

**EXHIBIT NO. ___(GJZ-1T)
DOCKET NO. UE-07___/UG-07___
2007 PSE GENERAL RATE CASE
WITNESS: GREG ZELLER**

**BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION,**

Complainant,

v.

PUGET SOUND ENERGY, INC.,

Respondent.

**Docket No. UE-07___
Docket No. UG-07___**

**PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF
GREG ZELLER
ON BEHALF OF PUGET SOUND ENERGY, INC.**

DECEMBER 3, 2007

PUGET SOUND ENERGY, INC.

**PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF
GREG ZELLER**

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1 **PUGET SOUND ENERGY, INC.**

2 **PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF**
3 **GREG ZELLER**

4 **I. INTRODUCTION**

5 **Q. Please state your name, business address, and position with Puget Sound**
6 **Energy, Inc.**

7 A. My name is Greg Zeller. My business address is 10885 N.E. Fourth Street,
8 Bellevue, WA 98004. I am the Director Electric Operations for Puget Sound
9 Energy, Inc. (“PSE” or “the Company”).

10 **Q. Have you prepared an exhibit describing your education, relevant**
11 **employment experience and other professional qualifications?**

12 A. Yes, I have. It is Exhibit No. ___(GJZ-2).

13 **Q. What are your duties as Director Electric Operations for PSE?**

14 A. I am responsible for the overall operation of PSE’s electric transmission and
15 distribution systems. I work with all related groups to support the safe, reliable,
16 compliant, and cost effective operation of the system. The Electric Operations
17 organization is a 24 hours per day, 7 days per week operation. I direct and
18 oversee functions relating to the construction, maintenance and operation of

1 electric substations, monitoring and control of PSE's electric transmission and
2 distribution systems and the electric first response function. My responsibilities
3 include emergency outage response and restoration management.

4 **Q. What is the nature of your testimony in this proceeding?**

5 A. My testimony describes the consequences to PSE's customers and to PSE's
6 electric transmission and distribution infrastructure caused by storms in 2006 and
7 2007. During the test year, October 1, 2006 through September 30, 2007, and for
8 the preceding months in 2006 (January 1, 2006 through September 30, 2006),
9 PSE's customers and PSE's transmission and distribution electric system were
10 subjected to weather-related events that caused extensive system damage and
11 widespread power outages. It took great expenditures of time and capital to
12 rebuild the damaged electric system to restore service and function to PSE's
13 customers. My testimony provides a summary of the damage the storms caused,
14 particularly the December 2006 Hanukkah Eve Storm, plus the costs to bring
15 PSE's system back to normal. In addition, my testimony provides information
16 relating to the changes PSE has made to its electric system construction and
17 maintenance plans as a result of the storms during the test year.

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1 **Q. Do you have a summary of the storm events in 2006 and in the test year?**

2 A. Yes. Exhibit No. ___(GJZ-3) provides a summary of the qualified and non-
3 qualified storm events during 2006 and through September 30, 2007. This
4 summary also provides details of outage events during the same period, such as
5 the number of customers impacted by outages and the costs to repair and restore
6 PSE's electric delivery system.

7 **Q. How did the storms impact the Company's construction and operation and**
8 **maintenance ("O&M") plans during 2006 and 2007?**

9 A. The storms had "spillover impacts" on PSE operations. So many corporate
10 resources had to be re-deployed to restore electric service and repair storm
11 damage that a portion of PSE's normal and planned capital construction and
12 maintenance work could not be completed as scheduled. The damage caused by
13 the storms required replacement of millions of dollars of infrastructure that would
14 not have otherwise required replacement. In addition, new customer construction
15 work fell behind schedule because crews were focused on storm restoration
16 efforts, and this back log had to be completed after the storm. Reliability projects
17 that were delayed due to the necessity of the storm repairs are expected to be
18 completed during 2007.

