PSC-025

Regarding: CREP, Judith Gap costs, information from D2009.1.4
Witness: Fine

a. Is the CREP solicitation you discuss on p. 6 closed, or is there still a possibility that NWE may procure one or more resources submitted in response to the solicitation?
b. Please provide a summary of all bids, including prices, quantities, and proposed contract durations, submitted in response to the CREP solicitation.
c. Please provide a copy of the August 10, 2007, Memorandum from you to Public Service Commissioners Molnar, Mood, Raney, Toole and Jergeson regarding Commissioner Molnar's request that NWE quantify the costs attributable to the actual generation from Judith Gap being greater than or less than the amount scheduled.
d. Please provide copies of the following data requests and NWE's responses (updated as NWE feels appropriate) from Docket No. D2009.1.4: PSC-008c, PSC-008d (with 2010 contract information), PSC-013, PSC-015d, PSC-023b.
e. At this time, can NWE demonstrate conclusively that the 3-Tier forecast system, when combined with discretionary actions by real-time schedulers, results in lower wind integration costs than would be the case without 3-Tier? If not, why is it reasonable to include in rates the costs of the 3-Tier system?

RESPONSE:

a. The 2008 CREP process is closed. NorthWestern is negotiating with one bidder to secure a purchase power agreement.

b. See attached.

c. A copy of the August 10, 2007 Memorandum is attached.

d. See attached.

PSC-025 (con't)

e. No. However, it is prudent utility practice to employ the available industry tools in the conduct of day-to-day Energy Supply business functions. The 3-Tier product supplied to NorthWestern is a high quality, state-of-the-art wind energy forecasting tool that enables NorthWestern to exercise informed judgment when preparing electric pre-schedules and while performing the real-time function.

In addition to forecasting, through 3 Tier, NorthWestern has the capability to compile, process, and model the data inputs from the meteorological towers, the Judith Gap Supervisory Control and Data Acquisition (SCADA) system, and other weather data, including information from the National Oceanic and Atmospheric Administration (NOAA).

Dkt. No. D2008.5.45/D2009.5.62

PSC Set 1 – 025(b)

Attachment 1

*DRAFT *** NorthWestern Energy 2008 CREP RFP *** DRAFT*
Summary of Proposals
August 15, 2008

Proposal Number:	*1*	*2*	*3*	*4*	*5*	*6*	
Contract Capacity	2.3 MW	10.1 MW	5 MW	Up to 4 separate 5 MW contracts	Up to 4 separate 5 MW contracts	0.5 MW	
Project Capacity	2.3 MW	10.1 MW	5 MW	20 MW	4 separate 5 MW sites	0.5 MW	
Fuel	Straight Vegetable Oil	Hydro - Irrigation	Biomass	Wind	Wind	Wind	
Technology	Caterpillar recip engine	Conventional	Cogen at sawmill	Clipper 2.5 MW Liberty turbines	2 2.5 MW Fuhrlaender turbines per site	2 Mitsubishi MWT-250 turbines	
Term	20 year tolling arrangement	20 year	20 year	20 Year	10 or 20 year terms	16 years	
Expected On-Line Date	12/15/2009	2010	2010	Jan 2010	October 2010	May 2009	
Price Offered	Alt 1 - $140/kW-yr Fixed + $15.96 VOM, both indexed or Alt 2 - $150/kW-yr Fixed + ???	$79.65 with 1.75% annual escalator	$125/kW-year fixed + $110/MWh variable with variable escalating at PPI.	Non-binding indicative price range of $80-95 first year with 3% annual escalation compounded monthly	$49/MWh adding $10/MWh every 5th year; 10 Year offer: $69/MWh first half, $70/MWh second half	$65/MWh with a 3.125% annual escalation	
Forecasted Capacity Factor	N/A	26,200 MWh or about 30% CF	6 aMW??	Above 40%	38% and 41% for two of the sites, with wind assessment not completed on the other two sites.	24% (1051 MWh/year)	

Dkt. No. D2008.5.45/D2009.5.62

PSC Set 1 – 025(c)

Attachment 1

NorthWestern Energy

NorthWestern Corporation
d/b/a NorthWestern Energy
40 E. Broadway
Butte, MT 59701
Telephone: (406) 497-1000
www.northwesternenergy.com

To: Commissioners Molnar, Mood, Raney, Toole, and Jergeson
From: Dave Fine
Subject: NWE response regarding additional costs of wind generation
Date: 10 August 2007

NorthWestern Energy ("NorthWestern" or "NWE") has received requests from Commissioner Molnar to review the costs of wind generation and to identify and quantify any costs that may be attributed to this resource, particularly any additional costs from wind generation that are the result of wind output being greater than or less than the amounts scheduled. This Memorandum is in response to this review.

The purchase power agreement between Judith Gap I, LLC and NorthWestern Energy (NorthWestern) obligates NorthWestern to purchase the entire energy output of the Judith Gap wind energy production facility (135MW installed capacity) regardless of the amount scheduled. Since production began in November 2005, NorthWestern has purchased and taken delivery of all the energy produced and delivered at Judith Gap, and has in turn, used it to serve default supply customers. In presentations made to the Montana Public Service Commission (the Commission) during 2007, NorthWestern provided detailed descriptions of the costs and operational requirements that have occurred as a result of integrating wind resources into the NorthWestern control area.

In an effort to better understand the cost of wind energy purchases, NWE conducted an analysis to compare the price of electricity purchased from Judith Gap to the price of electricity from a market reference. The contract price for Judith Gap wind energy was compared to the hourly cost of imbalance energy purchased for Default Supply for the period January 1, 2006 through April 30, 2007. Because there is no intra-hour market for electricity in the northwest, NWE used the cost of imbalance energy to serve as a proxy for market pricing and to provide a basis for comparison purposes. The results of the hour-to-hour comparison is as follows:

2006 - 79% of the time, the contract price of Judith Gap wind energy was less than the market cost of imbalance energy. On average, the contract purchase price was $13.66/MWH cheaper than imbalance energy.

2007 – (Jan – Apr) 83% of the time, the contract price of Judith Gap wind energy was less than the cost of imbalance energy. On average, the contract purchase price was $13.22/MWH cheaper than imbalance energy.

