

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

UE 196

In the Matter of)	
)	
PORTLAND GENERAL ELECTRIC COMPANY)	OPENING BRIEF OF
)	APPLICANT PORTLAND
Application to Amortize the Boardman Deferral.)	GENERAL ELECTRIC
)	COMPANY
)	

INTRODUCTION

Portland General Electric Company ("PGE") submits this Opening Brief in this amortization docket. This docket concerns an October 2005 outage at the Boardman coal-fired power plant caused by a crack in the rotor of one of the low-pressure steam turbines at Boardman (the "LP1 Turbine"). In this docket, PGE seeks to recover a portion of its cost of purchasing replacement power during the Boardman outage. In the original deferral docket in this matter, UM 1234, PGE sought to recover its full cost of replacement power, approximately \$45.7 million. In its deferral order, the Commission authorized deferral of \$26.439 million of PGE's replacement power costs.

For the reasons below, PGE respectfully requests that the Commission determine that it acted prudently with respect to the LP1 Turbine and, therefore, is entitled to amortize the portion of its replacement power costs approved by the Commission. PGE was prudent in its initial decision to purchase high-efficiency steam turbines for the Boardman plant in 2000; was prudent in its operations of the upgraded turbines; and acted prudently to repair the cracked rotor as quickly and with as little

interruption in service as possible. No party has questioned the prudence of PGE's acquisition of replacement power during the outage.

BACKGROUND

A. Factual Background

This outage was caused by a crack in the rotor of the LP1 Turbine at Boardman. The LP1 Turbine is one of two low-pressure turbines that were manufactured and installed at Boardman by Siemens Westinghouse Power Company ("Siemens"). Siemens installed the LP1 and LP2 Turbines at Boardman in June 2000. UM 1234, PGE/200 at 3.

The upgraded LP1 and LP2 Turbines replaced existing turbines that had been in operation for more than 20 years. *Id.* PGE chose to upgrade the turbines because the existing turbines, with their small rotor blades, did not allow PGE to get full production from the Boardman plant. July 23 Hearing Trans. at 103-04. PGE worked with Siemens and other turbine manufacturers over several years to design a turbine for Boardman that would generate more electricity from the same amount of fuel. *Id.* at 104-05. When Siemens installed the new LP1 and LP2 Turbines in 2000, it contractually guaranteed significant increases in electricity output for the same energy input. ICNU/103 at 61, 63-64. After the turbines were installed, electricity output at Boardman increased by about 35 megawatts for the same energy input, which represented an improvement of approximately 7 percent in efficiency and output. UM 1234, PGE/200 at 2. This increase in efficiency satisfied Siemens' contractual guarantees of increased electricity output for the same steam input.

PGE personnel consulted with Siemens' engineers during the design process to ensure that the upgraded turbines would deliver the increased power that Siemens had promised. July 23 Hearing Trans. at 104-05. The primary differences in the upgraded turbines were (1) a ruggedized (*i.e.* solid) rotor shaft and (2) significantly lengthened and reshaped last-row blades. PGE/300; July 23 Hearing Trans. at 101-03.

These new components were not unique or experimental; they had been incorporated in other turbines manufactured by Siemens. July 23 Hearing Trans. at 101-03. However, PGE's upgraded LP1 and LP2 Turbines were the first in Siemens' fleet of turbines (the BB271 fleet) to be upgraded with longer last-row blades in an effort to increase efficiency. July 23 Hearing Trans. at 102. Because the upgraded BB271 turbines had not been proven to deliver the promised increases in efficiency, PGE negotiated with Siemens for contractual guarantees of increased electricity production and liquidated damages if the new turbines did not perform as expected. *Id.* The contract also provided for cash payments to PGE if other users of the BB271 fleet purchased the new design. ICNU/103 at 24.

After Siemens installed the LP1 and LP2 Turbines in 2000, PGE employees at Boardman monitored conditions along the turbine array. July 23 Hearing Trans. at 114. PGE's monitors continually logged vibration and temperature readings along the array to detect any anomalous conditions or stresses on the turbines. *Id.*

The Boardman turbine generator train consists of:

- one combination high and intermediate pressure turbine (HPIP),
- two low-pressure turbines, and
- one generator.

