environmental harms, the remaining difference should be paid by taxpayers for the benefits of jobs and economic development and because of the desirability of solar to the Oregon public. It should be noted that this is a simplistic depiction and we have not considered the values of energy independence (ie stable energy supply without fuel price shocks or interrupted supply and avoided costs of militarily protecting supply chains) and disaster recovery benefits and enhance local grid reliability.

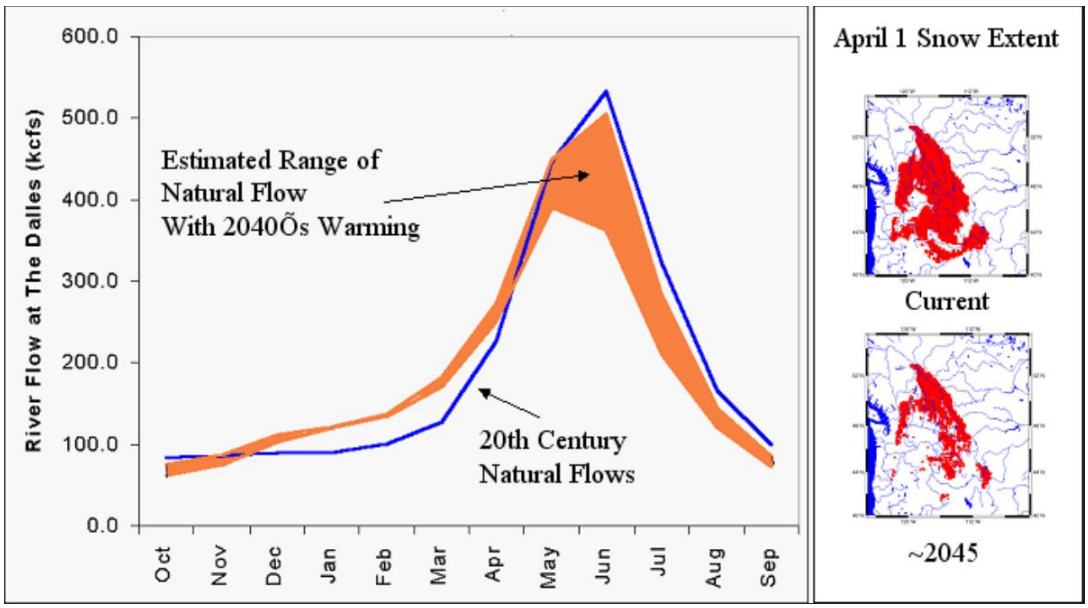
8. **How are the benefits of incentive programs distributed among non-participating retail customers?**

As citizens, non-participating retail customers benefit from all the social, health, and environmental values that solar provides. As retail customers, they benefit from the long-term rate stability inherent in free-fuel technologies. Just as customers in the Pacific Northwest benefit in their rates today from the huge capital investments in our hydroelectric system, local renewable energy projects installed today protect customers from the risks and costs of:

- fuel price shocks
- the increasing cost of fossil fuels as supplies diminish and the costs of extraction increase
- inevitable carbon policies that add to the cost of business as usual
- likely groundwater protection regulations that limit fracking and thus reduce supplies of natural gas
- increased cost to run thermal power production in the face of decreasing water supplies

Moreover, with continued utility investments in traditional power plants rather than renewables, retail customers risk being burdened with costly stranded assets and having to then build renewable infrastructure under a regime of higher and increasing energy costs.

Stream flows for the Columbia Basin and through the BPA hydroelectric system are projected to decrease overall and shift to earlier in the spring as global climate change reduces snow packs in the watershed. Solar, even without storage, is a good choice for meeting some of the lost hydro production predicted for May, June, July, and August.[11]



