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 MW	))))))	Docket No. 03-035-14

REBUTTAL TESTIMONY OF GREGORY N. DUVALL

September 2005

Q. Are you the same Gregory N. Duvall that filed direct testimony in this case?

A. Yes.

Q. Would you please summarize your testimony?

A. In my rebuttal testimony:

- I adopt changes to the Company's original Differential Revenue Requirement (DRR) proposal to incorporate changes suggested by Mr. Hayet. I label this the Partial Displacement DRR method.
- I show that concerns over using a 100 percent capacity factor for the adjustable QF are not relevant when using the Partial Displacement DRR method.
- I rebut criticisms made about GRID assumptions for market caps and transmission access.
- I rebut claims made by several witnesses that the GRID assumptions on market caps and transmission access are not reasonable.
- I agree with Dr. Powell that the DRR method yields superior results when compared to the Proxy method.
- I show that concerns voiced by several witnesses over the complexity of the GRID model are overstated and that GRID is an appropriate tool to use in for determining avoided costs.

Adoption of Phil Hayet's Proposed Changes to the DRR method

Q. Have you reviewed Mr. Hayet's testimony in this case?

A. Yes. I have reviewed Mr. Hayet's proposed changes to the Company's original DRR methodology and determined that his proposed changes have merit. On page

12 and 13 of his testimony, Mr. Hayet clarifies his proposed DRR methodology. On pages 14 and 15 of his testimony, Mr. Hayet proposes to partially displace or "scale back" the capacity of the IRP resources. It is the combination of these items that the Company believes represents a reasonable DRR methodology. In order to put a name to Mr. Hayet's proposed DRR methodology, the Company has selected the term, Partial Displacement DRR methodology. We've selected this term in order to recognize that the IRP resource is not totally displaced, but rather is partially displaced by the QF resource.

Q. Why did the Company adopt Mr. Hayet's proposed method?

A. After reviewing the prefiled testimony of various parties and considering the comments received by the Company during technical conferences, the Company decided that the Original DRR Method had limitations and that Mr. Hayet's Partial Displacement Method was both more technically correct and resolved some intervenor's concerns with the prior method.

Q. Would you discuss the limitations with the Original DRR Method?

A. Yes. One of the single greatest strengths of the DRR method is the ability to model the specific operating characteristics of the QF resource and provide avoided cost prices specific for that resource. The Company's Original DRR Method, required that the 525 MW IRP resource be totally displaced and that the total of the QF plus an adjustable QF resource exactly total 525 MW[1]. This approach had the effect of blending the QF's price with the adjustable QF's prices. Thus, the QF's prices did not reflect any given QF's operating characteristics.

[1] For example a 99 MW QF resource would be paired with a 426 MW 100% capacity factor adjustable QF resource for a total of 525 MW.

Under the Partial Displacement Method, there is no blending of prices and the prices that come out of the model reflect solely the operating characteristics of the QF resource.

Second, the Company's Original DRR Method assumed that the adjustable QF resource had a 100% capacity factor. Several parties argued that this was an unreasonable assumption and that it resulted in reduced avoided costs. The Partial Displacement Method does not have an adjustable QF resource so this issue is no longer relevant.

Q. Would you please describe Mr. Hayet's changes to the DRR methodology as you understand them?

A. The changes which Mr. Hayet has proposed have no impact on the original base case GRID run. As before, the Company will develop a base case GRID run using the best information available at the time. Included in the base case run will be the Company's most recently filed IRP expansion plan, the Company's most recent Official Price Projections (both energy markets and gas prices) and the load forecast used in the IRP. When a QF requests prices, the Company will make two changes to the base case in order to calculate avoided costs. First, the Company will evaluate the QF's operating characteristics and will model these characteristics in GRID as a zero cost resource. Second, the Company will partially displace the capacity of the IRP resources on a one-for-one basis in an amount equal to the capacity of the QF resource. During the period 2006 up until the 525 MW combined cycle combustion turbine (CCCT) IRP resource goes online (April 2009), the Company will partially displace front office trades

(FOT). When the CCCT comes online, the Company will partially displace this unit.

