

**EXHIBIT NO. ___(AF-4T)
DOCKETS UE-151871/UG-151872
PSE LEASING TARIFF
WITNESS: AHMAD FARUQUI, Ph.D**

**BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION,**

Complainant,

v.

PUGET SOUND ENERGY,

Respondent.

**Dockets UE-151871
UG-151872**

**PREFILED REBUTTAL TESTIMONY (NONCONFIDENTIAL) OF
AHMAD FARUQUI, Ph.D.
ON BEHALF OF PUGET SOUND ENERGY**

JULY 1, 2016

PUGET SOUND ENERGY
PREFILED REBUTTAL TESTIMONY (NONCONFIDENTIAL) OF
AHMAD FARUQUI, Ph.D.

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I. INTRODUCTION

Q. Are you the same Ahmad Faruqui who submitted prefiled direct testimony in this proceeding on February 25, 2016, on behalf of Puget Sound Energy (“PSE” or “the Company”)?

A. Yes.

Q. Please summarize your rebuttal testimony.

A. Customers who participate in the Lease Solutions service do so because their individual private benefits exceed their individual private costs and they receive a net private benefit from the service. This results in a series of public benefits for all customers (participants and non-participants alike), since some of the equipment being leased is more efficient than that which would otherwise be installed (or kept beyond its useful life). These public benefits take the form of avoided carbon and capacity investments. Non-participants pay nothing for these benefits and bear no risk, since Lease Solutions is financed in such a way that all risk is borne by PSE’s shareholders. As I discussed in my original testimony, the reason that these public benefits exist is that Lease Solutions manages to overcome several behavioral and financial barriers that inhibit some customers

1 from purchasing new, efficient products. Witnesses for the Commission Staff and
2 Public Council propose several possible alternatives to the leasing service that
3 purport to overcome these barriers. In my rebuttal testimony I show that these
4 proposed solutions are cumbersome, address the barriers piecemeal, and fail to
5 offer a relatively simple and complete bundled solution that is comparable to
6 Lease Solutions. In short, Lease Solutions produces net private benefits for
7 participants as well as public benefits that extend to the entire customer base at no
8 additional cost or risk to non-participants.

9 **II. ALTERNATIVE SOLUTIONS FAIL TO ADDRESS**
10 **BARRIERS TO ADOPTION OF NEW, EFFICIENT PRODUCTS**

11 **Q. Having reviewed the testimony from other parties in this case, do you still**
12 **believe there are the barriers to the adoption of new, efficient products in**
13 **PSE's service territory which Lease Solutions can help remove?**

14 **A.** Yes, as stated in my direct testimony, there are five key barriers to the adoption of
15 new, efficient products: credit constraints, risk aversion, imperfect information
16 and search costs, myopic behavior (hyperbolic discounting), and the presence of
17 external benefits that do not accrue just to those customers who purchase new,
18 more efficient products, but to all PSE customers. As discussed in more detail
19 later, PSE's proposed Lease Solutions addresses these barriers and allows for the
20 accelerated adoption of efficient technologies.

1 **Q. What alternative services to leasing have other witnesses proposed to**
2 **overcome these barriers?**

3 A. No alternatives were presented that were comparable to the comprehensive Lease
4 Solutions service proposed by PSE. Public Counsel and Commission Staff state
5 that the barriers to adoption can be addressed through many financing and
6 maintenance packages that are already available in the market. Witnesses
7 Kimball, Cebulko, and O’Connell provide three examples: bank or credit union
8 loans for energy efficiency, on-bill financing partnerships between utilities and
9 financial institutions, and retailer or contractor financing.

10 **Q. Are all of these services readily available as a single package or bundle in**
11 **PSE’s service territory or in service territories adjacent to PSE’s?**

12 A. No, they are not.

13 **Q. Do Public Counsel and Commission Staff give examples of energy-efficiency**
14 **financing available in PSE’s service area?**

15 A. Yes. For example, Public Counsel and Commission Staff state that the Puget
16 Sound Cooperative Credit Union (PSCCU) offers Energy-Smart Loans
17 throughout the state of Washington.¹ These loans for energy efficient or

¹ Kimball, Exhibit No. ____ (MMK-1HCT), 47:19-21, O’Connell, Exhibit No. ____ (ECO-1HCT), 44:12-16.

