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BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

In the Matter of the Application of PACIFICORP for Approval of an IRP Based Avoided Cost Methodology for QF Projects Larger than 1 Megawatt	DOCKET NO. 03-035-14

PREFILED DIRECT TESTIMONY OF NEAL TOWNSEND

The UAE Intervention Group hereby submits the Prefiled Direct Testimony of Neal Townsend.

DATED this 29th day of July, 2005.

/s/ Gary A. Dodge,
Attorney for UAE Intervention Group

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing was served by email this 29th day of July, 2005, to the following:

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PREFILED DIRECT TESTIMONY

Of

NEAL TOWNSEND

On behalf of UAE Intervention Group

In the Matter of the Application of PACIFICORP for Approval of an IRP Based Avoided Cost Methodology for QF Projects Larger than 1 Megawatt

Docket No. 03-035-14

July 29, 2005

Q. Please state your name and business address.

A. My name is Neal Townsend. My business address is 215 S. State, Suite 200, Salt Lake City, Utah 84111.

Q. For whom do you work?

A. I am a Senior Consultant in the firm of Energy Strategies, LLC, a professional energy consulting firm.

Q. Please describe your educational background.

A. I received an MBA from the University of New Mexico in 1996. I also earned a B.S. degree in Mechanical Engineering from the University of Texas at Austin in 1984.

Q. Please describe your professional experience and background.

A. I have provided regulatory and technical support on a variety of energy projects at Energy Strategies since I joined the firm in 2001. Prior to my employment at Energy Strategies, I was employed by the Utah Division of Public Utilities as a Rate Analyst from 1998 to 2001. I have also worked in the aerospace and oil and natural gas industries.

Q. On whose behalf are you testifying?

A. I am filing testimony on behalf of the Utah Association of Energy Users Intervention Group (UAE). In this case, UAE's interest is primarily the development of reasonable avoided cost rates that could foster development of efficient qualifying facility cogeneration projects (QFs) at industrial locations, while maintaining ratepayer neutrality.

Q. What is the purpose of your testimony?

A. My testimony analyzes PacifiCorp's (the Company) proposed method for developing avoided cost pricing for "intermediate" size QFs -- QFs that range in size from 3 MW to whatever size the Commission determines is appropriate for this QF category.

Q. Can you please summarize your testimony?

A. In my testimony, I review the Company's calculation of the avoided capacity and energy price it proposes for "intermediate" size QFs. In my opinion, PacifiCorp's proposed capacity payment should be adjusted to include transmission upgrade costs associated with the "avoidable" IRP-based 2009 CCCT. I also demonstrate that the Company's proposed method for determining capacity payments penalizes QFs because of PacifiCorp's insistence on a maximum 20 year QF contract. For determining avoided energy costs, I recommend that the Public Service Commission (PSC) reject the use of the GRID production dispatch model. This model is complicated, difficult to understand, subject to an array of assumptions, and not a common model used in the industry. Its use would impose an additional and unreasonable barrier on QF development. I propose a simple, straightforward proxy model approach that allows for both a tolling and fixed QF pricing structure. This easily understood proxy model is subject to just a few critical assumptions. I identify the most critical issue that drives differences in avoided cost results as the avoided energy prices in low load hours. In this proxy model, I offer suggestions for both high load and low load hour QF pricing, both in the

years prior to the assumed deferrable 2009 IRP CCCT, as well as after its assumed operational date.

Q. Can you describe PacifiCorp's proposed avoided cost methodology?

A. The Company uses what it describes as a differential revenue requirement (DRR) method. Under the Company proposal, the QF capacity price is determined based on a proxy plant approach, using capital cost information from PacifiCorp's 2004 IRP for a 525 MW dry-cooled combined cycle combustion turbine (CCCT) included in the "Portfolio E" expected to come on-line in 2009. Prior to 2009, the Company does not propose paying any capacity payment. To determine the QF energy price, the Company makes two model runs using its production dispatch or net power cost model, GRID, modified to run over a 20 year period. The differences between these two model runs, one run with the 2009 CCCT (and other 2004 IRP resources as well) and one run with a zero cost QF and no 2009 CCCT, determine the energy-only prices that are added to the capacity payment (assuming an 85% capacity factor) to determine the total avoided costs. In practice, if such a method were approved, it appears the Company would reduce this generic 525MW zero cost QF by the specific size of the proposed QF, add a zero cost resource with the specific characteristics of the proposed QF, update the model inputs, and make the two model runs to determine the energy only component for use with the capacity payments described above. Under PacifiCorp's proposal, this method would apply to any QF sized from 3 to 99 MW.