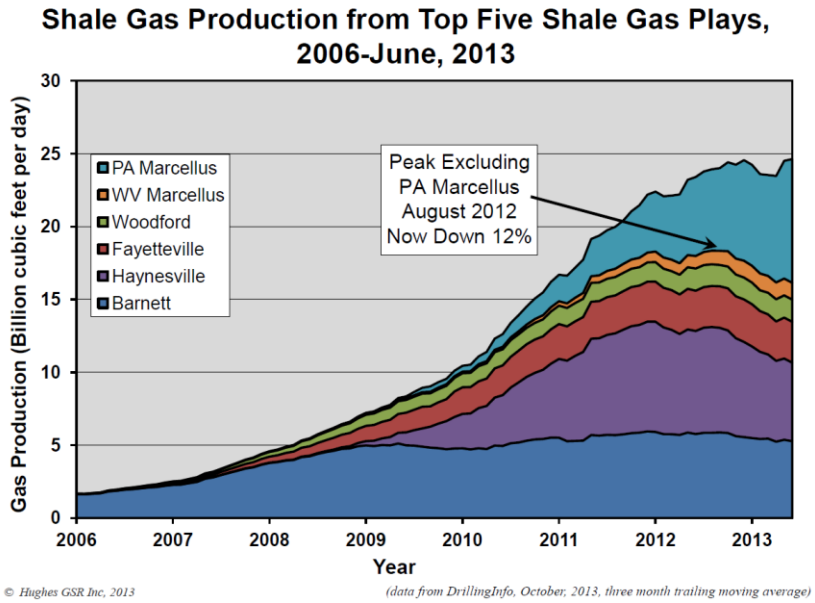
9. Can those benefits be quantified? If so, how? What studies would need to be done and what data would be needed?

These benefits can be estimated and to some extent are done so in the scenario analyses done by the NW Power and Conservation Council. (We note that in the 6th Power Plan the input costs of renewables were extremely inflated leading lower renewable recommendations, an error we hope will be avoided in the 7th Power Plan) And again, when pricing renewables, we emphasize the importance of using apples to apples comparison between renewables and fossil fuel technologies where capital costs are levelized over the entire projected life of the asset. When the analysis is done in this manner solar is shown to be quite affordable.[12]

In considering future fuel prices we recommend looking at the body of work assembled by geologist David Hughes for a clear-eyed look at reserves and extraction rates of coal, natural gas, and oil. As if often the case when insiders value a resource, we suspect that the natural gas wave that we are currently riding may in fact prove to be another bubble.

[11] http://cses.washington.edu/cig/res/hwr/hwrkeyfindings.shtml
[12] *Vision to Integrate Solar in Oregon* (VISOR), Chris Robertson & Associates, LLC http://chrisrobertsonassociates.files.wordpress.com/2013/04/visor-2013_04.pdf

It is telling to note that of the five top shale gas plays in the US at this time, only the PA Marcellus has not yet peaked.



The typical life-cycle of a shale play shows that the most productive sites are quickly identified and tapped, that any given well decreases production by 80% in 3 years, and that the play becomes "middle-aged" in just five years.[13] This does not bode well for a strong supply of natural gas for coming decades, particularly if the US becomes a net exporter.

There is a wealth of information about projected water shortages from Oregon and other states' agency and in the academic literature.

10. **What available studies on benefits of SPV (national or from other states) might be applicable to Oregon, and how would the results be adjusted so that the dollar value of the benefits is realistic for Oregon?**

Studies in other jurisdictions can be helpful in suggesting methodology and costs and benefits to consider in a "value of solar" study. Since every region and every utility has a different mix of resources, daily and seasonal load curves, time-of-day cost of energy, and solar resource, it is difficult to make direct extrapolations from one jurisdiction to another. It is *perhaps* possible to use the value of solar in one jurisdiction as an upper or lower value for another.

11. **Do incentive programs create cross subsidies?**

    a. **Who pays them?**

    b. **Are some ratepayer classes more affected than others?**

    c. **How are low income ratepayers protected?**

[13] Tight Oil: A Solution to U.S.Import Dependence? Presented at the *Geological Society of America*, *Denver, Colorado*, *October 28, 2013* by J. David Hughes, Global Sustainability Research Inc. Post Carbon Institute

d. Do some types of programs create less of a cross subsidy than others?

12. Do VIR and Net Metering participants pay their full share of the fixed costs of maintaining the grid? How are fixed costs recovered, and how should they be recovered?

With regard to cross subsidies between classes of rate payers under incentive programs, please refer to the Joint UM 1673 Core Principles.