Q. How would you partially displace a 525 MW CCCT?

A. As Mr. Hayet mentioned on page 15 of his testimony, the Company will partially displace the IRP resources by scaling back the capacity of the IRP resources by the capacity of the QF. For example, a QF with a 99 MW nameplate would result in scaling back the 525 MW CCCT IRP resource to 426 MWs. All of the attributes associated with the 525 MW resource are also scaled back. These attributes include nameplate, minimum operating level, MMBtu to start the plant, reserve contribution, and heat rate curves.

Q. Would you explain how new QFs receive prices under the Partial Displacement DRR Method and the Company's Original DRR Method?

A. Yes. Under the Partial Displacement DRR method, when the first QF requests prices, the Company develops the base case GRID run and the second avoided cost GRID run which was described earlier. If the first QF decides to contract with the Company, then they become an existing resource that is included in the Company's resource expansion plan. When a second QF requests prices, the capacity of the first QF is included in the base case. If the second QF also decides to contract with the Company, their capacity would then be included in the base case of any future QFs that request prices. As additional QFs contract with the Company, the size of the IRP resources would be reduced until ultimately the CCCT would become zero when a total of 525 MW of QF resources are contracted.

Under the Company's Original DRR Method, the base case always remained the same. When the first QF requested prices the Company would make three adjustments to the base case to create the avoided cost GRID run: (1) displace 525 MW of IRP resources (FOT and CCCT); (2) add the first QF; and (3) add an adjustable QF resource at a 100% capacity factor and with a capacity equal to 525 MW less the first QF's nameplate capacity. When the second QF requested prices, the base case remained unchanged and the Company would make four adjustments to the base case to create the avoided cost GRID run: (1) displace 525 MW of IRP resources; (2) add the first QF; (3) add the second QF; and (4) add the adjustable QF with a capacity equal to 525 MW less the first and second QFs nameplate capacity. As additional QFs contract with the Company, the size of the adjustable QF resource would be reduced until ultimately it would become zero when a total of 525 MW of QF resources are contracted.

Q. Have you prepared a Table showing the impact of the Partial Displacement DRR methodology?

A. Yes. Table 1 below shows the impact of a 99 MW QF resource at various capacity factors. At an 85% capacity factor, the Partial Displacement DRR methodology results in a $3.96 / MWh ($50.83-$46.62) increase in avoided costs over the Company's original proposed DRR methodology. For comparison purposes, the Company's is using the 20 year levelized price.

TABLE 1

20 Year Levelized Prices $/MWH (1)

Method	Type of QF Requesting Prices (2)			
	100% CF	85% CF	70% CF	HLH
Partial Displacement	$48.49	$50.83	$53.86	$57.43
Updated DRR	-	$46.62	-	-

Footnotes:

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

(2) 99 MW Resource with the stated overall Capacity Factor. Energy is 100% capacity factor in HLH and with the balance of energy in LLH

Q. Please describe how the examples in Table 1 were developed.

A. The prices were developed assuming a 99 MW QF resource with the overall capacity factor as labeled in the table. Energy was shaped with a 100% capacity factor in Heavy Load Hours (HLH) and with the balance of energy in Light Load Hours (LLH). The HLH resource has energy in HLH only.

Q. Why did you describe different types of QF resource in Table 1?

A. One of the advantages of the DRR approach is its ability to provide specific prices given the operating characteristics of the specific QF resource. A QF resource that provides HLH capacity and energy only is providing a very different product than a 100 percent capacity factor QF. Both of these QFs should be paid based upon the value of the capacity and energy that they provide to the Company.

Q. Mr. Hayet raised an issue regarding capturing the impact of wind resource integration costs in the DRR method. Has the Company analyzed that option?

A. Yes. Based on that analysis, we have determined that the DRR method has the capability to capture wind resource integration costs in the modeling of individual

wind QFs. Therefore, the Company is proposing to model each QF proposal according to the hourly generation profile provided to the Company by the developer. This is another example of the benefits of the DRR method.