The energy purchase and sale activities performed by NorthWestern on both the pre-schedule and real time basis are conducted explicitly to achieve load – resource balance. As with any purchase power agreement containing a fixed price schedule, there is the risk that at times, contract price will exceed market or index price. Our analysis shows that this occurs roughly 20% of the time (based on historical price comparisons provided above) for energy that is purchased from Judith Gap. During the remaining time (approximately 80%) Judith Gap energy purchases were lower than the corresponding market price for energy.

NWE recognizes that the price comparisons above are hour-to-hour comparisons that have not been weighted for hourly wind production. They are presented as an "indicator" of the cost of Judith Gap wind energy purchases relative to a market benchmark and are not a substitute for purchases that NorthWestern would have otherwise made in the absence of the Judith Gap wind energy purchase power agreement. The price comparison does not include the cost of wind integration and other payments such as taxes. In NorthWestern's February 6, 2007 presentation to the commission, the first year costs of Judith Gap energy were shown to include $12.84/MWH of costs (average) above the purchase of the wind energy at the contracted price. On average, the total cost of wind energy appears to be slightly below the corresponding market price proxy. Note that these costs reflect the wind integration costs that are currently in effect. Indications are that wind integration costs are expected to rise significantly as the market for third party ancillary services become more illiquid for NorthWestern. Thus, in the future the distinction between wind costs and market proxy may well be reversed.

Wind energy purchases from Judith Gap are managed with other resources in the Default Supply resource portfolio. The production characteristics of wind energy differ substantially from other types of conventional resources; however, Judith Gap wind energy contributes and will contribute substantially to the renewable resource standard that must be achieved by NorthWestern as the Default Supplier.

Dkt. No. D2008.5.45/D2009.5.62

PSC Set 1 – 025(d)

Attachment 1

Montana Public Service Commission (PSC)
PSC Set 1 (001-008)

NWE (007-008)

Data Requests received January 30, 2009

PSC-008

Regarding: Scheduling and forecasting wind output

Witness: Dave Fine/Casey Johnston

a. Please explain how NWE's supply function scheduled output from Horseshoe Bend during the 2008 contract period. For example, did NWE use a persistence forecast? If so, please provide the precise method of calculating the hour-ahead output forecast. If NWE did not attempt to specifically schedule output from Horseshoe Bend during the contract period, please explain why.

b. Please explain how NWE's transmission function forecasts output from the Horseshoe Bend project in developing its hourly load-resource balance calculations. If the transmission function does not specifically forecast the output from the Horseshoe Bend project please explain why.

c. If NWE has evaluated the performance of the 3-Tier forecast system for Judith Gap output compared to a persistence forecast, please provide the results of the evaluation. If NWE has not performed such an evaluation, please explain whether it intends to and, if so, when.

d. Please provide the contract costs and quantities and associated transmission costs for regulating reserves acquired by NWE's default supply function for 2009. Please provide this information in a Microsoft Excel workbook table similar to the

Montana Public Service Commission (PSC)
PSC Set 1 (001-008)

NWE (007-008)

Data Requests received January 30, 2009

one NWE provided in Two Dot Wind Docket No. D2007.12.152, prefiled testimony of John Hines, p. JDH-5.

RESPONSE:

a)

b)

Montana Public Service Commission (PSC)
PSC Set 1 (001-008)

NWE (007-008)

Data Requests received January 30, 2009

PSC-008 (con't)

c) NorthWestern Energy monitors the performance of the 3Tier forecasting service by reviewing monthly summary information on the 3Tier secure website. Each month 3Tier updates the comparison of the 3Tier forecast to persistence forecasts and calculates the percentage improvement that is realized from the 3Tier forecast. The results of NorthWestern's most recent review of the 3Tier forecast versus persistence forecast is provided in Attachment c1.

d) Please refer to the attachment d1.

Dkt. No. D2009.1.4

PSC Set 1 – 008(c)

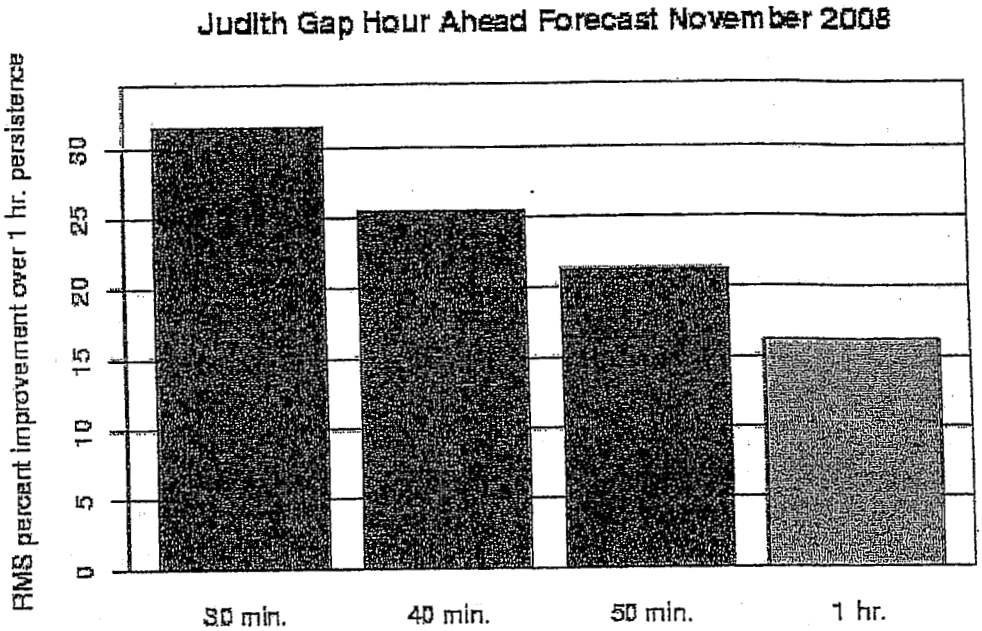
Attachment 1

Hour Ahead Forecast

The following plots show the percent improvement over persistence for the hour ahead forecasts made 30, 40, 50, and 60 minutes before the start of the hour. The actual root mean square (RMS) error of hour ahead persistence in megawatts (MW) is provided on the figure.