19 Regular planned O&M work such as substation transformer, breaker and relay
20 maintenance, still needed to be performed. However, as with the personnel
21 performing the capital work, personnel performing this O&M work were re-

1 deployed to the storm restoration effort instead of working on planned non-storm
2 O&M activities. The result was that the O&M work was compressed into a
3 shorter time frame. External resources had to be brought in so that the scheduled
4 maintenance could be completed and equipment maintenance cycles could be
5 preserved. Planned substation transformer, breaker and relay maintenance are
6 expected to be completed by the end of 2007 and within the budget allocation.

7 **Q. Returning to the test year, please describe the storm events that impacted**
8 **PSE customers and damaged PSE's electric delivery system.**

9 A. Thirteen weather-related events disrupted service to PSE customers during the 12-
10 month test year. (The events ended in March 2007.) Several storms seemed to
11 emerge one after another. For example, on November 15, 2006, winds from the
12 "Mid-November Blast" interrupted service to nearly 180,000 customers. Trees
13 and wind knocked out 24 transmission lines and 30 substations. Total restoration
14 and final repairs took four days and costs exceeded \$9.4 million.

15 One month later in mid-December, the Hanukkah Eve Storm hit. Its specific
16 impacts will be discussed later in this testimony.

17 Next, the "Play-Off Storm" windstorm struck Whatcom, Island, Thurston, King
18 and Kitsap counties on January 5, 2007. This storm disrupted service to over
19 43,000 customers. Total restoration and final repairs took two days and costs
20 totaled over \$2.9 million. During this storm, sixteen transmission lines and nine
21 substations were knocked out of service.

1 Just four days later, on January 9, 2007, the “Northern Exposure Storm” disrupted
2 service to over 56,000 customers in Whatcom, Skagit, Island, Kitsap and King
3 counties. Total restoration and final repairs took three days and costs exceeded
4 \$4 million. During this storm, wind and trees knocked out seven transmission
5 lines and five substations. See Exhibit No. ___(GJZ -4) for a summary of all test
6 year qualified and non-qualified storm events.

7 **Q. Please describe the total storm event restoration costs associated with the 13**
8 **test year weather events?**

9 A. The total storm event restoration costs associated with the 13 weather-related
10 events that impacted PSE customers during the 12-month test year totaled over
11 \$119 million. The O&M costs of these events totaled \$112 million. PSE deferred
12 \$101 million of IEEE 1366-2003 qualified expenses that met the definition of a
13 qualifying event, which left \$11 million recorded in expense. Capital costs
14 totaled \$7.0 million. Capital storm costs represent storm restoration costs that are
15 associated with the replacement of a damaged capital asset such as pole or
16 transformer replacements. Capital amounts are accounted for in accordance with
17 PSE capital accounting practices.

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1 **Q. Please explain why PSE's \$11 million of test year storm O&M expenses**
2 **exceeded the \$7 million catastrophic loss threshold that was established in**
3 **the 2004 General Rate Case ³?**

4 A. During the test year, PSE storm event O&M expenses totaled \$11 million. This
5 amount is comprised of the \$7 million cost deferral threshold and \$4 million of
6 non-deferrable expenses. Non-deferrable O&M expenses are storm event
7 expenses that did not meet the IEEE 1366-2003 definition of a qualifying event or
8 were IEEE 1366-2003 qualifying event expenses that are not deferrable per PSE's
9 accounting practices. For example, non-deferrable qualifying event expenses
10 include certain straight time labor charges, stores and fleet personnel labor
11 charges, cost center assessments, and certain vehicle charges

12 **Q. Is PSE requesting that the current catastrophic storm loss deferral**
13 **mechanism be extended?**

14 A. Yes, with slight modifications as discussed in the testimony of Mr. John Story.
15 The Company benefits from this catastrophic storm cost deferral mechanism
16 because it allows PSE to restore service in the most cost effective and expeditious
17 manner, without first seeking approval to defer storm repair costs. Additionally,
18 in his prefiled direct testimony, Mr. Story explains that customers also benefit
19 because the mechanism levels rates for these uncontrollable storm costs and

³ See *WUTC v. PSE*, Docket No. UE-040640, Final Order No. 06 (2004) at ¶¶ 231-46.

1 provides a known mechanism for review and recovery. See Exhibit No ___(JHS-
2 1CT).