GRID results and assumptions are reasonable

Q. Various parties had concerns about unreasonable modeling assumptions in GRID.[2] Please address these concerns.

A. It appears that the concern about the GRID modeling is centered around one outcome of the model. When the QF resource is added to the system, the Company's existing coal fired resources back down in graveyard hours. Avoided costs during these hours are influenced by the decremental cost of backing down the units. These parties have the expectation that if the QF resource is added, that the power can always be sold at market and since the power can always be sold, that coal plants should never be backed down. These parties don't understand the realities of utility operation.

Q. Do the Company's coal plants generate less during graveyard hours?

A. Yes. Company owned coal fired plants generated less during graveyard hours than during all other hours. The Company has reviewed actual generation for the period January through July 2005. Examination of this data shows that the Company owned coal fired plants generated about 156 MW less during graveyard hours than during all other hours.

Q. What do the parties typically indicate causes coal plants to back down during graveyard hours?

[2] Direct Testimony of Neal Townsend Page 15, Line 6; Direct Testimony of Roger Swenson Page 7, Line 18; Prefiled Testimony of Richard Collins Page 9, Line 16.

A. Mr. Townsend states "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.[3]" The use of a 100% capacity factor QF is no longer relevant since the Partial Displacement Method does not use an adjustable QF resource with a 100% capacity factor. The second issue is commonly referred to as market caps.

Q. Please explain market caps.

A. Yes. During graveyard hours, customer loads are at their lowest levels during the day, dispatchable high cost resources are backed down to minimum or shut down completely and some of the Company's existing coal fired resources are backed down. Markets are very illiquid during these hours, meaning that other utilities face the same low load situations and also have resources available for sale. Essentially, a large quantity of capacity is available from a variety of sellers but there are few buyers. Once again this is a utility reality. The Company sets market caps in GRID equal to the average of 48 months of actual graveyard market sales.

Q. Is the modeling of 48 months of actual graveyard market sales consistent with the market caps used in the last Utah general rate case?

A. Yes.

Q. Has anyone in this proceeding presented any evidence justifying increasing the market caps?

[3] Direct Testimony of Neal Townsend Page 15, Line 7.

A. No.

Q. What would happen if the Company removed the market cap limitation?

A. I would expect that any impact would be limited since the additional market caps would be removed from both the base case and avoided cost runs and would result in additional market sales in the base case. The avoided cost would only reflect the difference in market activity between the base GRID run and the avoided cost GRID run.

Q. What about Mr. Townsend's concern about non-firm transmission?

A. Mr. Townsend and others argue that the Company should allow the GRID model to utilize non-firm transmission. Non-firm transmission by its very nature is non-firm. It would not be reasonable to develop QF prices assuming that power could be sold using non-firm transmission unless the Company had some assurance that the non-firm transmission would always be available. If the non-firm transmission was always available, the transmission operators would most likely sell the transmission rights as firm. Furthermore, the lack of market liquidity during the graveyard hours is the primary issue. When demand falls off in the graveyard hours, there is no point in buying non-firm transmission since there are not additional buyers for that energy.

Q. What would be the impact if the Company modeled more non-firm transmission or additional transmission upgrades?

A. It depends on the location, timing and size of the additional non-firm transmission or transmission upgrades, as well as the cost associated with using such transmission. I would expect that any impact would be limited since the

additional non-firm transmission or transmission upgrades would be added to both the base case and avoided cost runs and the base case would utilize the additional transmission rights to optimize system operation. The avoided cost would only reflect the difference in use of the additional transmission capability between the base GRID run and the avoided cost GRID run.

Q. What percent of avoided costs are associated with existing coal-fired generation?

A. Table 2 shows the percent of total avoided cost dollars. As can be seen, the switch from the Company's Original DRR Method to the Partial Displacement Method reduces the percent of total avoided cost dollars coming from the displacement of existing coal fired resources. Under the Partial Displacement Method, only 11 to 12 percent of the avoided cost price is associated with displacing coal plant fuel costs.