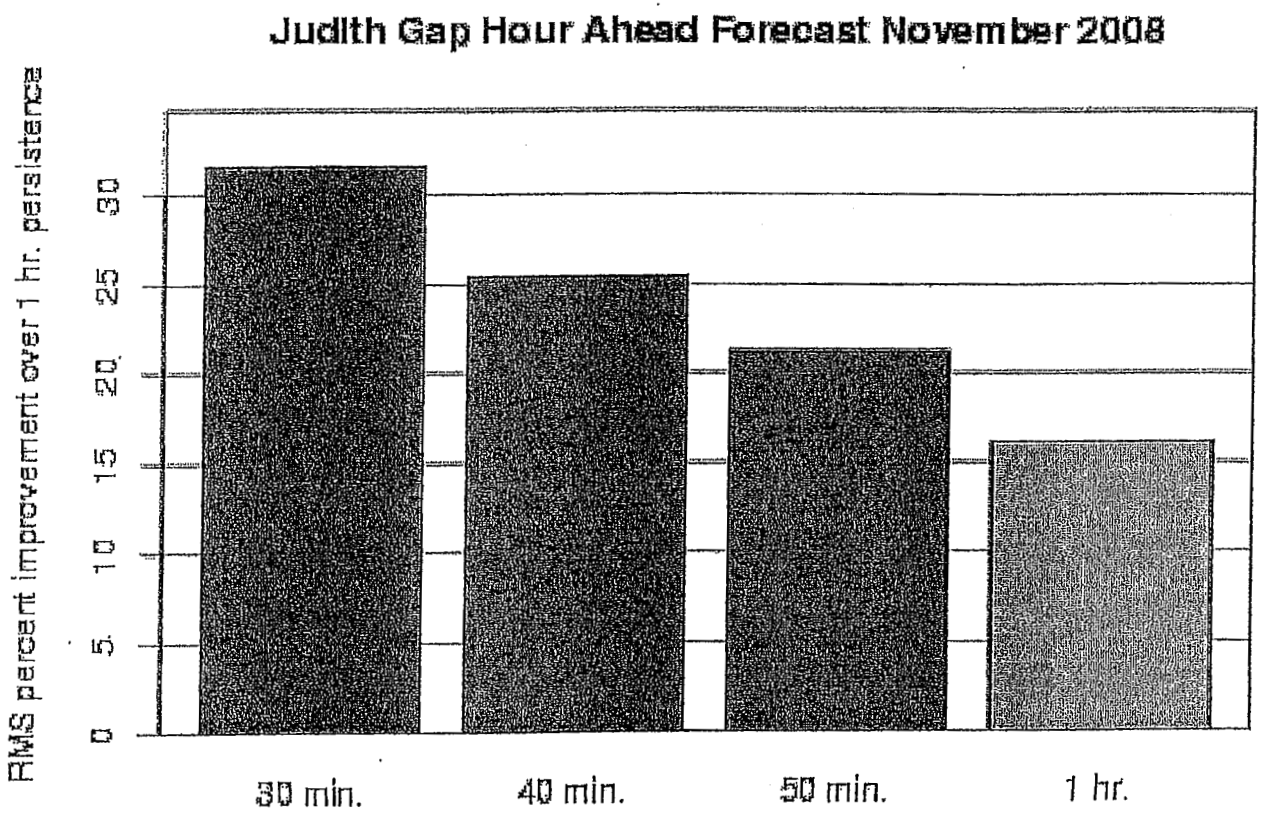
The root mean square (RMS) error is the difference between the forecast and the actual power squared, then averaged and the square root taken. The RMS error of the hour ahead persistence forecast is written in the figure in terms of percent of the maximum capacity of the plant and megawatts. An RMS percent improvement of 10%, means the forecast error was 10% less than the hour persistence error. If the hour ahead persistence value was 10 MW and the forecast RMS error was 9 MW, the RMS percent improvement of the forecast error would be 10%. The RMS percent improvement over persistence is one minus the RMS error of the forecast divided by the RMS error of persistence.

The four bars of the graph represent forecasts at different lead times. The one hour golden bar represents the longest forecast lead time, the forecast made for 10 a.m. to 11 a.m. at 9 a.m. The 30 minute lead time represents the forecast made at 9:30 a.m. for the hour from 10 a.m. to 11 a.m. The percent improvement of the RMS error over persistence increases as the forecast lead time decreases. More accurate forecasts are available closer to the hour that is being forecast.



1 hr. persistence RMS = 32 MW = 23.7 %

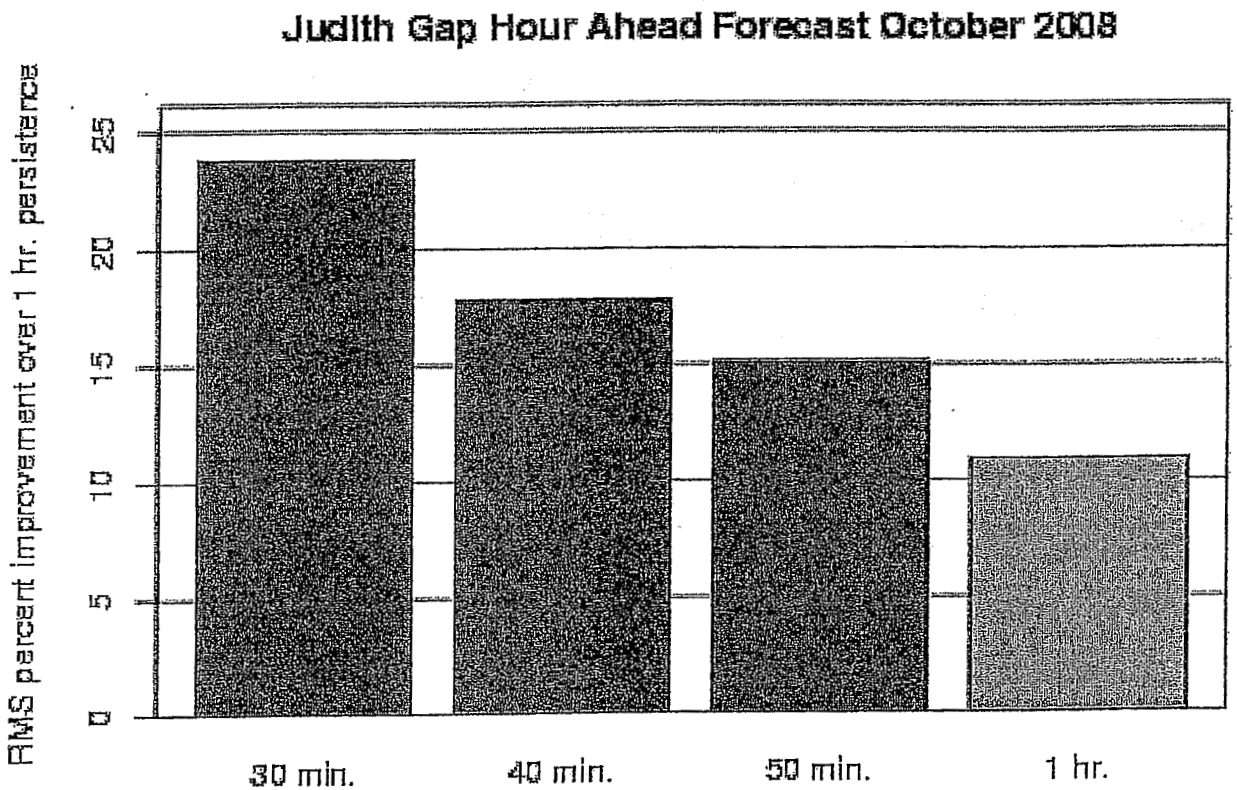
3Tier Environmental Forecast Group versus Persistence Forecast