3 **III. THE HANUKKAH EVE STORM**

4 **Q. Which test year storm provided the most significant service disruption to**
5 **PSE’s customers?**

6 A. The Hanukkah Eve Storm severely impacted PSE’s customers and inflicted the
7 worst damage to PSE’s electric transmission and distribution system, possibly in
8 the history of the Company. The storm began on December 13, 2006, with the
9 main thrust occurring late December 14 and into the early hours of December 15,
10 2006.

11 **Q. Please describe the Hanukkah Eve Storm.**

12 A. University of Washington climatologist Cliff Mass classified this December
13 windstorm as a once-per-decade event based upon wind speeds alone. More
14 significantly, he said that the damage caused by this storm was closer to what one
15 would expect from a once-per-century event⁴, an observation he attributed
16 principally to soil saturation. The damage from the Hanukkah Eve Storm was
17 exacerbated by the heavy rains that preceded the Hanukkah Eve Storm.

⁴ The designation of a 100-year storm is an event that scientist predict has a one percent chance of happening in any given year, per the May 1, 2007 Crosscut Publication article, “Imperfect predictions of the perfect storm”. This article states that there have been at least six “100-year” storms since 1986 in the greater Seattle area.

1 November 2006 was among the wettest months ever recorded in Pacific
2 Northwest history (15.63 inches of rainfall). Another 3.31 inches of rain fell in
3 early December prior to the storm, and nearly a full inch of rain fell in a one-hour
4 period on the afternoon of December 14, 2006. The wet conditions resulted in
5 widespread soil saturation, which significantly reduced soil/tree root stability and
6 rendered thousands of otherwise healthy trees vulnerable to failure. *See* WUTC
7 Workshop Summary Report (March 29, 2007), Exhibit No. ____ (GJZ-5).

8 The Hanukkah Eve Storm carried the strongest winds since the Inauguration Day
9 Storm of January 1993, with recorded wind gusts of 69 mph at Seattle Tacoma
10 International Airport on December 15, 2006. Seemingly healthy trees with root
11 systems that had survived prior windstorms were uprooted and damaged a
12 substantial portion of PSE's transmission and distribution system. So severe was
13 the destruction from uprooted trees that, in addition to the damage to PSE's
14 electric infrastructure, trees also broke 30 natural gas lines by disrupting the
15 ground around the lines.

16 **Q. Please describe the magnitude of the structural damage to PSE's electric**
17 **transmission and distribution system.**

18 A. The Hanukkah Eve Storm damaged 85 PSE transmission lines, in turn disabling
19 service to 159 substations. To put this in perspective, the damage affected
20 approximately one-half of PSE's total transmission lines and distribution
21 substations. The storm's initial damage and outages occurred late December 14,

1 and early December 15, 2006. Winds continued into late morning December 15,
2 and further damaged many of the already de-energized transmission and
3 distribution lines and equipment. This created many additional damage locations
4 within line segments and exacerbated an already significant amount of repair and
5 restoration work. Historically, in more routine weather events, a transmission or
6 distribution line may be disabled due to damage from a single tree or limb. In the
7 Hanukkah Eve Storm, many transmission and distribution lines sustained multiple
8 tree-caused damage locations within a particular segment of line. This greatly
9 complicated the restoration process. Additionally, repair was hampered due to
10 the number of trees blocking roads and other access paths. Storm crews replaced
11 approximately 750 poles, 670 transformers and 130 miles of electrical conductor.

12 The windstorm's destruction was the worst and most widespread that PSE has
13 ever experienced. Damage occurred in each of the nine counties of PSE's service
14 territory. The majority of damage occurred throughout King, Kitsap, Thurston,
15 Pierce, and Island counties.

16 **Q. Other than the scope of the damage, were there any other factors that were**
17 **different from what has historically been experienced in storm restoration?**

18 A. A key factor in the Hanukkah Eve Storm was the amount of damage that occurred
19 to PSE's transmission system, particularly in Northeast King County. For
20 example, the storm leveled six structures and tore down several spans of wire on
21 PSE's Snoqualmie-Lake Tradition #1-115kV transmission line. In one three-mile

1 area, the damage was so severe and concentrated that engineering crews had to
2 assess the damage and complete restoration drawings before the repair work could
3 commence.