PGE/100 at 8. The components are bolted together, end to end, to form a single rotor exceeding 100 feet in length. The rotor is supported by bearings located near the ends of each of the individual components. The total weight of the turbine generator train is over 190 tons. All of the rotor components, and the bearings that support them, must be aligned within specifications to assure proper operation. *Id.*

Since perfect alignment of such large and heavy components cannot be achieved, design criteria for the rotor include a specified margin (tolerance or range) to allow for slight movement of the rotor components or the bearings. *Id.* PGE is not an expert in the alignment of low-pressure turbines. PGE contracted with Siemens for major

maintenance, including alignment of the turbine bearings and components. The alignment work performed by Siemens was performed under warranty. In 2002, Siemens performed some maintenance under warranty. This included replacing the old bearings with a new, tilting pad design offering more load carrying capability. *Id.* at 8-9.

Siemens aligned the LP1 and LP2 Turbine array at Boardman using its proprietary methodology. July 23 Hearing Trans. at 65. PGE employees at Boardman were present for and monitored the results of maintenance and alignments, but did not physically align the turbines themselves. *Id.*; PGE/300 at 12-13.

In July 2005, PGE observed a slight increase in the vibration levels on the LP1 Turbine. PGE/100 at 3. Though vibrations were well within safe operating limits at that time, PGE continued to monitor the condition. Siemens and PGE's independent vibration consultant, Robert Kowalczyk (RK Ltd.), visited Boardman, reviewed vibration data, collected additional data, and performed their own analyses. *Id.* They both suspected that the data indicated a turbine "rub" due to a bowed shaft. *Id.* at 3-4. On Siemens recommendation, the LP1 Turbine was shut down and partially disassembled to allow Siemens and PGE to look for the rub. *Id.* at 4.

After partial disassembly, indications of rubbing in the steam seal area were discovered and corrected. *Id.* Following reassembly, PGE attempted to restart the turbine. *Id.* The vibration levels were more severe than before. *Id.* Siemens then tried twice to rebalance the turbine, but were not successful in reducing vibration. *Id.* PGE, Siemens, and RK Ltd. concluded that the balancing difficulties could not be explained by a rub or a bowed shaft and a complete disassembly was required. *Id.* PGE and Siemens disassembled the turbine and discovered that the LP1 rotor was cracked. *Id.*

After finding that the rotor had cracked, PGE obtained competitive repair bids from Siemens and from Alstom, another turbine manufacturer who has made numerous repairs to Siemens' turbines at other plants. *Id.* Although both manufacturers were highly qualified, PGE chose Alstom, because Alstom promised to finish the repairs

nearly a month earlier than Siemens could have, thus saving significant replacement power costs. *Id.*; July 23 hearing Trans. At 120-21.

PGE arranged to have the rotor assembly flown to Alstom, rather than shipped by truck, thereby saving another 10-12 days of transit time. July 23 hearing Trans. At 120-21. Although flying the turbine was more expensive than trucking, the expected benefit from Boardman being on-line and generating power 10-12 days sooner, as opposed to purchasing replacement power for those days, outweighed the additional transportation costs. *Id.* Alstom repaired the rotor and returned it to Boardman on January 25, 2006. PGE/100 at 5. Siemens' field personnel re-installed the rotor in accordance with their requirements. *Id.*

In an effort to learn the causes of the rotor crack, PGE commissioned Alstom to perform a root-cause analysis of the LP1 failure. PGE/100 at 6; PGE/105C-B. Siemens and PGE also performed separate analyses. *Id.*; PGE/105C-A, PGE/105C-C. Siemens, as the manufacturer and installer, focused their analysis on the turbine, its placement, and operations since the installation in 2000. *Id.* Alstom, as the repair contractor, performed a metallurgical analysis and reviewed and analyzed plant operational data. *Id.*

Alstom reviewed the operating data from the date of the turbine installation, and performed a metallurgical analysis at their Materials Technology Center in Tennessee. *Id.* The operating data included:

- vibration data,
- unit temperatures and pressures,
- bearing loads and alignment.

Alstom calculated mechanical stresses and evaluated the mechanical properties of samples taken from the cracked area. PGE/105C-B. Siemens analyzed the same type of data as Alstom. Their analysis focused on four potential causes:

- high cycle fatigue;

- low cycle fatigue;
- torsional overload; and
- environmental/manufacturing.

PGE/105C-C.