1 renewable energy projects have terms up to 15 years and cover amounts up to
2 \$35,000 with fixed rates between 4.49 and 7.99 percent.²

3 **Q. Is the loan bundled with the purchase of new, efficient products?**

4 A. No, it is not. The customer would have to deal with a cumbersome process to
5 select a product, a vendor, and a loan. This is a multistep process involving
6 several parties.

7 **Q. What process must a customer undergo to apply for and receive an Energy-
8 Smart Loan?**

9 A. A customer must first research and decide on which product to purchase and
10 contractor to hire before applying for the loan. The customer then needs to work
11 with PSCCU staff to confirm that product to be financed meets certain energy
12 efficiency standards.³ There is no quick reference guide for customers to see if
13 equipment that they are interested in can be financed, or to find equipment that is
14 already approved.⁴ After deciding on the equipment and vendor, the customer
15 needs to fill out an online application. This begins with authorization for PSCCU
16 to check the customer's bank account, credit, and employment history, in addition
17 to the provision of personal details, such as a social security number and employer

² Exhibit No. ____ (MMK-5), pp. 1-3 and Exhibit No. ____ (BTC-6), pp. 6-7.

³ Exhibit No. ____ (MMK-5), p. 2.

⁴ Call with PSCCU employee, June 28, 2016. Also see "Energy-Smart Loans," Puget Sound Energy Cooperative Credit Union, <https://www.pscu.org/Borrow/Energy-Smart-Loans.aspx>, last accessed June 20, 2016.

1 contact information. Once approved, the applicant must pay a filing fee of \$180,⁵
2 and open an account with the credit union, which requires that he or she maintain
3 a \$5 minimum balance in a savings account.⁶

4 **Q. Does the PSCCU inform customers of product options or potential**
5 **contractors?**

6 A. The PSCCU does not provide a comparative guide or other information online
7 that could assist customers in making a decision about which appliances to
8 purchase or contractors to use in installing and/or maintaining the equipment.⁷

9 **Q. Does the PSCCU offer other services such as warranties or maintenance**
10 **packages?**

11 A. No.⁸

12 **Q. What examples of on-bill financing exist near PSE's service area?**

13 A. Public Counsel and Commission Staff state that Seattle City Light and Northwest
14 Natural Gas offer on-bill financing for energy-efficiency equipment in partnership
15 with Craft3, a Community Development Financial Institution that examines utility

⁵ O'Connell, Exhibit No. ___(ECO-1HCT), 44:17-19.

⁶ Call with PSCCU employee, June 22, 2016.

⁷ Call with PSCCU employee, June 28, 2016. Also see "Energy-Smart Loans," Puget Sound Energy Cooperative Credit Union, <https://www.pscu.org/Borrow/Energy-Smart-Loans.aspx>, last accessed June 20, 2016.

⁸ Call with PSCCU employee, June 28, 2016.

1 bill payment history as one aspect in evaluating loan applications.⁹ Craft3 offers
2 Home-Energy Efficiency Loans with terms up to 20 years and amounts up to
3 \$30,000, with rates of 4.49 percent to eligible households. Craft3 also offers lower
4 rates of 3.49 percent for households with an annual income up to 80 percent of the
5 Area Median Income (depending on family size).¹⁰

6 **Q. What process does a customer undergo to apply for and receive Craft3**
7 **financing for efficient equipment?**

8 A. The online application process consists of personal and financial details, such as a
9 social security number, household income, and utility account information, and
10 authorization for Craft3 to check the applicant's utility payment history and
11 preform a credit check. The applicant must also ensure that he or she is listed in
12 the title of the home, and that the same name is listed on their utility account.