4 **Q. What was the effect of this damage on PSE customers?**

5 A. Over 700,000 PSE customers lost service early on December 15, 2006. By the
6 end of the day on December 18, 2006, PSE had restored service to nearly 500,000
7 customers, and by the end of the day on December 23, 2006, PSE crews had re-
8 energized nearly 625,000 customers. By the end of the day on December 25,
9 2006, those customers that remained out of power were out of power due to
10 damage to their customer-owned equipment. These customers required a third
11 party to repair their electrical entrance equipment, as PSE cannot repair customer
12 owned equipment. See Exhibit No. ___(GJZ-6) for a detailed list of customer
13 outages and durations resulting from this storm.

14 In addition to customers directly affected by storm-related outages, other PSE
15 customers were indirectly affected by the “spill over impacts”. During the storm
16 and for an extended post-storm period after December 26, 2006, all resources
17 were focused toward system repair. Accordingly, PSE was unable to perform
18 normal system maintenance, capital construction projects, new customer line
19 extensions, conversion or relocation projects, new services, or meter sets. Such
20 work waited until additional resources were acquired, and the existing resources
21 were dedicated to completing storm repairs.

1 **Q. Please describe the total operations and maintenance and capital costs**
2 **required to restore PSE customers and make needed electric system**
3 **transmission and distribution repairs caused by the Hanukkah Eve Storm?**

4 A. Overall, the storm repair costs totaled over \$90 million. Storm repair labor costs
5 (including overheads and assessments) totaled nearly \$11 million, material costs
6 totaled nearly \$4 million, contractor costs totaled nearly \$73 million and other
7 miscellaneous expenses totaled over \$3 million. Included in these amounts are
8 post-storm repair costs of \$2.5 million. Such post-storm repairs are discussed
9 later in this testimony. The O&M portion of the \$90 million total repair cost
10 totaled nearly \$85 million. Of this, \$83.6 million was deferrable and \$1.4 million
11 was non-deferrable. Capital repair costs totaled over \$5 million. Please refer to
12 page 9 of Exhibit No. ___(GJZ-6), which provides a summary of these restoration
13 costs.

14 **Q. Why did this storm cost so much?**

15 A. Costs of restoration and repair were high because of several factors, some of
16 which I discussed above. The damage was widespread throughout PSE's service
17 territory; damage was significant, in that many transmission and distribution lines
18 were damaged and most had multiple damage locations; access was impaired due
19 to the number of downed trees; and repairs required an enormous workforce. I
20 will provide further information on workforce later in my testimony.

1 **Q. Given the amount of money PSE spent repairing and replacing storm-**
2 **damaged infrastructure, will future system maintenance costs be lower as a**
3 **result?**

4 A. Unfortunately, no. The storm broke transmission and distribution infrastructure
5 of all types, sizes, locations, and service lives. In other words, not just the older
6 lines, poles, and other equipment had to be replaced. The large number of trees
7 and limbs did not discriminate in their damage to the transmission and
8 distribution system. Crews had to repair and replace systems that had been
9 functional and would not have been replaced or repaired except for the damage.

10 The system in place today requires ongoing inspection and maintenance, whether
11 it is new or old. PSE is actually expanding its maintenance as a result of the
12 storm. For example, PSE's vegetation management program has been expanded
13 to address PSE's cross-country transmission corridor access and maintenance.
14 PSE expects to spend nearly an additional \$2 million in 2007 (\$500,000 related to
15 North American Electric Reliability Corporation ("NERC") Compliance and \$1.1
16 million for other vegetation management.)

17 **Q. How many PSE employees, service providers and contractors were involved**
18 **in the restoration efforts?**

19 A. Over 1,300 PSE employees performed some level of storm duty during this event.
20 In addition, PSE engaged nearly 700 local service provider and contractor
21 personnel and imported over 1,200 additional workers. Including PSE forces,

1 nearly 500 line, service and tree crews worked to repair and restore service.
2 Crews came from as far away as Alaska, Wisconsin, Missouri, and Southern
3 California. Please refer to Exhibit No. ___(GJZ-7) for a detail of contractors, and
4 service providers who contributed to the restoration and repair efforts.