Neither analysis identified a single cause. Alstom concluded that:

[T]here has been no supporting evidence that the plant has been misoperated resulting in the failure of the LP1 turbine rotor. These results of the analysis, point in the direction of a misalignment of the train and an unsecured bearing pedestal. All the data and associated information indicate the root cause for this failure lies in a combination of factors. PGE/105C-B at 41.

Siemens concluded that the cracked rotor was not due to misoperation of the Boardman plant by PGE. PGE/105C-C at 35. Siemens further concluded that the rotor crack was caused by high-cycle fatigue due to an unknown condition or combination of conditions. PGE/105C-C at 35.

B. Procedural Background

On November 18, 2005, PGE filed an Application for Deferred Accounting for \$45 million of excess power costs incurred from November 18, 2005 through February 5, 2006, due to the Boardman outage.¹ The Application sought to defer the difference between the variable power costs for the Boardman plant, as established in the annual power cost update (PGE's resource valuation mechanism), and replacement power costs incurred during the 105-day Boardman outage. PGE assessed that the total excess power cost impact associated with the Boardman outage, which began in October 2005, was \$59 million. *See* Order No. 07-049 at 5. Because a portion of those costs were incurred before PGE filed its deferred accounting application, PGE initially calculated

¹ There were two outages at Boardman, one before and one after Siemens' installation of the repaired LP1 Turbine. PGE only sought to defer replacement power costs for the first outage. PGE did not seek to defer any of the costs of repair or transport of the cracked LP1 rotor.

that approximately \$45.7 million in replacement power costs were eligible for deferral.

Id.

In the deferral phase of this proceeding, the Commission determined that the Boardman outage reflects an extraordinary event not forecasted in rates with a material financial impact on PGE. Accordingly, the Commission concluded the application met the legal requirements for deferred accounting and "that the Boardman outage satisf[ied] deferral discretionary criteria." *Id.* at 10. In addition, the Commission concluded, after making several adjustments supported by all parties, that \$42.8 million in replacement power costs were eligible for deferred accounting. *See* Order No. 07-049 at 13.

In the order granting PGE's application, the Commission required PGE to reduce the amount actually deferred substantially. To lower the deferred amount, the Commission first applied a 100-basis-point deadband on ROE to reflect a measure of "normal" business risk. *Id.* at 19. Next, the Commission adjusted the ROE deadband from 100 to 80 basis points to account for the SB 408 effect for costs incurred on or after January 1, 2006. Finally, the Commission required PGE to absorb 10 percent of the deadband-adjusted replacement costs. *Id.* at 20. As a result, the Commission authorized PGE to defer \$26.439 million or 62 percent of the costs eligible for deferred accounting treatment. This amount reflected about 45 percent of the total Boardman outage costs from the beginning of the outage in October 2005 through February 5, 2006.

This proceeding was commenced in order for PGE to recover the replacement power costs approved for deferred accounting treatment. Under ORS 757.259(5), amortization of deferred amounts is subject to a prudence review and an earnings test. No party has questioned that PGE's earnings during the period support full recovery of the deferred amount. Prudence is therefore the only remaining issue.

LEGAL STANDARD

In a prudence review, the Commission reviews "the objective reasonableness of a decision at the time the decision was made." *See* UM 995, Order No. 02-469 at 5. The Commission does not focus on the outcome of the utility's decision, but rather on the reasonableness of the actions "based on information that was available (or could reasonably have been available) at the time." *See In Re PGE*, UE 102, Order No. 99-033 at 36-37. *See also In Re Transition Costs*, UM 934, Order No. 98-353 at 9 ("[when utilities mitigate transition costs], they must behave prudently, meaning that their decisions were reasonable, based on information that was available (or could reasonably have been available) at the time"); *In Re Northwest Natural Gas*, UG 132, Order No. 99-697 at 53 ("in this review, therefore, we must determine whether the NW Natural's actions and decisions, based on what it knew or should have known at the time, were prudent in light of existing circumstances").

DISCUSSION

Two intervenors, Industrial Consumers of Northwest Utilities ("ICNU") and the Citizens Utility Board ("CUB") oppose PGE's application. Somewhat surprisingly, they have focused their attacks on PGE's initial decision to upgrade to high-efficiency LP1 and LP2 Turbines in 2000, rather than on any particular aspect of PGE's operations.