13 The program requires the customer to work with a separate, program-approved
14 contractor to finalize a bid before receiving a loan. Craft3's website does not
15 appear to provide a list of approved contractors. In fact, for the lender's
16 partnership with Northwest Natural Gas, the customer must go onto a partner
17 organization's separate website to search for an approved contractor. The partner
18 organization – the Energy Trust of Oregon (ETO) – is a ratepayer-funded non-

⁹ Kimball, Exhibit No. ___(MMK-1HCT), 36:8-14–37:1-11 and
Cebulko, Exhibit No. ___(BTC-1HCT), 26:18-21–27:1-2.

¹⁰ Exhibit No. ___(MMK-5), pp. 4-7.

1 profit that provides energy efficiency and renewable energy incentives.¹¹ In order
2 to receive a Craft3 loan, the applicant must work with an ETO-approved
3 contractor to fill out an additional application to be submitted with a “project bid”
4 to the ETO.¹² Craft3 determines an applicant’s eligibility for a loan while ETO
5 decides whether the applicant’s project meets efficiency criteria; both processes
6 must be complete in order to receive financing.¹³

7 The customer would only receive up to 50 percent of the loan amount to pay the
8 contractor upfront, then Craft3 would pay the contractor the remaining amount
9 after an “energy upgrade and quality oversight check” are completed.¹⁴

10 **Q. From where does Craft3’s home energy-efficiency loan program receive**
11 **funding?**

12 A. Craft3 receives funding for its loans and other activities from external grants and
13 loans to the organization. The organization’s funders include state and local

¹¹ “Who We Are,” Energy Trust of Oregon, <https://energytrust.org/about/who-we-are/>, last accessed June 22, 2016.

¹² The application asks the applicant to confirm that he or she is “working with an Energy Trust - Trade Ally Contractor who is approved to participate in this program, and [has] completed the ETO Incentive Application which has been submitted with [his or her] project bid to Energy Trust.” See the first page of the application form here: <https://ola.craft3.org/EnergyTrustWALoanPage1.aspx>, last accessed June 22, 2016.

After some searching, a webpage can be found that notes that the approved contractor can help the applicant fill out the necessary forms to receive cash incentives. See “Energy Savings for NW Natural Customers in Washington,” Energy Trust of Oregon, <https://energytrust.org/washington/>, last accessed June 22, 2016.

¹³ Call with Craft3 employee, June 22, 2016.

¹⁴ Exhibit No. ___(BTC-6), p. 2.

1 government entities, such as the City of Seattle and the State of Washington's
2 Department of Commerce and Department of Ecology.¹⁵ In addition, ETO, the
3 partner organization that approves projects for Craft3 financing and provides
4 additional incentives, is funded by the ratepayers of Portland General Electric,
5 Pacific Power, Northwest Natural Gas, and Cascade Natural Gas.¹⁶

6 **Q. What retailers and contractors offer financing for energy-efficient appliances**
7 **in PSE's service area?**

8 A. Mr. Cebulko notes that some HVAC contractors partner with credit unions and
9 cooperatives to offer financing at lower interest rates.¹⁷ His exhibits also provide
10 the example of financing options from Lowe's in Olympia, Washington for
11 purchases made over \$299,¹⁸ and financing from the home improvement
12 contractor Washington Energy Services, which works with local banks and credit
13 unions to provide loans for its products and installation.¹⁹

14 **Q. What process does a customer undergo to apply for and receive financing**
15 **from Washington Energy Services?**

¹⁵ Craft 3 2015 Annual Report, May 31, 2016, p. 2, <http://www.craft3.org/docs/default-source/annual-reports/craft3-2015-annual-report.pdf?sfvrsn=8>, accessed June 22, 2016

¹⁶ "Who We Are," Energy Trust of Oregon, <https://energytrust.org/about/who-we-are/>, last accessed June 22, 2016.

¹⁷ Cebulko, Exhibit No. ___(BTC-1HCT), 26:15-18.

¹⁸ Exhibit No. ___(BTC-6), p. 10.