1 hr. persistence RMS = 32 MW = 23.7 %

This plot shows the percent improvement over persistence for the hour ahead forecasts made 30, 40, 50, and 60 minutes before the start of the hour. The actual RMS error of hour ahead persistence in MW is provided on the figure.

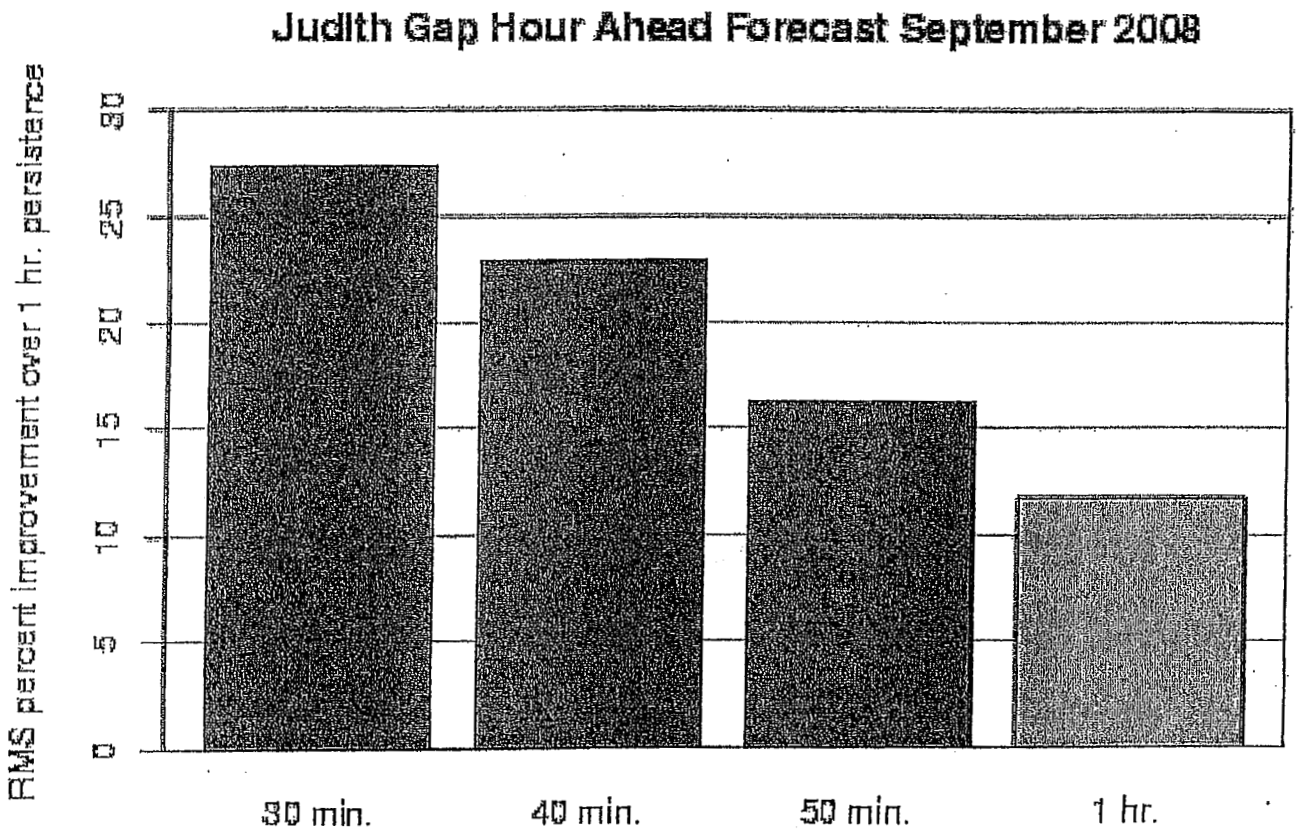
3Tier Environmental Forecast Group versus Persistence Forecast



1 hr. persistence RMS = 29.6 MW = 21.9 %

This plot shows the percent improvement over persistence for the hour ahead forecasts made 30, 40, 50, and 60 minutes before the start of the hour. The actual RMS error of hour ahead persistence in MW is provided on the figure.