ICNU and CUB ignore the undisputed fact that the increase in efficiency from the LP turbine upgrade was so significant that the net impact of the upgrade was a financial benefit to customers even if the entire amount of this proposed deferral is granted. Notwithstanding the benefit customers have received from the upgrade, they now argue that PGE should have stuck with its existing, low-efficiency turbines, rather than upgrading and increasing efficiency at Boardman. But the prudence of PGE's decisions is not viewed in hindsight. It is not enough for ICNU and CUB to say that PGE's decision to upgrade was imprudent because one turbine rotor unexpectedly

cracked five years after installation. The appropriate standard is whether PGE's actions were reasonable and prudent based on the information available at the time. Viewed through that lens, PGE's decisions in this matter have been prudent and, from any perspective, have benefitted customers.

A. PGE's Purchase of the LP1 Turbine Was Prudent

ICNU and CUB focus their arguments on PGE's initial decision to upgrade the LP1 and LP2 Turbines in 2000. They argue that it was imprudent for PGE to be the first adopter of upgraded last-row blades in Siemens' BB271 fleet. They also argue that PGE should have mitigated its risk, either by negotiating a contract with Siemens that required Siemens to pay consequential damages in the event that the LP1 rotor failed, or by purchasing insurance that would have covered PGE's cost of replacement power if the rotor cracked at some time in the future.

Before addressing those specific allegations, it is worth noting what is not in dispute here. No one disputes that PGE's goal in upgrading the LP1 and LP2 Turbines was to increase efficiency at Boardman by producing more electricity from the same amount of fuel. No one disputes that, as a general matter, it is a good idea for utilities to operate their power plants more efficiently, or that the goal of producing more electricity from the same amount of fuel is a prudent goal. And no one disputes that the upgraded LP1 and LP2 Turbines actually produced significantly more electricity than their predecessors for the same amount of fuel.

It is also worth remembering that the question of PGE's prudence is not viewed in hindsight, with knowledge that one of the LP rotors would unexpectedly crack after five years of operation. Rather, the question is whether PGE's decision to upgrade to higher-efficiency turbines was prudent based on information available at the time.

Considered under that standard, the decision to upgrade was prudent. As PGE's witness Stephen Quennoz testified, the old Boardman turbines had undersized blades which limited the plant's ability to produce electricity efficiently. July 23 Hearing

Trans. at 103-04. PGE worked with Siemens and other turbine manufacturers on a design that would significantly increase efficiency at Boardman. Although PGE has been criticized in this proceeding for embracing "experimental" or "untested" technology, the primary upgrades to the LP Turbines – longer, reshaped last-row blades and a ruggedized shaft – were already in use elsewhere in Siemens' other turbine fleets. July 23 Hearing Trans. at 101-03. Although they had not previously been employed in the BB271 fleet, these upgrades were not unique or untested technology.

ICNU and CUB have made much of the fact that PGE's contract with Siemens refers to the upgraded turbines as new technology and includes performance guarantees. But as Mr. Quennoz testified, the only truly "experimental" or "untested" aspect of these upgraded turbines is whether they would actually produce more electricity from the same amount of fuel. July 23 Hearing Trans. at 100-03. PGE mitigated this risk – the risk that the upgraded turbines would not in fact be more efficient – by including a liquidated damages provision in the contract that required Siemens to compensate PGE if the efficiency gains were not achieved. But, again, those gains were achieved.

Further, no party has linked the upgraded last-row blades or ruggedized shaft to the cracking in the LP1 rotor. There is simply no evidence, and no argument, that these new components somehow caused or contributed to the crack. Indeed, ICNU's expert, John Martin, testified that his only basis for his belief that there was something untested or experimental about the upgraded LP turbines was statements in PGE's contract with Siemens. PGE/301 at 6. But, as noted, those statements refer to the fact that Siemens' claims of higher efficiency had not yet been tested; they did not mean that the underlying components of the upgraded turbine were experimental or untested.

PGE was presented with an opportunity to upgrade lower-efficiency turbines that limited power production at Boardman. They worked with Siemens, a leading turbine manufacturer, to implement a design that promised higher efficiency while incorporating components that were in use elsewhere in Siemens' fleet. PGE's

financial analyses of the upgrade demonstrated that the promised increases in efficiency would create significant savings in power costs, far exceeding the cost of the upgraded turbines. In these circumstances, where a reputable manufacturer worked with PGE to design upgraded turbines and guaranteed significant increases in efficiency, it would have been imprudent for PGE not to upgrade its turbines.