However, it is important to note on the subject of cross subsidies, that, given what we now know about the causality between carbon emissions and climate change and ocean acidification (as well as the looming crises with regard to fresh water needed by thermal electricity generation), it is clear that ***the status quo of heavy reliance on fossil fuels by Oregon's investor-owned utilities amounts to substantial cross subsidization of IOU ratepayers by taxpayers and all other citizens*** since all citizens are bearing the cost of the externalities of extracting and burning fossil fuels to create electricity. We also note that under predicted scenarios of global climate change, those with the least are negatively affected the most. Thus continuing the with status quo is not in the best interest of low-income people

Low-income ratepayers absolutely need to be protected from rate increases but it is not wise to subsidize all ratepayers (and subsequently disincentivize conservation and efficiency) in order to protect one subclass. Social welfare programs belong in the sphere of governments and should not interfere with the appropriate, full-cost-based pricing of electricity. Utility customers should pay the price necessary for responsible energy. Low-income ratepayers should be protected through targeted programs, especially those using deep weatherization and conservation to lower electricity bills. .

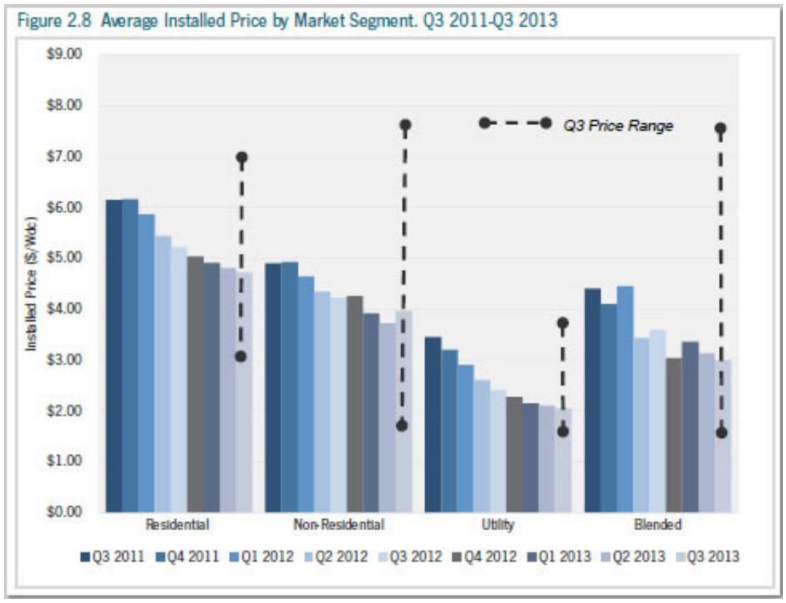
13. At what level of penetration does the impact on utility revenue become a significant factor?

The answer to this question depends entirely on how ownership of solar is distributed between utilities and individuals, and what on other services utilities transition into as they evolve their business model to accommodate extremely high penetrations of free-fuel, renewable energy production. German utilities own only 7% of renewable production and have seen their revenue and value plummet. This is a cautionary tale. With a willingness to evolve on the part of our utilities and with a good policy environment we can make a smoother transition in Oregon that maintains a strong, reliable electricity system and benefits all Oregonians.

Questions about Forecast Costs associated with solar photovoltaic systems in Oregon (HB 2893 (4)(1)(c))

14. What are sources of forecasts of solar panel prices? How big is the range of estimates?

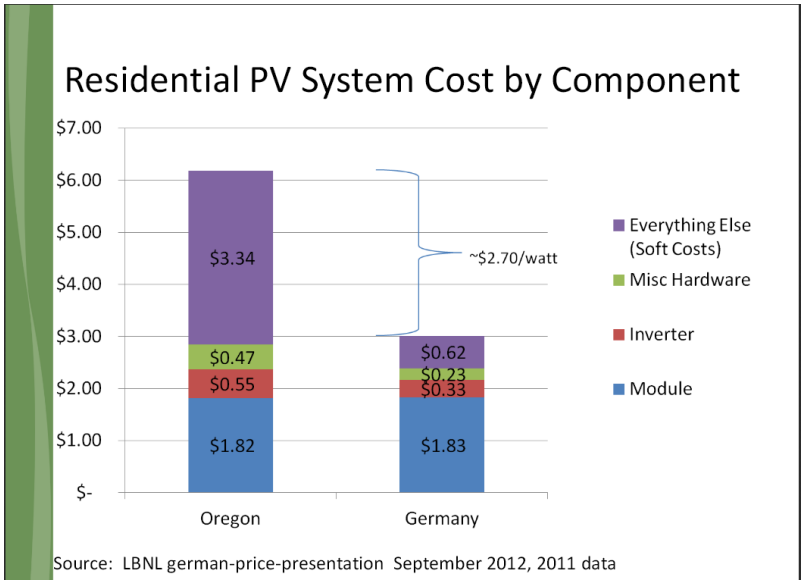
For recent data on installed costs for recent installations from *US Solar Market Insight*, Q3-2013, published by the Solar Energy Industries Association and Greentech Media.