Q. What do you think of PacifiCorp's avoided cost price methodology?

A. I generally agree with the Company's approach to determine capacity payments, although I offer some corrections or modifications to make the pricing more accurate. I prefer a simpler approach to determine energy payments and I strongly disagree with several key assumptions used in the Company's calculation. I offer several comments and recommendations for both the capacity and energy payments.

QF CAPACITY PAYMENT

Q. Does UAE agree with PacifiCorp's use of a proxy method to determine the capacity payment?

A. Yes, UAE supports PacifiCorp's proposed method, but believes some corrections or modifications are necessary to appropriately reflect capacity prices.

Q. What corrections or modifications to PacifiCorp's capacity payment do you recommend?

A. PacifiCorp's calculation fails to include the cost of transmission upgrades identified in its 2004 IRP that are necessary to move the power from the 2009 IRP CCCT to the load center along the Wasatch Front. I have added these transmission costs into PacifiCorp's capacity payment calculation. UAE clients are also interested in development of a QF tolling arrangement. Such a payment structure requires both a capacity payment and a heat rate. PacifiCorp's proposal does not include any capacity payment prior to 2009. There are several possible approaches to arrive at a pre-2009 capacity price. One approach that has been

previously considered is to use the full (or partial) costs of a simple cycle combustion turbine. However, at this point, I have elected to simply spread the 17 years of capacity payments proposed by PacifiCorp for the 2009 IRP CCCT over the full 20 year period using a real levelized approach such that the 20 year net present value is maintained.

Q. Why are these modifications necessary?

A. Avoided transmission capital costs are appropriately captured in the capacity price. Ignoring these avoided capacity costs (they are not included in my energy prices) understates the costs that can be avoided by the utility and its ratepayers. The failure to pay capacity payments for years prior to 2009 also understates avoided costs. According to PacifiCorp's 2004 IRP, the East control area is capacity deficient in all fiscal years except 2008. In addition, capacity, by its very nature, comes on-line in lumpy sizes. The utility routinely seeks full recovery for plants that come on-line before the load has increased to the level necessary to use all of the new plant's capacity. Arguably, QFs should be treated in the same manner. A QF project is unlikely to be economic or financable without capacity payments in the early years. At the very minimum, the utility should offer to stretch the available capacity payments over the entire contract term, as I have done in my calculations.

Q. How do these changes affect the capacity price proposed by PacifiCorp?

A. The impact of these changes is shown in Table 1 below and provided in more detail in Exhibit 2.1 (TNT-1). The avoided cost capacity payments increase by an

average of $14.46/kW over the 20-year term. This calculation is reflected in Table 1 below:

Table 1

Year	PacifiCorp Proposed Capacity Price (1) $/kW-yr	UAE Proposed Capacity Price $/kW-yr
2006	$0.00	$73.46
2007	$0.00	$74.94
2008	$0.00	$76.45
2009	$82.51	$78.00
2010	$84.18	$79.57
2011	$86.66	$81.91
2012	$89.20	$84.32
2013	$91.83	$86.80
2014	$94.53	$89.35
2015	$97.31	$91.98
2016	$100.17	$94.68
2017	$103.11	$97.47
2018	$106.14	$100.33
2019	$109.26	$103.28
2020	$112.48	$106.32
2021	$116.91	$110.02
2022	$121.51	$113.85
2023	$126.30	$117.81
2024	$131.28	$121.91
2025	$136.45	$126.15
20 Year Levelized Prices (Nominal) @ 7.20% Discount Rate (2)		
$/kW	74.94	89.40

Footnotes:

(1) PacifiCorp capacity prices taken from Direct Testimony of Greg Duvall, Exhibit UP&L ___ (GND-1).