To conclude otherwise would create a perverse disincentive for utilities to upgrade outdated and inefficient components in their power plants. No one objected between 2000 and 2005, when these upgraded turbines delivered greater efficiency and lower power costs. But now, when a component of one of the turbines unexpectedly cracked after five years of operation, ICNU and CUB are before the Commission arguing that PGE never should have upgraded to higher-efficiency turbines in the first place.

Neither ICNU nor CUB explains how PGE could have known in 2000 that one of the turbine rotors would crack due to high-cycle fatigue in 2005. Neither ICNU nor CUB points to any evidence in the record that would have alerted any reasonable utility to this danger. They simply argue that the old turbines were working, albeit inefficiently; one of the new turbine rotors cracked after five years of operation; and, therefore, PGE should have known not to upgrade its turbines in 2000. They make no mention of the fact that gains in efficiency have more than offset the cost of the turbine and of this outage, even if this docket is amortized in full. July 23 Hearing Trans. at 95-98. And they ignore the fact that the Commission has already significantly reduced the amount of this deferral to account for business risk of the upgrade that PGE must bear. ICNU and CUB argue that PGE should bear all risk of subsequent failure of an upgraded component, even after five years of operation, and even if the upgraded component proves in practice to be more efficient than the component it replaced. If this is in fact the law, then it is hard to see how it would ever be a reasonable business decision for a utility to upgrade inefficient components.

ICNU and CUB are not asking for prudence; they are asking for precognition. But the reasonableness of PGE's decision to upgrade is not viewed in hindsight. Based on the information available to PGE at the time of the upgrade, this was the prudent decision.

ICNU and CUB also argue that PGE was imprudent for not mitigating the risk of turbine failure through either (1) contractual guarantees of consequential damages in its original purchase contract with Siemens; or (2) insurance to cover replacement power costs in the event of a turbine failure. But as PGE's witnesses testified, equipment manufacturers like Siemens do not enter into contracts that call for consequential damages in the event of power plant outages. PGE 300 at 12. It would be economically unfeasible for a manufacturer like Siemens, who sold the LP1 and LP2 Turbines to PGE for approximately \$12 million, to enter into a contract that would require it to pay for replacement power if one of its turbine components failed after five years of operation. After all, this single outage resulted in more than \$59 million of replacement power costs, exclusive of repair costs and transportation. Even ICNU's expert, Mr. Martin, testified that he is not aware of any circumstance in which any equipment manufacturer has ever entered into such a contract. PGE/301 at 2-5. PGE negotiated aggressively with Siemens to obtain contractual guarantees of efficiency and liquidated damages in the contract. But PGE cannot reasonably be expected to have obtained additional contractual guarantees that are unavailable in the industry.

By the same token, PGE's witnesses testified that they are unaware of any public utility that purchases insurance to cover replacement power costs in the event of power plant outages. PGE/300 at 11-12. By the same token, Mr. Martin testified on behalf of ICNU that, while he believes that some smaller, privately owned projects may purchase replacement power insurance, he is not aware of any public utility ever having purchased it, or any insurance broker who offers such insurance, or what such insurance would cost. PGE/301 at 11-14. And Mr. Durrenberger of OPUC Staff testified at the

July 23 hearing that he investigated the possibility of obtaining such replacement power insurance, but was unable to find any broker who offered it or any public utility who had purchased it. July 23 Hearing Trans. at 135-38. Without some evidence that such insurance exists, or what it costs, or that any other public utility purchases such insurance when it installs upgraded components, this argument is pure speculation. PGE cannot be held to have been imprudent for failing to purchase this hypothetical insurance on this record.

PGE respectfully requests that the Commission conclude that its decision to purchase and install the high-efficiency LP1 and LP2 Turbines was prudent based on the information available to PGE at the time. PGE's decision to upgrade the turbines was reasonable in light of the promised increases in efficiency and decreases in fuel costs from the upgrade. As a practical matter, the upgrade has resulted in greater efficiency and correspondingly lower fuel costs at Boardman. The decision to upgrade the LP Turbines was prudent at the time it was made, notwithstanding the unforeseen cracking in the LP1 rotor after five years of operation.