For future costs consider the targets set by the US Department of Energy (USDOE) Sun Shot Initiative.

15. How much of SPV system costs are soft costs (interconnection, permitting, code compliance, other)?

Robert Del Mar of ODOE gave an excellent presentation on this subject at the 2013 Solar Now! University hosted by Solar Oregon. His presentation[14] including the chart below is well worth reviewing for a quick introduction to the components of soft costs and their magnitudes.



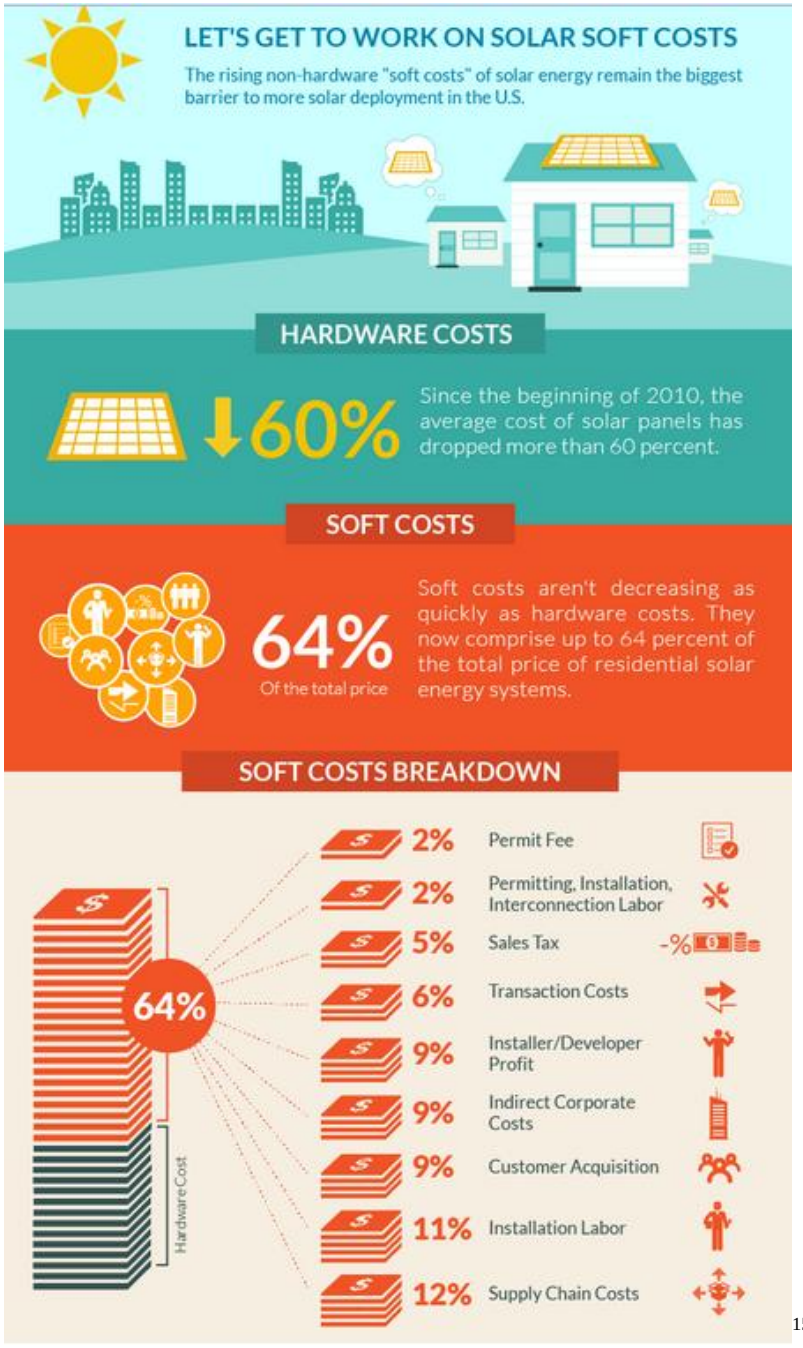
Rob Del Mar emphasizes in his presentation that the volume of installation is important in driving down soft costs. Please see comments on this issue in the Joint UM 1573 Core Principles.