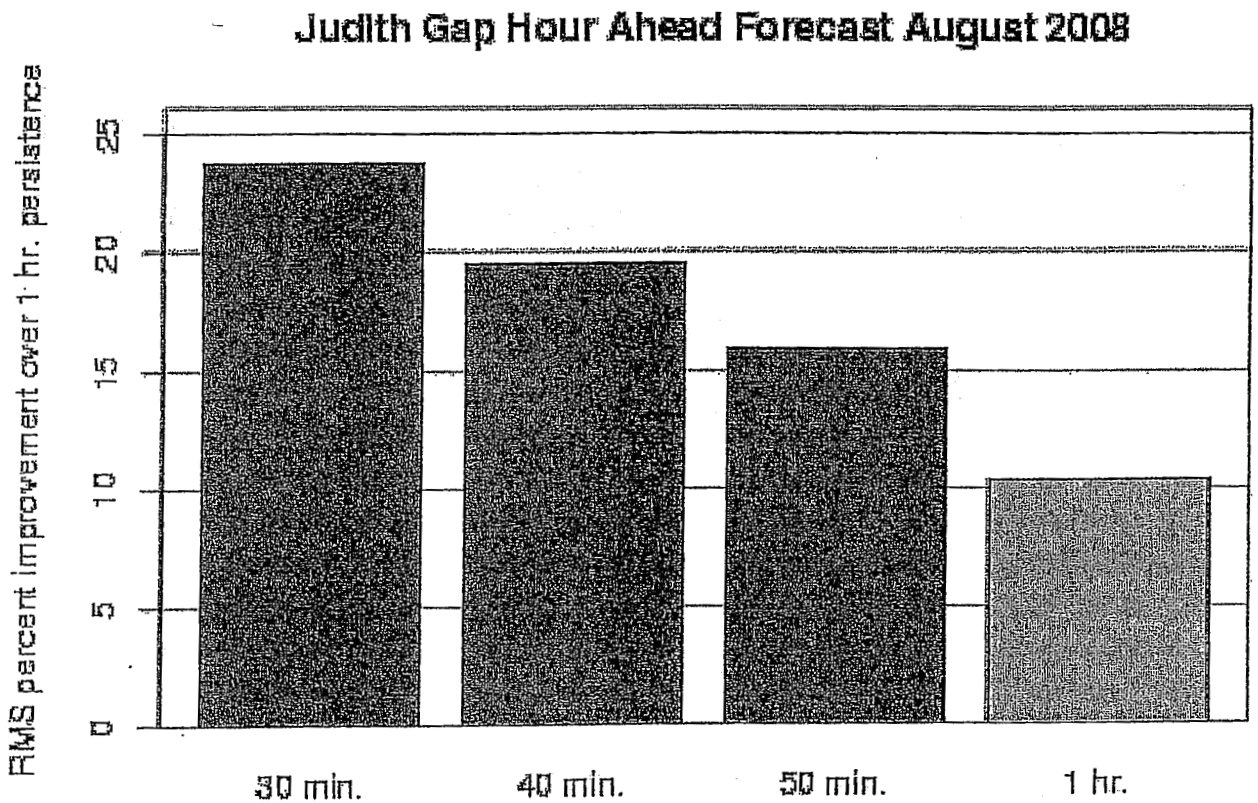
3Tier Environmental Forecast Group versus Persistence Forecast



1 hr. persistence RMS = 25.3 MW = 18.7 %

This plot shows the percent improvement over persistence for the hour ahead forecasts made 30, 40, 50, and 60 minutes before the start of the hour. The actual RMS error of hour ahead persistence in MW is provided on the figure.

3Tier Environmental Forecast Group versus Persistence Forecast

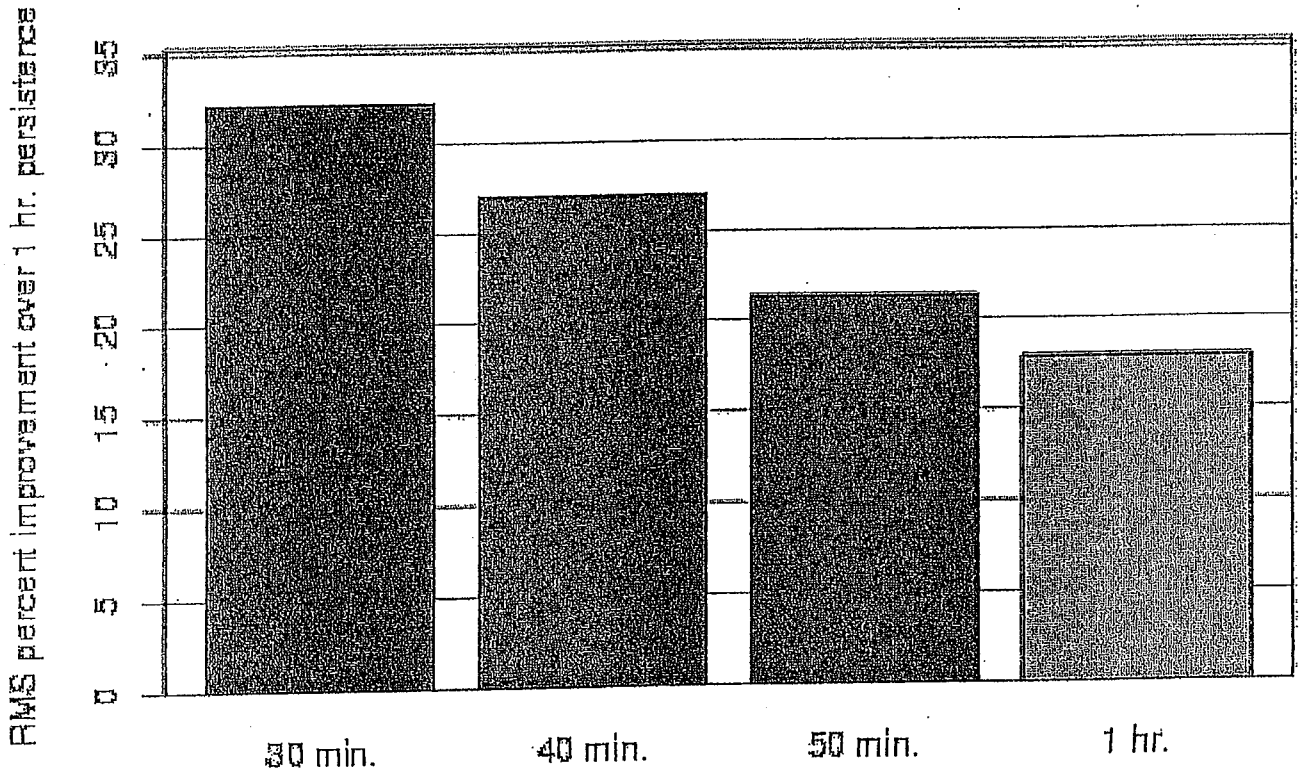


1 hr. persistence RMS = 29.7 MW = 22 %

This plot shows the percent improvement over persistence for the hour ahead forecasts made 30, 40, 50, and 60 minutes before the start of the hour. The actual RMS error of hour ahead persistence in MW is provided on the figure.