B. PGE's Operation of the LP1 Turbine Was Prudent

Although PGE contracted with Siemens for maintenance and alignment of the LP1 Turbine, PGE is ultimately responsible for operation at the Boardman plant. Extensive review of PGE's operations of the plant during the time leading up to the crack of the LP1 rotor demonstrates that PGE's operations were prudent and were not a major cause of the rotor crack. In its root-cause analysis, Alstom concluded: "In conclusion, there has been no supporting evidence that the plant has been misoperated resulting in the failure of the LP1 Turbine rotor." PGE/105C-B at 41. Siemens conclusion was to the same effect: "The operational data provided by PGE did not indicate an operation issue which Siemens concluded could lead to rotor cracking." PGE/105C-C at 34. Even ICNU's own expert, Mr. Martin, refused to point the finger at PGE's operations of the

Boardman plant, stating that he did not believe that PGE's operations were a major cause of the rotor crack. PGE/301 at 1.

Although there has been no allegation in this proceeding that PGE's day-to-day operations of Boardman were imprudent or caused the rotor crack, it is worth addressing three points about PGE's operations that have been raised by intervenors.

First, ICNU has argued that PGE had a practice of running the LP1 Turbine level above recommended operating pressure levels, and that this practice contributed to some degree to excessive torsional stresses that caused the rotor crack. This argument is premised on a simple misunderstanding by ICNU and its expert, John Martin. Mr. Martin reviewed PGE's contract with Siemens, which contains a guaranteed power output expressed in megawatts. This guarantee is Siemens' contractual promise that PGE's upgraded rotors will deliver a certain amount of electricity at a given level of steam pressure. As discussed above, PGE insisted on these contractual power guarantees because its sole reason for purchasing the upgraded turbines in the first place was to produce more electricity at Boardman with the same amount of fuel.

In practice, the upgraded LP turbines beat the contractual guarantees. Both after the LP upgrade and after the subsequent HPIP upgrade, PGE consistently exceeded Siemens' contractual power guarantees at Boardman.

ICNU simply misunderstands what this means. The fact that PGE was generating more than the guaranteed amount of electricity at Boardman does not mean that PGE was operating the turbines at higher than recommended pressure. In fact, as Mr. Quennoz testified during the July 23 hearing, PGE's practice is not to run the Boardman plant at greater than 100 percent of recommended pressure, even though steam turbines are designed to operate safely at up to 105 percent of recommended pressure. July 23 Hearing Trans. at 116-19. The fact that PGE was producing more electricity simply means that its high-efficiency turbines were outperforming Siemens' guarantees, even though PGE was not in the practice of running the turbines at greater than 100

percent of recommended steam pressure. ICNU's and Mr. Martin's mistake is to confuse power output from Boardman, measured in megawatts, with steam input into the turbine array. ICNU's argument that PGE operated Boardman at above recommended levels of steam pressure is simply wrong and unsupported by any evidence in the record.

Second, there was discussion at the hearing of a sentence in the conclusion of Siemens' root-cause analysis, which states that "high-cycle fatigue due to excessive misalignment induced by an unknown operational condition is the most probable root cause of the LP1 rotor cracking." PGE/105C-C at 34. Siemens' phrase "unknown operational condition" should not be read to suggest that Siemens blames PGE's day-to-day operation of the Boardman plant for the crack in the LP1 rotor. That suggestion is inconsistent with the bulk of the Siemens' report, and with the specific statement in the conclusion of the root-cause analysis that the data reviewed by Siemens "did not indicate an operational issue which Siemens concluded could lead to rotor cracking." *Id.* Read together with that sentence, the phrase "unknown operational condition" can only mean a condition that occurred after the turbine was in operation, as opposed to a condition in the design or manufacture of the turbine. Reading the phrase otherwise simply makes it inconsistent with the remainder of Siemens' report.

Third, ICNU has noted that two of the 28 nuts on one of the sole plates at the base of one section of the support structure of the turbine array were found to be missing by PGE in 2006. The sole plate was not readily visible during routine operations at Boardman and was covered by protective decking during the turbine upgrade. PGE/400 at 11; July 23 Hearing Trans. at 44-45. PGE discovered the missing nuts during inspection after the rotor crack occurred, and brought them to the attention of Alstom and Siemens. July 23 Hearing Trans. at 44-52.