(2) Discount Rate - 2004 IRP After Tax Weighted Average Cost of Capital.

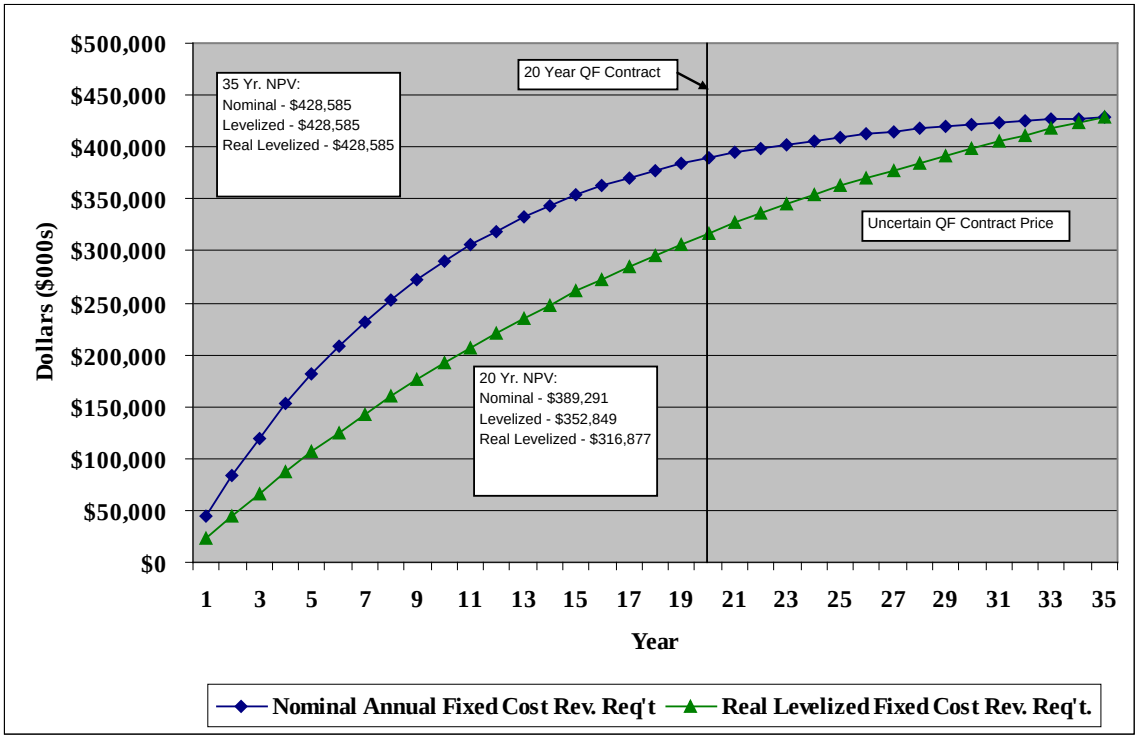
Q. Do you have any other concerns regarding PacifiCorp's capacity payment calculations?

A. Yes. The payment factor used to develop PacifiCorp's proposed real levelized payments is based on analysis that uses a 35 year CCCT plant life. This real levelized payment factor produces the same net present value as the nominal revenue requirement over the 35 year life of the plant. However, PacifiCorp proposes to limit QF contracts to 20 years. By determining capacity payments based on a 35-year plant but refusing to sign a contract for more than 20 years, PacifiCorp's proposal results in a serious underpayment to the QF facility at year 20. At year 20, the use of real levelized payments will put a 525 MW QF facility at risk of not recovering approximately $70 million. In other words, the Company will be $70 million better off when the contract ends than it would have been had the QF been paid in the same manner that the Company recovers its costs--based on nominal revenue requirement which starts at a much higher level and decreases over time. The QF will receive its full capacity payments--and ratepayers will be indifferent--only if the QF continues to receive the same levelized capacity payment for an additional 15 years. PacifiCorp's proposed 20 year contract term thus penalizes the QF and creates significant uncertainty as to whether the QF will receive the real levelized capacity payment over the remaining 15 years. This unfairness is illustrated in the figure below, based on projected capital costs for a

CCCT.