3Tier Environmental Forecast Group versus Persistence Forecast

Judith Gap Hour Ahead Forecast July 2008

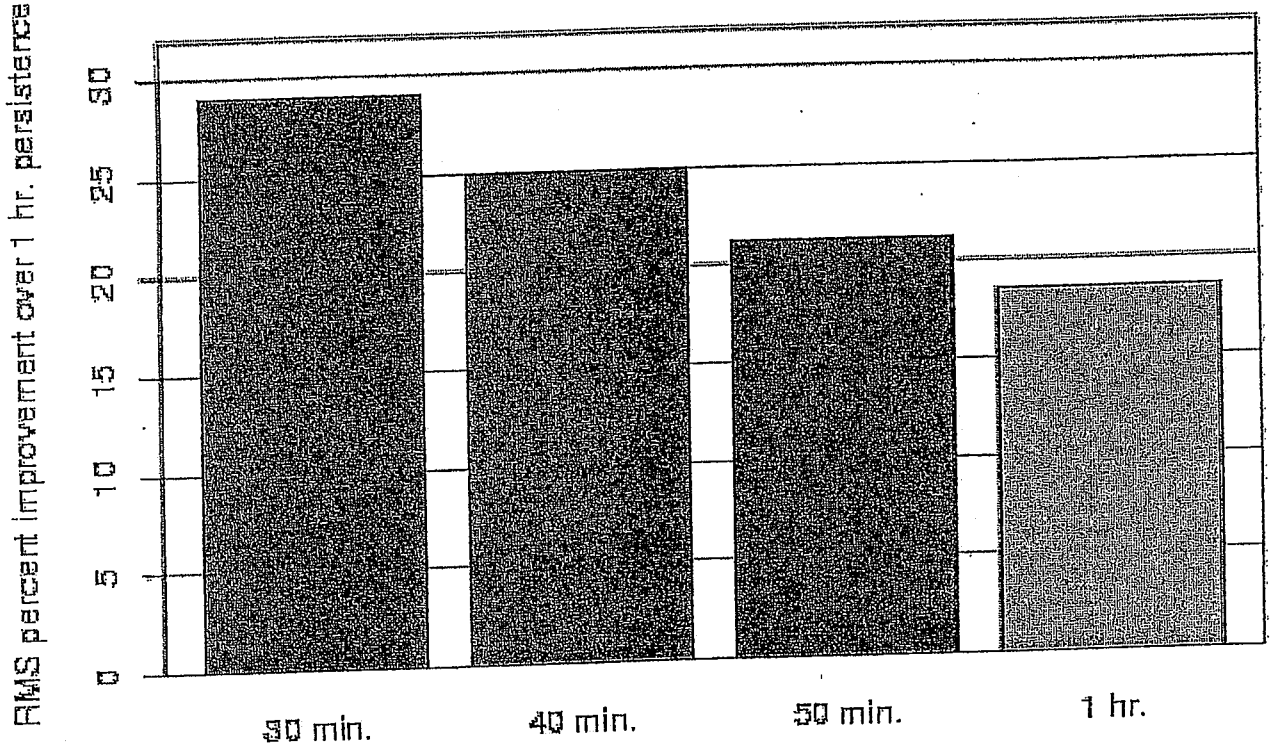


1 hr. persistence RMS = 33.3 MW = 24.7 %

This plot shows the percent improvement over persistence for the hour ahead forecasts made 30, 40, 50, and 60 minutes before the start of the hour. The actual RMS error of hour ahead persistence in MW is provided on the figure.

3Tier Environmental Forecast Group versus Persistence Forecast

Judith Gap Hour Ahead Forecast June 2008

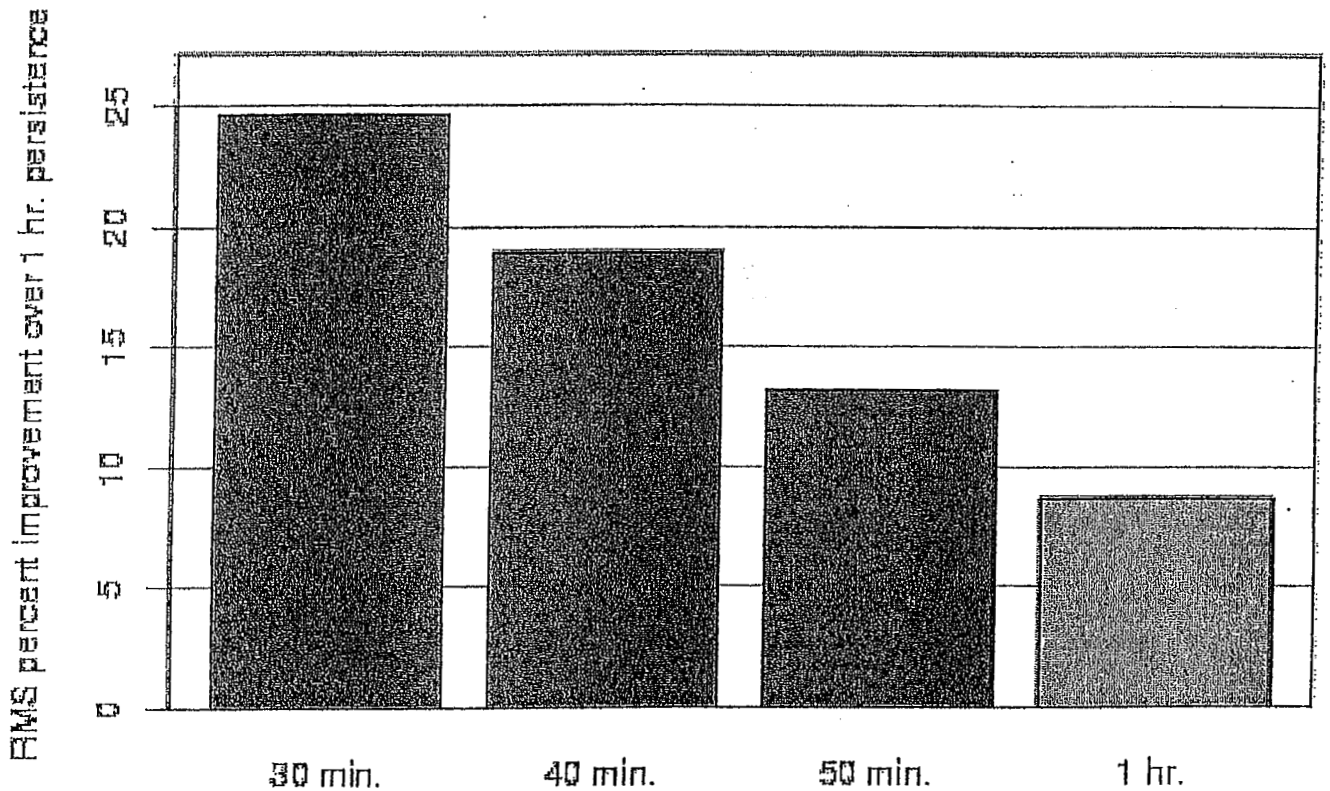


1 hr. persistence RMS = 31.8 MW = 23.5 %

This plot shows the percent improvement over persistence for the hour ahead forecasts made 30, 40, 50, and 60 minutes before the start of the hour. The actual RMS error of hour ahead persistence in MW is provided on the figure.