Although Alstom stated that missing fasteners are a condition that might cause bending stresses along a turbine array, neither Alstom nor Siemens identified these missing nuts as the major or precipitating cause of the LP1 rotor crack at Boardman. Nor

were any of the operational conditions that ordinarily might accompany a loose or unsecured footing on a turbine pedestal – such as cracked or destroyed grout below the pedestal – present in this case. PGE/400 at 11; July 23 Hearing Trans. at 114-16. Although it could be argued that Siemens should have discovered the missing nuts during its installation or maintenance of the upgraded LP Turbines, there is no compelling evidence to indicate that the absence of 2 of the 28 nuts in one part of one pedestal of the more than 100-foot array contributed in any significant way to causing this crack.

Both Siemens and Alstom concluded that PGE's operations of the Boardman plant were not a significant cause of this crack. In light of this conclusion, neither ICNU nor CUB has made any significant allegation of shortcomings in PGE's operations. As noted above, Mr. Martin's claim that PGE operated the Boardman turbine array at higher than recommended levels of pressure is false and based on a simple misunderstanding of the evidence. PGE's operations of Boardman were prudent and, accordingly, the Commission should allow PGE to amortize the full deferred amount in this docket.

C. PGE's Repair of the LP1 Turbine Was Prudent

Finally, PGE's repair of the cracked LP1 rotor was prudent and was conducted so as to minimize replacement power costs. PGE chose to have Alstom conduct the repair, rather than Siemens, because Alstom could perform the repair quicker, thereby saving about one month of replacement power costs. PGE also chose to transport the cracked rotor to Alstom by airplane, rather than truck, saving another 10 to 12 days of replacement power. PGE made those choices, and thereby reduced the expenses it is seeking to amortize in this docket, even though PGE is not seeking to recover the cost of the repair or transportation in this or any other docket.

This point is worth repeating: PGE is not seeking to recover any of the costs of repair or transportation of the rotor in this or any other docket. Although ICNU and CUB have not directly challenged the prudence of PGE's repair of the cracked rotor,

they have suggested that PGE might have been able to recover the cost of the repair under its warranty with Siemens, if it had chosen to have Siemens perform the repair. Further, they have suggested that, by having Alstom undertake the repair, PGE may have compromised its ability to recover on future warranty claims against Siemens.

PGE does not agree with this assertion. More to the point, however, it is not relevant to this docket. None of the replacement power costs that PGE is seeking to recover here were covered under PGE's warranty with Siemens. Even if PGE had allowed Siemens to perform the repair and recovered on a warranty claim, the amount at issue in this docket would not have been reduced. Quite the opposite: the amount would have been greater because, again, Siemens would have taken an extra month to repair the rotor, thereby causing PGE to incur significantly greater replacement power costs. Thus, the decision that ICNU and CUB are criticizing PGE for is actually a decision that reduced the amount that PGE is seeking to recover in this docket, with correspondingly greater expense to PGE. ICNU and CUB simply ignore this fact in their reflexive condemnation of every PGE decision.

In sum, there is no issue concerning the prudence of PGE's repairs of the cracked LP1 Turbine. Intervenors' arguments about PGE's warranty with Siemens are simply beside the point.

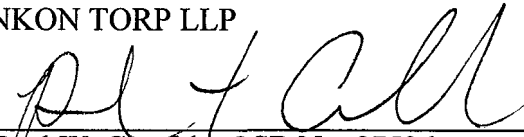
CONCLUSION

For the reasons stated, applicant PGE respectfully requests that the Commission grant its application to amortize the full amount of the deferred expenses authorized in Order 07-049.

DATED this 3rd day of September, 2008.

TONKON TORP LLP

By


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CERTIFICATE OF SERVICE

I hereby certify that on this day I served the foregoing **OPENING BRIEF OF PORTLAND GENERAL ELECTRIC COMPANY** by electronically mailing a copy thereof to each party listed below and by placing in a sealed envelope, first-class postage prepaid, addressed to those parties who have not waived paper service, deposited in the U.S. Mail at Portland, Oregon.

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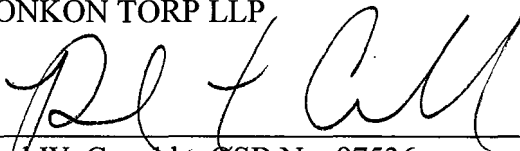
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