[14] http://solaroregon.org/solar-now/speakers/reducing-pv-system-costs-in-oregon

An email from the US department of Energy on 12/16/2013 announced a new grant opportunity for addressing soft costs:

> **"Help Solve Solar's Big Challenge: Soft Costs**
>
> New research shows that the non-hardware "soft costs" of a solar energy system – such as permitting, customer acquisition, and operations – now account for up to 64% of the total price of installing residential solar energy systems in the United States. That's why in the most recent round of the Solar Incubator program, SunShot announced $10 million to fund outside-of-the-box ideas to solve the soft costs problem. Learn more and see the infographic, then apply for Incubator funding today. Concept papers due Jan. 13."

and linked to more recent national data on soft costs:



[15]

[15] http://energy.gov/eere/articles/help-solve-solar-s-big-challenge

16. **What initiatives are underway to lower soft costs? Is the trend in soft costs going down at the same pace as panel costs? Do soft costs create a "floor"?**

The graphic above from USDOE indicates that soft costs are not falling as fast as hardware costs. It is our understanding that ODOE and ETO are undertaking a project in conjunction with the federal Sun Shot Initiative to reduce soft costs in Oregon. We leave it to those stakeholders to provide data specific to this effort but note several ideas that those parties may not be considering:

e. "Community" or "shared" ownership for broad participation and economies of scale in installation.

f. Policies that allow for optimization of roof space for generation to minimize the fixed costs/kW at each installation. The current ETO/state incentives are particularly bad at this in creating a financial "sweet spot" around 3kW.

g. Obligatory solar on new construction to minimize acquisition, engineering, permitting, and construction costs

h. Since customer acquisition costs are a substantial component of soft costs (14% in the USDOE figure above, and 43% in the data quoted by Rob Del Mar) and since utilities enjoy the trust and confidence of their customers, soft costs could be substantially reduced by utility participation in promoting solar and taking on maintenance of systems.

Questions about Barriers within the programs to providing incentives (HB 2893 (4)(1)(d)

17. **List perceived barriers within the incentive programs in Oregon.**

    1. **Barriers that could be reduced by modifying the incentive program.**

        a. Potential participants without tax burden (nonprofits, government, seniors, etc) have been excluded from programs that require tax appetite. The current ODOE program seeks to address that issue but has been ineffective at raising tax credits in its auctions. ODOE can speak better to this issue. The Solar Pilot Program works well for all.

        b. Participation in the Solar Pilot Program has been limited by the cap on capacity and consequent lottery system of allocation. The market wants certainty. An expanded program could be adjusted to correct this issue while still maintaining a cap on total capacity allocated.

        c. Participants of the Solar Pilot Program have been challenged at times in getting loans based on the production potential of the system. Solar production is a low risk activity and over time in other countries the financial community or state banks have come to realize that and offer loans.

Better financial tools would be facilitated by higher volume and also by a forum set up for communication between the financial and energy communities.

d. Citizens who don't own a good roof for solar have been largely unable to participate in solar development. This barrier can be surmounted by a program specifically targeting shared ownership. The Solar Pilot Program had great potential for community projects but limited capacity. Many church systems fall in the 30kW range and were unsuccessful in attaining capacity in the medium sized range before the VIR dropped and the federal grant program ended. (The loss of the Federal Grant in lieu of tax credits is a remaining challenge.)

2. "Barriers" that are really measures intended to minimize cost shifting or abuse

18. List "other" barriers unrelated to incentive programs (e.g. local permitting, building codes, other)

a. All programs have historically been limited by the high cost of solar. Hard costs have been driven down globally by market activity in other jurisdictions. Soft costs will be driven down here by targeted efforts and volume, allowing yet higher volume and lower costs. [16]

b. At some point integration may require investments in distributed storage. This will provide an opportunity for investment by utilities or perhaps by citizens. Germany has experimented with the latter approach.[17] Alternatively, much integration may be handled more cost effectively through demand response (water heaters, EV2G, etc).