3Tier Environmental Forecast Group versus Persistence Forecast

Judith Gap Hour Ahead Forecast May 2008

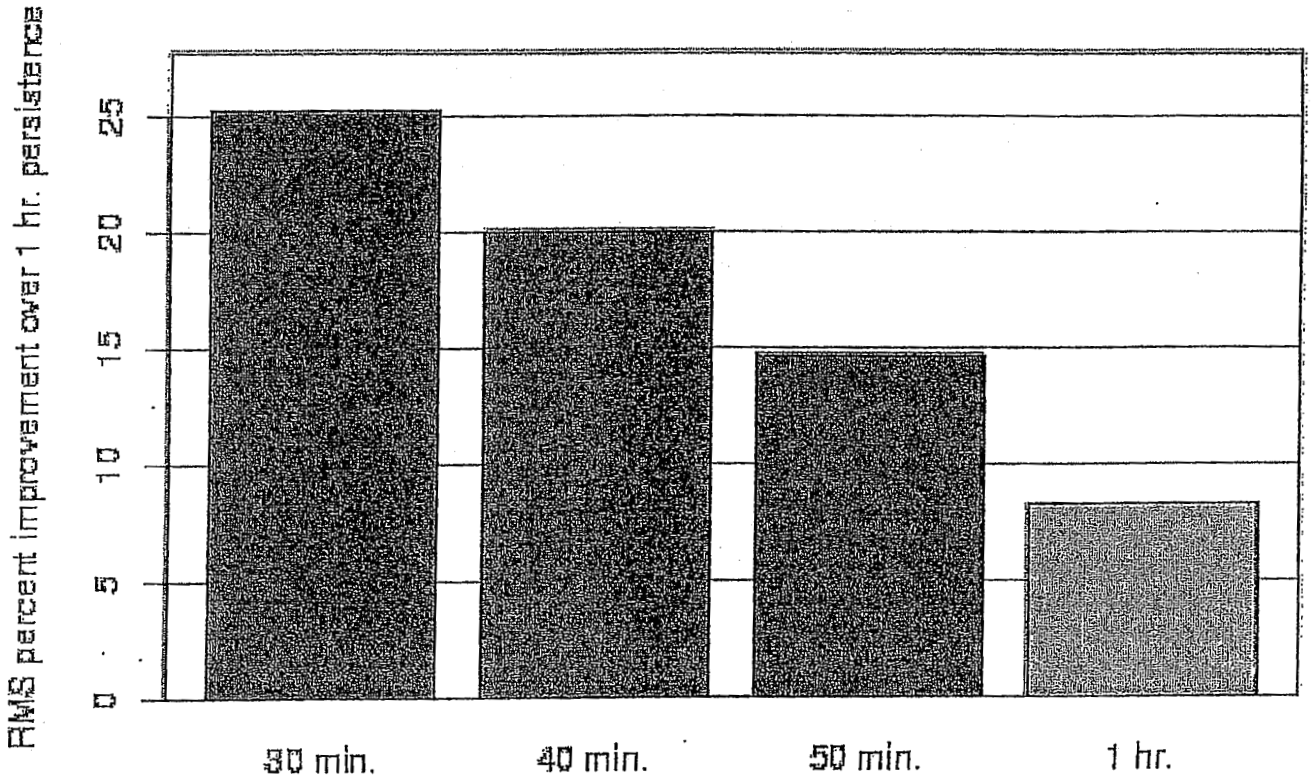


1 hr. persistence RMS = 30.7 MW = 22.7 %

This plot shows the percent improvement over persistence for the hour ahead forecasts made 30, 40, 50, and 60 minutes before the start of the hour..The actual RMS error of hour ahead persistence in MW is provided on the figure.