Figure 1

Cumulative Nominal vs Real Levelized Present Value of Revenue Requirements for a Combined Cycle Combustion Turbine



Q. What should be done to rectify this unfairness?

A. Either QFs should be offered a longer-term contract or the Company should pay QFs on a nominal revenue requirement basis like it recovers costs itself.

QF ENERGY PAYMENT

Q. Can you describe PacifiCorp's proposal for determining avoided energy prices?

A. PacifiCorp proposes to compare the results of two production dispatch model runs using a version of its GRID model that evaluates a twenty year period, 2005 through 2025. In its "base case" model run, the Company includes all its IRP planned resources, including the dispatchable 2009 dry-cooled CCCT. In the second run, the Company removes the 2009 CCCT and replaces it with a zero cost resource with capacity equal to the 2009 CCCT and a 100% capacity factor. The results of these two runs are compared to derive the avoided energy price for QFs.

Q. Do you agree with the use of the GRID model for purposes of determining avoided energy prices?

A. No. I favor the use of a much simpler, yet reasonable, proxy model approach that I will discuss in more detail below. While conceptually, at least, the GRID model might be capable of producing reasonable results after it is thoroughly understood and verified and all inputs and assumptions are accurate and reasonable, the GRID model is much too burdensome and complicated to serve as a reasonable, transparent and verifiable approach to calculate avoided energy prices in this docket.

Q. Are you able to operate the GRID model?

A. Yes, generally speaking. However, we estimate that it would literally take thousands of hours for one to become sufficiently proficient with the GRID model to fully understand all of its assumptions and calculations and to perform a valid

and meaningful verification of the model.

Q. What makes the use of the GRID model so complicated?

A. In the first place, PacifiCorp does not provide the GRID model in electronic format for parties to run on their own computers. Rather, the Company provides a locked computer processor with the GRID model loaded on it. PacifiCorp does not provide a monitor or a printer, so the GRID output must be written to a compact disc (CD) or a Universal Serial Bus (USB) drive for transfer to another computer that has a printer attached. The computer is also a stand alone system that cannot be connected to a computer network or the internet.

We received our GRID computer on May 9, 2005, a week after PacifiCorp filed its testimony. Initially, the model would not run; we received numerous error messages when we attempted to run the model. We wasted considerable amounts of time and resources attempting to find a solution to the problems with PacifiCorp. We were repeatedly asked to e-mail the computer's log to the Company's information technology (IT) personnel, a task made more difficult since the computer is a stand alone machine that cannot be connected to the internet. PacifiCorp finally provided an updated model that corrected the unidentified error on or about May 31, 2005.

Q. Was that the only problem?

A. No. After installing the model update, UAE again received an error message when it attempted to run a copy of the model. Again, PacifiCorp requested the computer logs be sent via e-mail. The solution to this problem, identified several

days later with the help of the IT department, was that the project name was too long. Unfortunately, this simple problem was not identified by the error message. This second issue was resolved nearly a month after PacifiCorp filed its direct testimony.

Q. Is UAE now able to run the GRID model?

A. Yes, after this second problem was corrected, UAE was able to perform GRID modeling runs. However, GRID is an extremely complex model that uses a multitude of assumptions and inputs located in numerous places throughout the model. Each run takes most of the day -- assuming everything works correctly. Moreover, it would take considerable amounts of time and effort for one to become proficient at running the GRID model. Even then, it would take months of consistent and dedicated effort to understand and validate all of the assumptions and calculations. The model is the opposite of a transparent model. Many of the assumptions GRID uses are buried deep within the model and would take considerable time to uncover and verify.