Questions about Future Development of Solar Energy

19. At what penetration does solar generation affect local distribution reliability?

OREP does not pretend to the technical expertise to answer this question directly but notes that other countries with high penetrations do not seem to have a problem. Around noon of October 3rd, 2013 wind and solar met 59.1% of German load, with solar providing more than half the renewable energy. The renewable energy contribution has exceeded 50% on numerous occasions.[18] "Portugal and Denmark already get 37% or more of their electricity from renewable energy on an annual basis, and Spain and Italy have reached more than 30%."[19]

We also question the assumption that addition of solar necessarily affects local distribution reliability negatively. With rapidly developing storage, EV2G, smart inverters providing reactive control (day and night), and microgrids, local reliability may in fact be enhanced by solar.

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[16] http://solaroregon.org/solar-now/speakers/reducing-pv-system-costs-in-oregon
[17] http://theenergycollective.com/stephenlacey/253121/germany-s-energy-storage-subsidy-no-solar-miracle

[18] http://www.solarserver.com/solar-magazine/solar-news/current/2013/kw41/german-solar-pv-wind-peak-at-591-of-electricity-production-on-october-3rd-2013.html
[19] http://www.solarserver.com/solar-magazine/solar-news/current/2013/kw38/uk-expects-renewable-energy-to-meet-37-of-electricity-demand-by-2022.html

20. What initiatives are in place to prepare for greater solar penetration, and what initiatives might be considered?

21. Looking forward, what initiatives are in place to reduce solar integration costs, and what initiatives should be considered?

Taking Questions #14 and #15 together, we are unaware of any existing initiatives but propose:

a. An initiative whereby maps and/or tables would be created for Oregon indicating "great", "okay", and "bad" locations for significant additions of solar energy production. These efforts have been undertaken in Ontario, Canada, where a map indicates availability of transmission for systems greater than and less than 50 MW[20] and tables indicate ability to accept solar at each station[21] and in Southern California, where maps (opened with Google Earth) at the distribution level indicate "preferred" or "not preferred" status and "Max. Available Capacity" for solar integration to particular distribution circuits.[22] Such maps and/or tables would add transparency to the siting process thereby enabling reduction of soft costs and promotion of solar generation in the most effective locations where integration would be easiest and the value of the energy produced would be the greatest.

b. Policy that pays more for solar panels that are oriented towards the west so as to better match air conditioning load and to produce energy further into the evening load that otherwise provides a challenge for utilities. In Austin, Texas, west facing panels reduced grid dependence during peak hours by 65%as opposed to 54%for south facing panels.[23]

22. What business models would best meet the overall goals in Questions 1 and 2?

Business models in the utility context was broadly discussed under question #2.