¹⁹ Exhibit No. ___(BTC-6), p. 11.

1 A. After selecting a product offered by the company, a customer must request a free
2 estimate by a Home Energy Specialist. This specialist will then discuss the
3 available payment options and go over the required forms. The specialist will
4 send the customer's completed application to a partner bank or credit union for
5 approval. Financing terms and payments are taken care of by the partner financial
6 institution.²⁰

7 **Q. What other services offered by retailers and contractors do Commission
8 Staff cite as alternatives to Lease Solutions in PSE's service area?**

9 A. Mr. Cebulko argues that Lease Solutions will compete with maintenance
10 packages and extended warranties.²¹ Washington Energy Services, for example,
11 offers multiple maintenance packages with one-time and/or monthly prices that
12 depend on the number of "tune-ups" provided and the length of the maintenance
13 term.²²

14 **Q. Do the aforementioned alternative solutions address all of the barriers to
15 adoption of new, efficient products?**

16 A. No. None of the alternatives currently available in the market fully address all of
17 the major barriers discussed in my direct evidence. Although several of the above

²⁰ Call with Washington Energy Services employee, June 22, 2016.

²¹ Cebulko, Exhibit No. ___(BTC-1HCT), 7:3-4.

²² "Guardian Maintenance Club," Washington Energy Services,
<http://www.washingtonenergy.com/services/guardian-maintenance-hvac-service>, last accessed
June 20, 2016.

1 solutions partially address the barriers of credit constraints, myopic behavior, and
2 externalities, they do not completely ease customers' risk aversion or the issues of
3 imperfect information and search costs. If these barriers did not exist, the
4 conservation programs offered by PSE would have much higher enrollment rates
5 than what they have today. The programs are well designed and among the best in
6 the country. However, some customers remain beyond their reach.

7 **Q. How do the aforementioned alternative solutions address credit constraints?**

8 A. Although Craft3's partnership with utilities allows it to use customer bill payment
9 data in determining initial eligibility for a loan, it and the other options discussed
10 above require a full credit and background check, which means that some
11 customers may still face constraints in obtaining a loan. PSE's proposed Lease
12 Solutions eligibility screening will only assess customer bill payment history in
13 establishing eligibility, which greatly reduces the additional credit constraints
14 placed on customers by the proposed alternative solutions.

15 **Q. How do the aforementioned alternative solutions address risk aversion?**

16 A. The fact that customers must work with retailers, financial institutions, and
17 installation and maintenance contractors separately imposes significant
18 transaction costs on them. Even if the customer decides to pursue the complex
19 process described above, he or she will not know until the process is completed
20 whether he or she or the products and contractors that have been chosen will meet
21 various eligibility criteria for the loan.

1 **Q. How do the alternative solutions address imperfect information and search**
2 **costs?**

3 A. In the face of imperfect information about optimal contractor and equipment
4 choices, search costs become an insuperable barrier for many customers. For
5 example, Northwest Natural Gas customers desiring to finance their gas HVAC
6 project with Craft3 have 112 contractor options, 59 of which are located within 20
7 miles of Vancouver, Washington.²³

8 In order to narrow down his or her choices, the customer will have to balance
9 many factors, such as prices, efficiency levels, and brand and vendor reputation.²⁴

10 Furthermore, the customer may have to engage in a bid process between several
11 vendors.

12 **Q. How do the aforementioned alternative solutions address myopic behavior?**

13 A. As with leasing, financing better aligns the costs and benefits of new equipment
14 purchases over the life of the product. However, the substantial amount of upfront
15 investment in effort may cause a customer to defer the process altogether, due to
16 short-term thinking. In addition to the research required to understand the
17 appliance market discussed above, the customer must undertake a cumbersome
18 process to apply for a loan, which typically involves approval of the customer's

²³ See "Commercial Trade Ally Contractors," Energy Trust of Oregon,
<http://energytrust.org/commercial/find-a-contractor>. My search terms were "Vancouver,
Washington" for location, "Existing Buildings" for building type, and "HVAC – Gas" for what I
need help with. Query was made on June 23, 2016.