Q. Is GRID used by other companies?

A. It is my understanding that GRID is a proprietary model, unique to PacifiCorp. This uniqueness, while perhaps allowing PacifiCorp to provide the model without concerns related to software licensing, limits the number of persons proficient with its use to PacifiCorp or regulators and consultants that operate the GRID model on a frequent basis. It is highly unlikely that most QF developers would have any familiarity or experience with the GRID model whatsoever.

Q. The complexity of the model aside, do you accept the model results?

A. I am not able to answer this completely because of the complexity and the resulting inability to thoroughly vet and verify the model results. We have, however, been able to demonstrate that model results produced by GRID are generally consistent with the results of more transparent models, using similar assumptions and inputs. Given sufficient time and money, one could develop a sufficient understanding of the model and how to modify its assumptions, at least to the extent the model permits such a change, to arrive at a comfort level. In my opinion, this would take many months, perhaps years, of consistent model use.

Q. Is there an alternative to using a production dispatch model to determine the avoided energy price?

A. Yes, UAE advocates the use of a much simpler Proxy Model for determining both the capacity and energy price for "intermediate" size QFs. Such models are routinely used in surrounding states and around the country for such purposes. The models are well understood, widely accepted and used, simple and transparent. As with any model, the results are reasonable if the inputs and assumptions are reasonable.

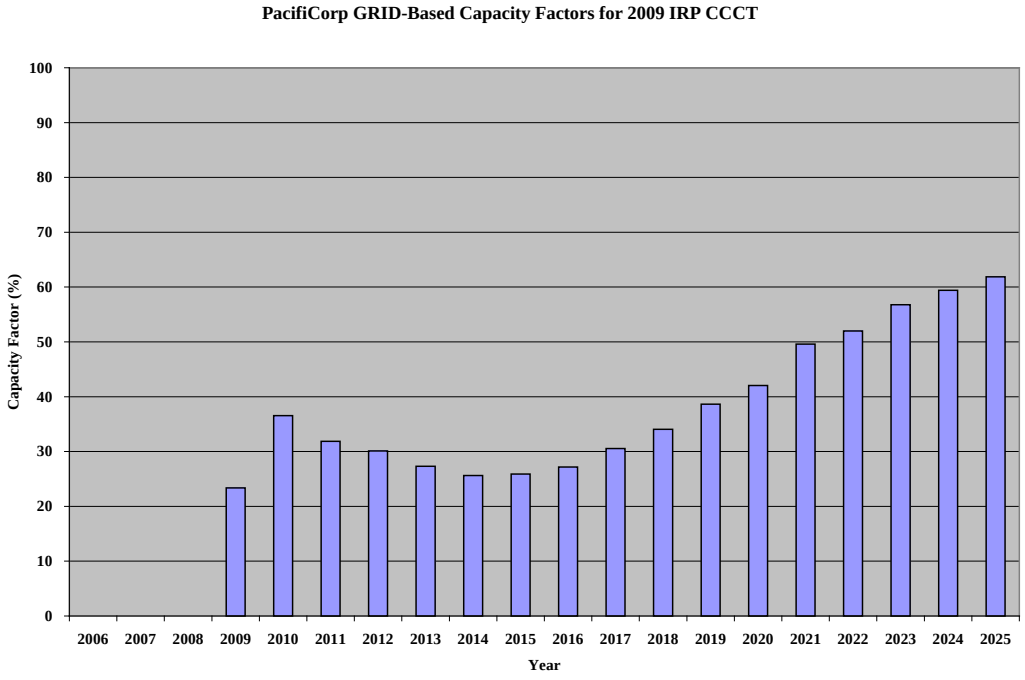
Q. Why is your proposed Proxy Model simpler than the GRID model?

A. Of necessity, the proxy model uses some simplifying assumptions. The results are reasonable so long as a few critical assumptions are reasonable. The most important assumption for a reasonable energy price is the expected capacity factor of the avoidable resource, the 2009 CCCT plant in this case. Other important

assumptions, at least for a fixed price option, include forward electricity and gas market prices.

Q. What does the Company project for the capacity factor of the 2009 CCCT?

A. Using the assumptions in the Company base case GRID run, this plant will have the annual capacity factors shown in the graph below.