5 **Q. What would have happened if PSE did not bring in outside resources?**

6 A. Without a doubt, storm restoration effort would have been extended. For safety
7 reasons, it is likely that shifts would have been shortened to provide more rest for
8 the workers, further extending the repair.

9 **Q. What impact, if any, did PSE's service provider model have on restoration**
10 **efforts?**

11 A. PSE's service provider model proved beneficial to restoration efforts, as PSE has
12 access to contractors, outside of the state, that are affiliated with the Service
13 Provider who would not otherwise be available to the Company. It is not
14 reasonable for PSE to staff, on a routine basis, the labor resources that are
15 necessary for the occasional catastrophic storm. PSE must maintain a balance
16 between resources to match daily work volumes and those required to meet the
17 demands of emergencies. A workforce larger than necessary for the daily work
18 volume would drive up day to day business costs. However, PSE's service
19 providers were committed by contract to provide all available staff to PSE during
20 this storm. Without these contracts in place, the additional service provider

1 employees would not have been committed to work for PSE. As stated in PSE's
2 Service Provider contract, "Emergency/Storm Event Response performed by
3 Service Provider under this contract shall take precedence over all other
4 work...for PSE or third parties."

5 Additionally, PSE maintains relationships with area contractors and other utilities
6 through mutual exchange agreements. Such agreements provide access to
7 additional resources in emergency situations and keeps non-storm costs in check.
8 Such practices are common throughout the utility industry.

9 **Q. Was it necessary to perform further repairs to PSE's electric transmission**
10 **and distribution system, even after service was restored?**

11 A. Yes. PSE's storm restoration goal is to restore service as quickly as possible. In
12 some cases, this may mean simply operating a switch or resetting a protective
13 device. In other cases, structural repairs or replacement of system components
14 must be completed to restore service, such as when a tree falls and breaks a pole.
15 In other cases, crews can make temporary repairs to expedite the restoration
16 process. For example, a crew may bolt a cross arm vertically on a pole to repair a
17 slightly broken pole top. This repair is much faster than replacing the entire pole,
18 but the pole must later be replaced because it may have sustained other damage
19 and is more susceptible to failure with less force. Another example is a damaged
20 switch that is "by-passed" to initially restore service. The switch should not be
21 left in an un-repaired state for a lengthy period because it would compromise the

1 operability of the system. These temporary repairs are tracked at PSE's storm
2 base, and permanent repairs are completed as quickly as is reasonable.⁵ In the
3 case of the Hanukkah Eve Storm, the system faced many permanent repairs after
4 crews made temporary repairs during the storm.

5 Due to the substantial amount of damage caused by the Hanukkah Eve Storm,
6 PSE formed a post-storm project team to systematically assess and document all
7 storm related temporary repairs. The scope of work for this team was to 1) patrol
8 all impacted circuits, 2) identify temporary repairs in order to schedule permanent
9 repairs, 3) identify abnormal open points (switches left in a different state during
10 the storm than what is indicated on PSE maps), and 4) remove debris and surplus
11 material left in the field at the various work sites throughout the storm-damaged
12 area. Assessment started on January 4, 2007 and was completed by February 9,
13 2007. On January 15, 2007, crews began full-time post-storm repairs and
14 completed repairs in mid-March. These crews worked only on storm damaged
15 infrastructure and temporary repairs that had been documented by the PSE post-
16 storm team.