²⁴ Fluetsch, Exhibit No. ____ (BF-1T), 10:1-8.

1 financial background, the contractor who will install the equipment or make the
2 retrofits, and the project's forecasted energy savings.

3 **Q. How do the aforementioned alternative solutions address externalities that**
4 **do not directly benefit adopters?**

5 A. Energy-specific programs, such as PSCCU's Energy-Smart Loan or Craft3's
6 financing partnerships, can align private and public benefits by encouraging
7 customers to purchase energy-efficient equipment. The more general financing
8 options available from retailers and banks, however, do not usually offer
9 particular loans for certain types of equipment, and thus do not attend to the
10 externalities associated with efficient appliances.

11 **Q. Does Lease Solutions address the barriers to adoption of new, efficient**
12 **products?**

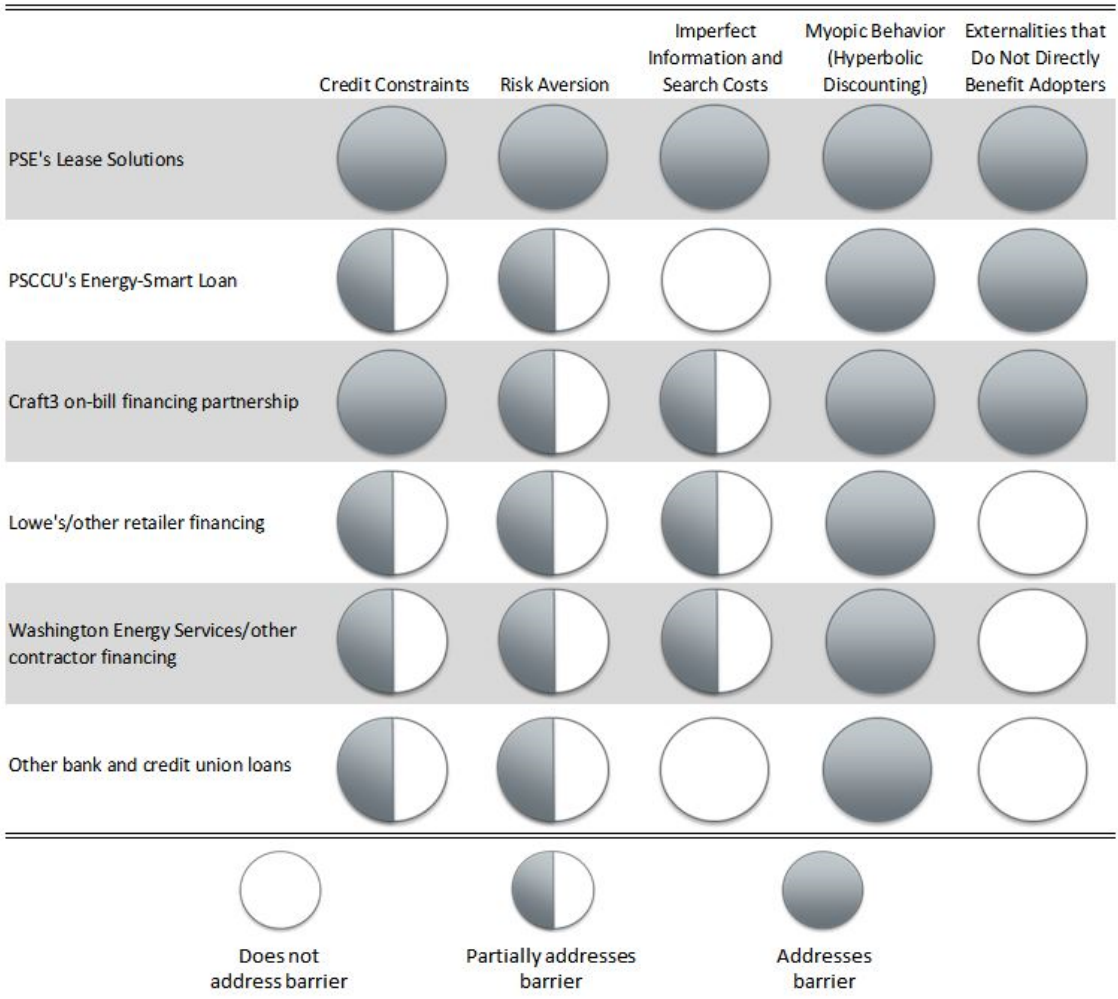
13 A. Yes. As stated in my direct testimony, Lease Solutions reduces credit constraints
14 for those who would otherwise find it difficult to obtain credit; eases risk aversion
15 through services such as maintenance, equipment repair and replacement, and
16 customer support over the life of the appliance; reduces imperfect information and
17 search costs by providing a convenient, "one-stop" shop for financing and
18 researched product and installation options; avoids myopic behavior by aligning