This reflects an average capacity factor of just 38.4%, whereas the average dispatch of the Company's Currant Creek and Lakeside CCCT plants are projected by GRID to average 59.01% and 64.11%, respectively, over this same time period.

Q. Are these reasonable expectations for the 2009 CCCT capacity factors?

A. No. These capacity factors are skewed in the GRID model because of the model's constraints and assumptions. For example, it is not clear why the 2009 CCCT

plant has a different heat rate curve and a $.37/MMBtu incremental fuel cost adder included in its gas price compared to the Currant Creek plant. The assumptions driving these differences are not transparent in the GRID model.

Moreover, the 2009 CCCT is described in the 2004 IRP as a 2x1 plant design, two (2) combustion turbines and one (1) a steam generator. PacifiCorp states this 2x1 configuration is the "the best representation for a CCCT with an expected capacity factor of between 15% and 100%", attributed to its capital cost and efficiency advantage. (PacifiCorp's Integrated Resource Plan 2004, p. 92). This assertion is in contrast to PacifiCorp's 2002/2003 IRP where it stated that a 2x1 configuration "is the best representation for a base-loaded CCCT with a capacity factor greater than 70%." Further, the 2002/2003 IRP stated that, for "more intermediate duty (capacity factors between 30% and 70%), the 1x1 configuration will be a better application." (PacifiCorp's Integrated Resource Plan 2003, p. 74). If the 2002/2003 IRP statement is accurate, the 2009 IRP 2x1 CCCT design would be expected to have a fairly high capacity factor. However, based on the QF GRID results, it does not.

Q. What other observations have you made regarding the QF GRID model?

A. UAE ran the Company's GRID model with the zero cost QF running only during high load hours (HLH), leaving all the other assumptions in the model unchanged. This model run produced an avoided levelized energy price of $46.95, roughly $10/MWh higher than 100% non-dispatchable Company run. In addition, in a data response, PacifiCorp ran the zero cost QF in a manner consistent with the

2009 CCCT and arrived a GRID avoided levelized energy price of $50.30/MWh. Furthermore, a GRID run where the zero cost QF dispatched only during low load hours produced a levelized avoided energy cost of $17.83/MWh.

Q. What conclusions do you draw from these results?

A. While I question the reasonableness of the entire model results, I conclude that the low value of energy derived by PacifiCorp in the low load hours (LLHs) has a significant and unreasonable impact on the avoided cost energy price for a high capacity factor QF. I suspect that this low energy value is caused by unreasonable modeling assumptions in GRID. The GRID model backs down PacifiCorp's coal plants during low load hours, at least in part because of PacifiCorp's assumptions of a 100% capacity factor QF, of limited LLH market size, and of access to only firm transmission capacity.

Q. Are these reasonable assumptions?

A. No. The market liquidity assumptions have not been adequately supported and appear intuitively unreasonable, particularly for QFs of "intermediate" size. In addition, the use of only firm transmission is not reasonable. While PacifiCorp used a similar assumption in its 2004 IRP model, it noted this firm transmission constraint "is a conservative market modeling assumption." (PacifiCorp's IRP 2004 Technical Appendix, p 75, footnote). The use of non-firm transmission in LLHs would likely maintain a higher dispatch level for coal plants. Particularly for QFs in the "intermediate" size range, it is not unreasonable to expect that PacifiCorp would sell power in the firm or non-firm market in most hours. And

finally, QFs, as shown in PacifiCorp's own analysis, would be expected to only have an 85% capacity factor, not 100%.

Q. What assumption have you made for capacity factor in the proxy model?

A. I believe a reasonable average capacity factor is 56% for the 420 MW CCCT portion of the plant and 16% for the 105 MW duct firing. These average capacity factors, outputs from PacifiCorp's 2004 IRP, are used to develop an energy weighted heat rate used for avoided energy pricing during high load hours beginning in 2009. Since high load hours, which represent some 57% of the hours in a year, are essentially equal to the IRP CCCT capacity factor (56%), I am using this weighted heat rate for high load hours starting in 2009 in my proxy model results.