23. What policy models would best meet the overall goals in Questions 1 and 2?

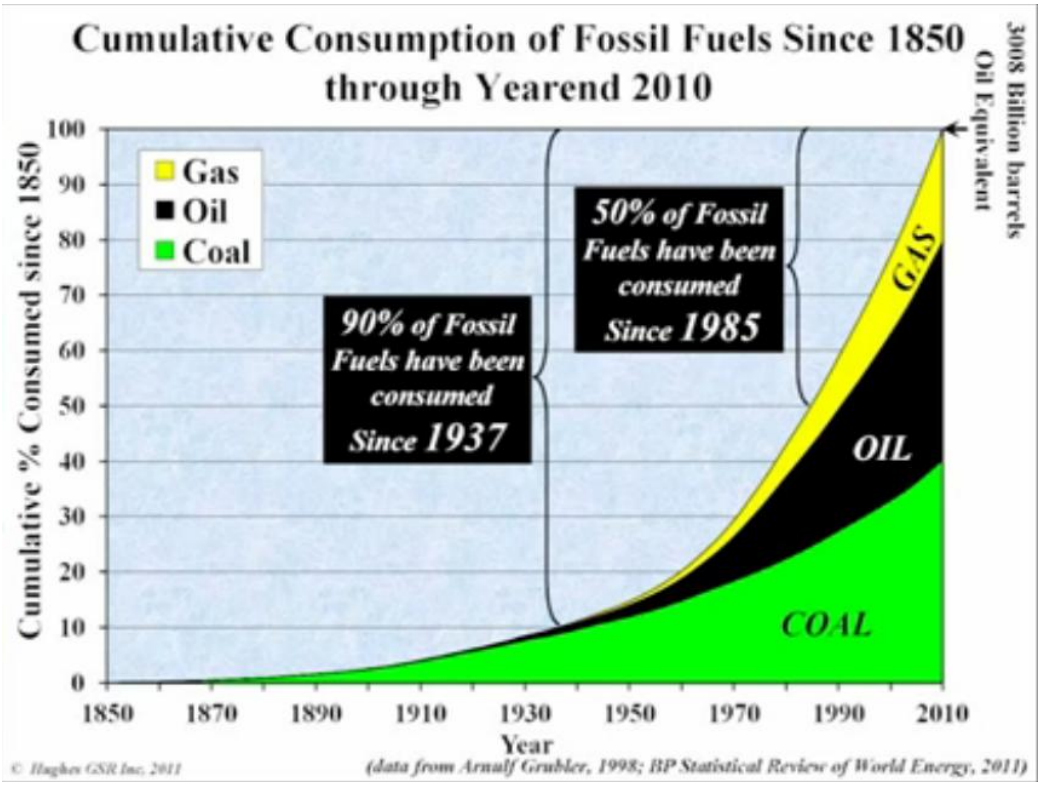
Among the important questions policymakers should consider are the desired timescale of the transition from fossil fuel generation to generation from distributed renewable sources taking into consideration the risks inherent in business as usual and the perceived urgency of climate change mitigation measures. In driving down the costs of solar, volume matters. Policy makers want to know the relative potential of competing program designs to scale rapidly and achieve the cost-efficiencies of increase volume. Programs recommendations should be evaluated on this criterion.

In considering policy options, the affordability to the state treasury, particularly the cost of front-loaded tax credits, should be taken into account. In this light and, given the current limited availability of tax incentives, ***production-based payments which stimulate investment of private capital and are accessible to governments, non-profits, utilities and community projects would seem to have the greatest potential to achieve rapid increases in installation volume.***

[20] http://fit.powerauthority.on.ca/sites/default/files/version3/FIT%203%20Area%20Map%20-%20October%203%202013.png
[21] http://fit.powerauthority.on.ca/sites/default/files/version3/TAT%20table%20-%20October%209%202013%20%28final%29_0.pdf
[22] *SCE* Generation *Interconnection Maps*
[23] http://www.sesco.us/2013/11/most-of-worlds-solar-panels-are-facing.html

A Personal Note

My parents were born in 1931 and are both still living. It is startling to realize that more than 90% of fossil fuels consumed have been consumed in their lifetime. Perhaps even more startling, almost 50% of fossil fuels consumed have been consumed in the lifetime my 26-year old daughter. As shown in the graph below, the current growth in fossil fuel usage is staggering. [24]



Science (and common sense) tells us that we as a species cannot continue on this trajectory of usage, both because of impact to the atmosphere, the climate, and the oceans, and because of ultimate limitations on the supply side. When is the appropriate time to seriously address this reality and profoundly change the way we "energize" our society? What are the risks, environmental and financial, of delaying the inevitable? What are the benefits of making serious strides in the transition now, in a controlled fashion, while the energy to build new infrastructure is still inexpensive?

We want to be fair and smart in allocating costs and benefits to current ratepayers, taxpayers, and other citizens, but let us not get bogged down in the weeds and ignore the larger reality that any existing degree of cost shifting between rate payers today pales in comparison to the intergenerational inequity we have unwittingly created but now have the choice to begin to mitigate.

[24] Graph from video of presentation by David Hughes at Cornell University, May 2, 2012 http://www.postcarbon.org/person/36208-david-hughes#

DATED this 19th day of December, 2013.

Oregonians for Renewable Energy Policy (OREP)

/s/ Kathleen A. Newman

OREP Representative

UM 1673−CERTIFICATE OF SERVICE

I hereby certify that I have this day caused Comments from Oregonians for Renewable Energy Progress in response to Staff Questions for Parties on Solar Incentive Program Report under HB 2893 to be served by electronic mail to those parties whose email addresses appear on the attached service list, and by First Class Mail, postage prepaid and properly addressed, to those parties on the service list who have not waived paper service from OPUC Docket No. UM 1673.

DATED this 19th day of December, 2013.

Respectfully submitted,

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