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the costs and benefits of the new equipment; and allows for positive externalities to be achieved by offering efficient equipment through a hassle-free process.²⁵

Figure 1 below illustrates how PSE’s proposed leasing service and the alternative solutions address each of the barriers to adoption of efficient products.

Figure 1 – How Lease Solutions and the Available Alternatives Address the Barriers to Customer Adoption of Efficient Products



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²⁵ Faruqui, Exhibit No. ____ (AF-1T), 14:15-15:13.

1 **Q. How does Lease Solutions compare with these alternative solutions?**

2 A. None of the financing services currently available in PSE's service area, or the
3 alternative utility solution of on-bill financing, offer the convenience of the
4 bundled leasing service that PSE proposes. In the alternative solutions, even if the
5 customer receives a loan, he or she may not have the benefit of on-bill repayment
6 and may have to purchase a separate maintenance plan. If the equipment fails
7 without a maintenance plan, the customer will have to coordinate the replacement
8 themselves, if the equipment is still under warranty. If it is beyond the warranty,
9 the customer will have to find the time and capital necessary to facilitate the
10 replacement on their own.

11 By combining installation, financing with payment through their existing utility
12 bill, maintenance, repair and replacement, and customer support, PSE's Lease
13 Solutions is unique and reduces a customer's aversion to the risk of purchasing an
14 expensive and technically-complex piece of equipment, and expedites the overall
15 process. Furthermore, the service reduces imperfect information and search costs
16 by having the customer's local utility, a trusted energy advisor, guide them
17 through the process.

18 In order to achieve the bundle of products and services offered in PSE's Lease
19 Solutions, a customer would have to:

- 20 1. Research and decide on the equipment they would like to finance,
21 2. Research options to finance this equipment,

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3. Find a vendor to provide and install the equipment,
 - a. If the customer is going through a specific lending service, such as that of Craft3, he or she may have to ensure that the project and contractor are approved by the lending institution.

4. Apply for a loan at a lending institution,
 - a. This process may be online, or may involve a contractor visit prior to filling out requisite forms, such as in the case of Washington Energy Services.
 - b. The customer may have to participate in a background and credit check, as well as confirm that their project will result in home energy conservation.
 - c. Additional applications may be required to approve the project, such as in the case of Craft3's service.

5. Purchase the equipment and/or pay contractor to install the equipment, using funding from the loan,
 - a. The full loan amount may not be available until the project is audited, such as in the case of Craft3's service.

6. Repay the loan, either to the lending institution directly or the utility of using a service such as Craft3's, and

7. Purchase a separate maintenance plan and/or warranty.

1 Total Resource Cost (TRC) and Ratepayer Impact Measure (RIM) tests, are not
2 relevant in this case since all costs are borne by those who choose to participate in
3 this optional service, while any risk is borne by utility shareholders. Put
4 differently, all costs and risks are borne by voluntary participants in the program,
5 and any public benefits that accrue to non-participating customers are a costless
6 bonus for them. This bonus is what the Public Benefits Model captures.