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⁵ But at no time is the safety of the general public or workers at risk if a temporary repair is left in

1 **Q. How do PSE's restoration time and costs compare with industry standards**
2 **or with those of neighboring utilities also impacted by the Hanukkah Eve**
3 **Storm?**

4 A. For the December windstorms, PSE's overall restoration cost was \$129 per
5 customer, and Seattle City Light reported a cost of \$38 per customer. To put this
6 comparison in perspective, PSE's electric service territory comprises nine
7 counties, whereas Seattle City Light's includes only the city limits of Seattle, plus
8 parts of Tukwila and Shoreline. PSE's overall customer density is around 230
9 customers per square mile compared to Seattle City Light's 2,860 customers per
10 square mile. The storm left a significantly larger footprint in PSE's service
11 territory than in Seattle City Light's territory. This comparison is similar to other
12 local utilities as well. In addition, much of the damage in PSE's case occurred
13 outside of core urban areas, and that affected power deliveries to both urban and
14 rural electric service. Further, PSE has approximately 20,000 circuit miles of
15 distribution and 50 customers per circuit mile compared to Seattle City Light's
16 2,500 circuit miles and 150 customers per circuit mile.

17 Taken together, these factors drove up the costs and time required to restore
18 service while complicating the logistics of repairs and restoration. What the
19 above statistics reflect is that storm-restoration in Seattle City Light's service
20 territory was made within a much smaller geographic perimeter on a much

place.

1 smaller system (measured by distribution circuit miles). Further, Seattle City
2 Light's customer density is such that a particular equipment repair results in
3 restoration of service to proportionally more customers than the repair of
4 equipment on PSE's system. The characteristics of Seattle City Light's territory
5 would likely support a lower restoration cost per customer than PSE. As for
6 restoration time, at the peak of the storm, Seattle City Light had 180,000
7 customers out of service, and it took nearly nine days to restore service (or
8 approximately 20,000 customers per day, on average).⁶ As mentioned previously,
9 at the peak of the storm, PSE had over 700,000 customers and had restored
10 service to all but a small number of customers within ten days, (or approximately
11 70,000 customers per day on average).

12 **Q. Has PSE performed a post Hanukkah Eve storm review?**

13 A. Yes. In July 2007 PSE completed an extensive review of its performance prior to,
14 during and following the Hanukkah Eve Storm. In addition to seeking customer
15 and employee feedback through telephone and Web surveys, focus groups, and
16 internal debriefings, PSE hired KEMA, an energy consulting firm, to provide an
17 independent, third-party, five-month analysis of PSE's pre-storm readiness and
18 post-storm response. KEMA prepared a report that outlined its analysis of PSE's
19 storm efforts, and well as recommended actions PSE can take now for continued
20 service reliability and improved outage response during future storms and other

⁶ See Davies Consulting, Inc. Seattle City Light December 2006 Wind Storm Report dated May

1 natural disasters. Please refer to the KEMA Report dated July 2, 2007, provided
2 as Exhibit No ____ (GJZ-8).

3 **Q. Has the Company undertaken the actions recommended in the KEMA**
4 **Report?**

5 A. Yes, Please see PSE's After Action Report dated November 27, 2007 describing
6 the implementation status of the KEMA recommendations, provided as Exhibit
7 No. ____ (GJZ-9).

8 **Q. Please summarize the KEMA Report related to the restoration and repair**
9 **effort as conducted by PSE.**

10 A. The KEMA Report states as follows: "PSE, its employee, and service providers
11 performed well in restoring power after this record-breaking storm. Employees at
12 all levels overcame many obstacles caused by the sheer magnitude of the storm
13 damage and overwhelming volume of restoration activities." Further, "[t]he rapid
14 response by PSE management to secure additional resources was a significant
15 factor in the company's ability to fully restore the system in approximately 12
16 days." KEMA points out the areas that PSE executed "extremely well" during
17 this weather event: crew and materials acquisition to support restoration;
18 employee and contractor safety; logistics support for the off-system crews
19 brought to the area; and performance of PSE employees in rising to the extreme

31, 2007.

1 challenge presented in this storm. Additionally, “PSE performed very well in the
2 execution of the CERP.” (Corporate Emergency Response Plan) The KEMA
3 Report goes on to say that “during the course of the unprecedented event, the
4 company recognized the need to deviate from the plan and institute new processes
5 to address previously unforeseen situations. This effort in itself was a major
6 undertaking and one that demonstrated the intent of the company to respond in
7 whatever manner necessary to restore service.”

8 **IV. CONCLUSION**

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

10 **A.** Yes, it does.