TABLE 2

Percent of Avoided Costs
Provided by Existing Coal-Fired Resources

Year	Partial Displacement (1)	Original Method (2)	Difference
2006-2008	11%	16%	-5%
2009-2025	12%	13%	-1%

Footnotes:
(1) 99 MW Resource with 100% overall Capacity Factor.
(2) Updated DRR Study Provided 5/27.2005

The DRR method is superior to the proxy method

Q. Do you agree with Dr. Powell's assessment of the DRR method?

A. Yes. He states on page 6 of is testimony, "… the DRR methodology, while more complex than a proxy plant methodology, yields superior results and, therefore, should be the basis of avoided cost calculations." I would also agree with Dr. Powell's assessment of the Proxy method starting on page 7 of his testimony. He states that the Proxy method only produces accurate results if: (1) the operating characteristics of the proxy plant closely match those of the QF resource; (2) the QF resource exactly replaces the entire capacity and energy of the proxy plant; and (3) the QF doesn't significantly affect other plant additions or system operations.

Q. Would a QF resource match these three criteria?

A. No.

Q. Does a typical QF have operating characteristic that are similar to the IRP resource?

A. No. The IRP resource is a CCCT. As such, the CCCT can be dispatched to serve load. When the plant is off-line, the Company can count the CCCT as non-spinning reserves. When the plant is operating, the plant can be dispatched at minimum operating levels and counted as spinning reserves. Finally, the CCCT can be set to follow load on a minute by minute basis. I am not aware of any QFs that have this level of dispatchability.

Q. Would a QF resource exactly replace the entire capacity and energy of the IRP resource?

A. No, not in terms of size or timing. The primary IRP resource is a 525 MW CCCT. A 99 MW QF would not replace the entire capacity and energy of the IRP

resource. It is also unknown whether or not a combination of QFs between 3 and 99 MW would replace the IRP resource. With regard to timing, the IRP resource is constructed according to the IRP action plan, while QF resources become available at the time a QF developer offers a QF resource to the Company.

Q. Would the QF have a significant affect on other plant additions or system operations?

A. The QF resource would certainly have an affect on system operations since the Company operates the system as an integrated system. Adding a new resource affects the dispatch of the entire system. The significance of a plant addition would depend upon the size of the QF, the location of the QF and how well the QF can be integrated into system operation.

Q. Several witnesses voiced concerns about the complexity of the DRR model. Do you agree with these concerns?

A. I would agree that the DRR methodology which uses GRID runs are more complex than the proxy method but not to the extent they suggest. Mr. Swenson stated that it "would require **hundreds of hours** of dedicated analysis to fully understand and analyze the model and verify its output.[4]" Mr. Townsend states "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.[5]" Mr. Collins states "it would take **decades** to test each input.[6]" Obviously, these are exaggerations. The Division had a decidedly different experience with the

[4] Direct Testimony of Roger Swenson Page 6, Line 5 (emphasis added).
[5] Direct Testimony of Neal Townsend Page 9, Line 18 (emphasis added).

GRID model. They were able to recreate the Company's runs to check for accuracy and examine input assumptions for reasonableness.[7]

There is no reason that QFs need to validate the GRID model. The GRID model has been validated in numerous other settings including in the last two Utah rate cases. All of the inputs into the GRID are included on the GRID computer which is available to the QF developer. The Company has committed to providing GRID training to QF developers. In this proceeding, the Company provided a workshop for all participants and telephone support where requested.

Q. Did various parties have problems with the GRID computers that were provided in this proceeding?

A. Yes. After providing the DRR study the Company received two types of complaints. First, a problem was found with GRID after the DRR study was shipped, so the Company provided a software maintenance patch that corrected the problem. Second, the DRR studies are very data intensive and there are limits on the amount of data that can be stored on the computer's hard drive. A special script was provided to clean up and compact the DRR results as a short term solution, larger hard drives will help in the future.

Both of these problems have been identified and can be fixed on a going forward basis.

Q. Do you think that the GRID model is a good tool despite the technical issues experienced in this Docket?

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[6] Pre-filed Testimony of Richard Collins Page 7, Line 20 (emphasis added).
[7] Direct Testimony of Andrea Coon Page 3, Line 61.

A. Absolutely. As mentioned above, the GRID model has been before this Commission in the last two general rate cases. In addition, the GRID model has been used in Oregon, Washington, Wyoming, Idaho and California in various proceedings and general rate cases. GRID has been used extensively in the Multi-State Process (MSP). Finally, the Division, Committee and Staff are all familiar with the model and support its use.

Q. Does this conclude your rebuttal testimony?

A. Yes.