Q. How have you calculated the high load and low load hour avoided energy payment for the years prior to 2009?

A. I have used 93% of the official Palo Verde high load and low load hour market price forecasts provided by PacifiCorp dated March 31, 2005. That is similar to the approach to pricing energy in non-dispatch hours used in the stipulation and it produces reasonable results. However, I have capped this market price at the energy cost of the 2009 IRP CCCT. This cap is calculated by multiplying the Company's gas price forecast by the un-degraded heat rate of the 2009 IRP CCCT. For QFs opting for a tolling agreement, this heat rate would also be used in 2006 through 2009 to calculate the energy payment when PacifiCorp elects to dispatch the plant.

Q. What other assumptions have you made in the proxy model?

A. I have degraded the capacity factor of the CCCT portion of the 2009 plant using a degradation pattern similar to data provided by PacifiCorp in the QF task force. I also recommend that a transmission loss adjustment be applied to the price if the QF is located near the Wasatch Front load center such that these losses can be avoided.

Q. What is the result of your recommended proxy model?

A. UAE's recommend proxy model produces an all-in 20-year levelized cost of $63.69/MWh, which is summarized in the following table, assuming an 85% capacity factor:

Table 2 - Summary of UAE's Proposed QF Proxy Model

Year	Capacity Price $/kW-yr	Heat Rate Btu/kWh	Energy Only Price $/MWH (2)	Total Price @ 85% Capacity Factor $/MWH
2006	$73.46	7,599	$52.14	$62.01
2007	$74.94	7,599	$48.05	$58.11
2008	$76.45	7,599	$44.58	$54.85
2009	$78.00	7,656	$42.10	$52.57
2010	$79.57	7,663	$39.71	$50.40
2011	$81.91	7,669	$42.24	$53.25
2012	$84.32	7,674	$47.96	$59.28
2013	$86.80	7,679	$51.35	$63.01
2014	$89.35	7,682	$51.93	$63.93
2015	$91.98	7,686	$53.11	$65.47
2016	$94.68	7,689	$54.57	$67.29
2017	$97.47	7,663	$56.31	$69.40
2018	$100.33	7,671	$57.92	$71.39
2019	$103.28	7,677	$59.42	$73.29
2020	$106.32	7,682	$60.99	$75.27
2021	$110.02	7,687	$62.57	$77.35
2022	$113.85	7,690	$64.21	$79.50
2023	$117.81	7,694	$65.86	$81.68
2024	$121.91	7,697	$67.50	$83.87
2025	$126.15	7,669	$69.02	$85.96

20 Year Levelized Prices (Nominal) @ 7.20% Discount Rate (1)

$/kW	89.40		
$/MWH		51.69	63.69

Footnotes:
(1) Discount Rate - 2004 IRP After Tax Weighted Average Cost of Capital
(2) 'Energy Only' Prices are capped at the 2009 IRP CCCT energy cost.

I have prepared an exhibit detailing this proxy model in UAE Exhibit 2.2 (TNT-2). This exhibit includes our recommended corrections to PacifiCorp's capacity payment as well as our calculation of the energy price.

Q. Do you have any other comments regarding the proxy model?

A. Yes, as I stated earlier, many industrial-based QFs desire a tolling arrangement with PacifiCorp under which they receive a capacity payment along with a specified gas-based heat rate in the hours PacifiCorp elects to dispatch the plant. The heat rate would be multiplied by an independent gas price, e.g. an Opal index price plus gas transportation costs (Kern or Questar transportation) to arrive at the avoided energy price at the time the energy is actually produced. The proxy

model as depicted in my exhibit assumes such a tolling arrangement for the high load hours. A fixed price option would be available to a QF by multiplying the heat rate by a gas price forecast, e.g. PacifiCorp's quarterly "official" forward market gas prices, in the high load hours and using a percentage (93% in my exhibit) of PacifiCorp's "official" Palo Verde price in the low load hours. Both these options are included in my exhibit. Hourly prices would also be shaped using PacifiCorp's hourly scalers.

Q. Does this conclude your direct testimony?

A. Yes it does.