7 **Q. Have you or your firm performed similar analyses that primarily examine**
8 **the benefits to be gained from a program?**

9 A. Yes, in a few cases, I have analyzed and presented the societal benefits of smart
10 grid investments without any specific quantification of costs. This includes
11 presentations made in Michigan and California in 2011 and 2014, respectively.²⁸

12 **Q. Do you agree with Mr. Cebulko that deferred capacity investments can only**
13 **be counted in the benefits model if the conservation savings meet a cost-**
14 **effectiveness test?**²⁹

15 A. No. The Lease Solutions service will attract a certain number of participants, who
16 find that their individual benefits of the service exceed their individual costs.
17 Once they are participating in the program, a certain number of those participants
18 will begin creating societal benefits. The Public Benefits model accounts for these

²⁸ See Ahmad Faruqui, "The Tao of the Smart Grid," presented to Michigan Smart Grid Collaborative, August 24, 2011; and Ahmad Faruqui, "The *Tao* of the Smart Grid," presented to California Energy Efficiency Industry Council, July 23, 2014.

²⁹ Cebulko, Exhibit No. ___(BTC-1HCT), 31:14-15.

1 societal benefits. This is not a conservation program and PSE is not asking for any
2 compensation from other customers for these societal benefits. The tests used for
3 judging the cost-effectiveness of conservation programs are unnecessary.

4 **Q. Do you agree with Mr. Cebulko's concern that with Lease Solutions, the**
5 **general ratepayer may benefit from some conservation benefits to the system**
6 **at the expense of participants in the program who are paying unreasonable**
7 **rates?**³⁰

8 A. No. As stated earlier in this testimony, customers will participate in this optional
9 service if the private benefits exceed the private costs. They are not considering
10 the public benefit in their lease decision.

11 **Q. Are there situations in which customers may choose a more expensive option**
12 **because of their private cost-benefit calculation?**

13 A. Yes, a customer may weigh certain factors over the monetary cost. For example,
14 there are intangible benefits such as convenience and hassle avoidance that are
15 often hard to quantify.

16 **Q. Mr. Cebulko expresses concern that a number of the offered appliances are**
17 **not energy-efficient models and thus would not produce any conservation**
18 **benefits.**³¹ **Do you agree with his concern?**

³⁰ Cebulko, Exhibit No. ___(BTC-1HCT), 32:1-2.

³¹ Cebulko, Exhibit No. ___(BTC-1HCT), 32:12-14.

1 A. Mr. Cebulko is correct that non-energy-efficient models would not produce
2 conservation benefits. However, the Public Benefits Model does not calculate any
3 energy savings or other benefits from these models. The Public Benefits Model
4 assumes that customers will choose to lease an energy efficient model when it is
5 technically feasible to do so. This is based on PSE survey data that showed that
6 obtaining efficient equipment was central to customer's decision to lease. If some
7 customers choose less efficient models, the public benefits will be proportionately
8 lower.

9 **Q. Mr. Cebulko states that you made strong conclusions from weak data in your**
10 **testimony. How do you respond to this statement?**

11 A. I built a robust and transparent model given the best data available, which had
12 similar features and characteristics to those I have used in other analyses. Mr.
13 Cebulko has had the Public Benefits Model in his possession, and is welcome to
14 adjust the data as he sees fit. However, one cannot reject the large range of
15 benefits demonstrated by the model simply based on criticisms of certain inputs.

16 **IV. THE VALIDITY OF THE MODEL INPUTS**

17 **Q. Are customer surveys a valid technique to generate participation numbers**
18 **for these types of models?**

19 A. Yes, customer surveys are a standard technique to generate participation numbers
20 used in evaluating similar programs. In fact, if there is no prior data on customer

1 preferences for a new product or service, customer surveys are the only way to
2 gauge likely customer interest.

3 **Q. Was PSE’s customer survey typical of surveys you have seen elsewhere?**

4 A. Yes. The PSE survey asked customers how many would participate in the Lease
5 Solution. This is the most direct way of ascertaining market interest in a new
6 product or service. PSE witness Malcolm McCulloch addresses this in more detail
7 in his prefiled rebuttal testimony.

8 **Q. Why does the Public Benefits Model assume a different participation rate
9 than PSE’s pricing model?**

10 A. The model conveys total possible benefits from the addressable market (i.e.,
11 market or economic potential), whereas PSE’s pricing model is meant to be
12 conservative (i.e., achievable potential).

13 **V. THE MODEL’S ANALYSIS OF ACCELERATED**
14 **REPLACEMENT**

15 **Q. How do you respond to Mr. Cebulko’s statement that “counting incremental
16 savings from upgrading appliances up to code is inconsistent with regional
17 and Commission conservation achievement counting practices”?**³²

18 A. The Public Benefits Model attempts to accurately forecast the benefits gained
19 from accelerated replacement of old appliances. This is not a conservation
20 program and PSE is not asking to be compensated for these accelerated benefits,

³² Cebulko, Exhibit No. ___(BTC-1HCT), 34:19-20.

1 rather we are just demonstrating that they do exist. We do this by using the actual
2 age distribution of appliances in the market, many of which were installed many
3 years ago and are past their useful life.

4 **Q. What does real-world data tell us about the energy efficiency of the**
5 **appliances currently in service that are past their useful life?**

6 A. The U.S. Department of Energy states that old, low-efficiency heating systems
7 have efficiency ratings of 56 to 70 percent AFUE.³³ Using Northwest Energy
8 Efficiency Alliance’s 2012 Residential Building Stock Assessment, we can
9 calculate the median age of appliances that are past their useful life. For example,
10 the median “old” furnace is 23 years old. The efficiency code for equipment
11 manufactured in 1992—one year before these “old” furnaces were purchased—
12 was 78 percent AFUE.³⁴ In comparison, current efficiency code as of 2015 is 80
13 to 81 percent AFUE,³⁵ and the efficiency rating of the gas furnace used in the
14 Public Benefits Model is 95 percent AFUE.³⁶

15 **Q. What impact does accelerated replacement have on the results of the model?**

³³ “Furnaces and Boilers,” U.S. Department of Energy, <http://energy.gov/energysaver/furnaces-and-boilers>, last accessed June 20, 2016.

³⁴ PUBLIC LAW 100-12 – 101 STAT 110-111, “National Appliance Energy Conservation Act of 1987,” <https://www.govtrack.us/congress/bills/100/s83/text/enr>, accessed June 20, 2016.

³⁵ Title 10 §430.32, Code of Federal Regulations, http://www.ecfr.gov/cgi-bin/text-idx?SID=a9921a66f2b4f66a32ec851916b7b9d9&mc=true&node=se10.3.430_132&rgn=div8, accessed June 23, 2016.

³⁶ This model would be installed in the 80% of households where it is feasible to do so.

1 A. The benefit of accelerated replacement is that customers with aged equipment
2 replace it with more efficient equipment at an earlier date than they would
3 otherwise do so. This increases efficiency and helps avoid the inconvenience of
4 equipment failures. However, the incremental benefits of accelerated replacement
5 in the Public Benefits Model were conservatively estimated and are very modest.
6 Benefits are only applied to those customers who both have older equipment and
7 indicated that they would replace this equipment earlier if a leasing solution was
8 offered. For example, accelerated replacement only accounts for less than one
9 percent of the total avoided energy savings over the first 20 years.

10 **VI. CONCLUSION**

11 **Q. What is your conclusion?**

12 A. Lease Solutions produces public benefits that extend beyond participants to the
13 entire customer base at no cost or risk to non-participants. Participants, who opt-in
14 to the service, do so because their private benefits exceed their private cost. While
15 the absolute magnitude of the public benefits does depend on modelling input
16 assumptions, their existence does not. Proposed alternative solutions are not
17 comparable to the Lease Solution in overcoming the barriers to adopting, new
18 efficient equipment and as such will not achieve these public benefits.

19 **Q. Does that conclude your testimony?**

20 A. Yes, it does.
21