3Tier Environmental Forecast Group versus Persistence Forecast

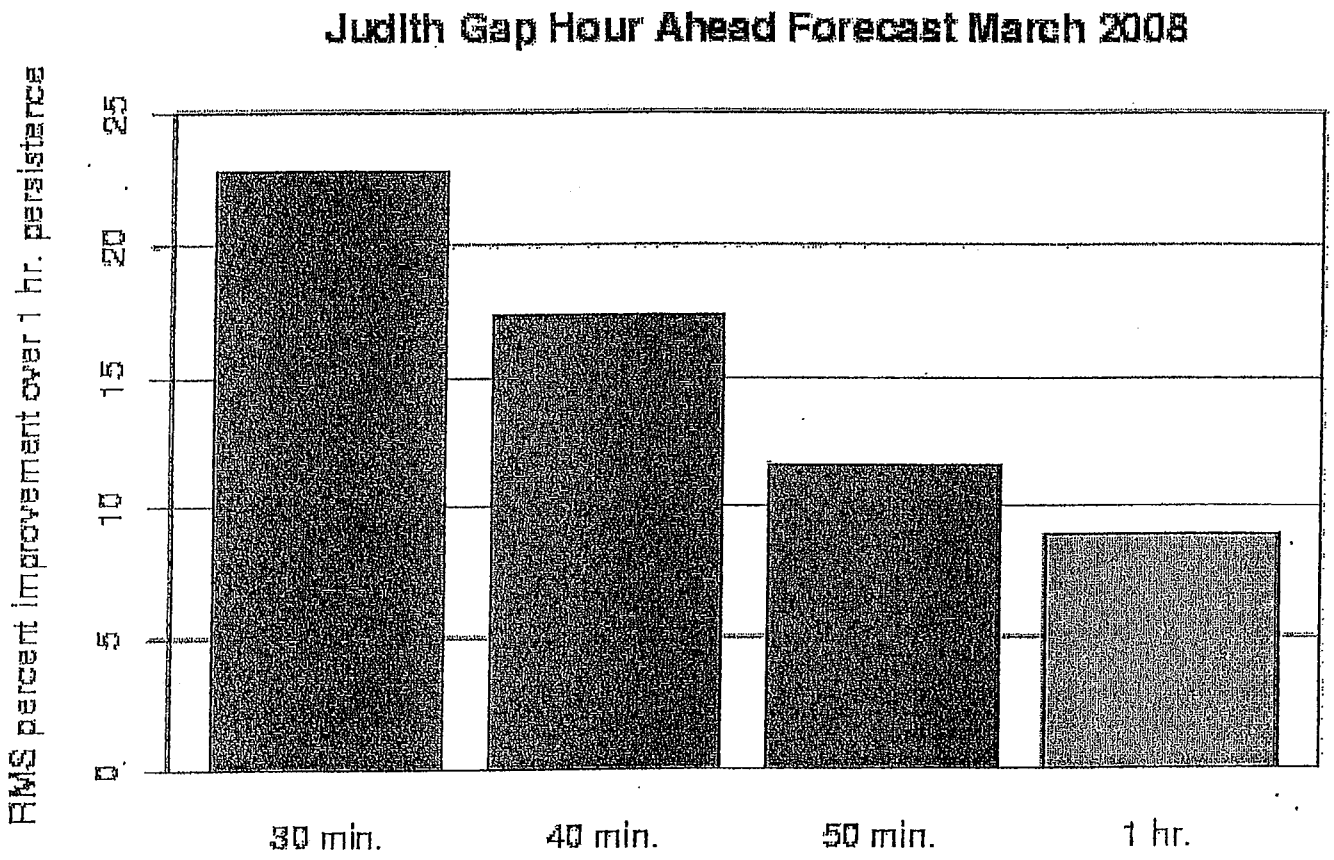
Judith Gap Hour Ahead Forecast April 2008



1 hr. persistence RMS = 30.9 MW = 22.4 %

This plot shows the percent improvement over persistence for the hour ahead forecasts made 30, 40, 50, and 60 minutes before the start of the hour. The actual RMS error of hour ahead persistence in MW is provided on the figure.

3Tier Environmental Forecast Group versus Persistence Forecast

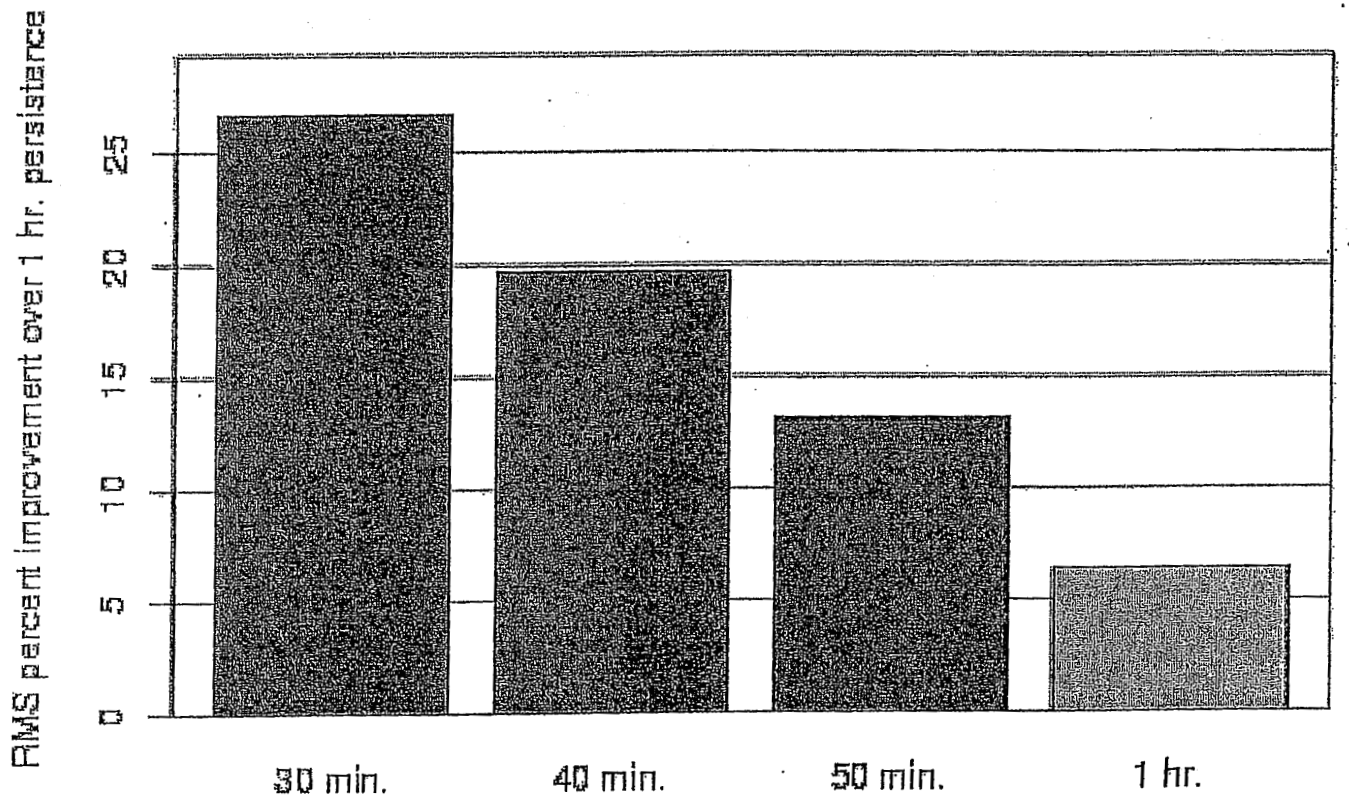


1 hr. persistence RMS = 31.5 MW = 23.3 %

This plot shows the percent improvement over persistence for the hour ahead forecasts made 30, 40, 50, and 60 minutes before the start of the hour. The actual RMS error of hour ahead persistence in MW is provided on the figure.

3Tier Environmental Forecast Group versus Persistence Forecast

Judith Gap Hour Ahead Forecast February 2008

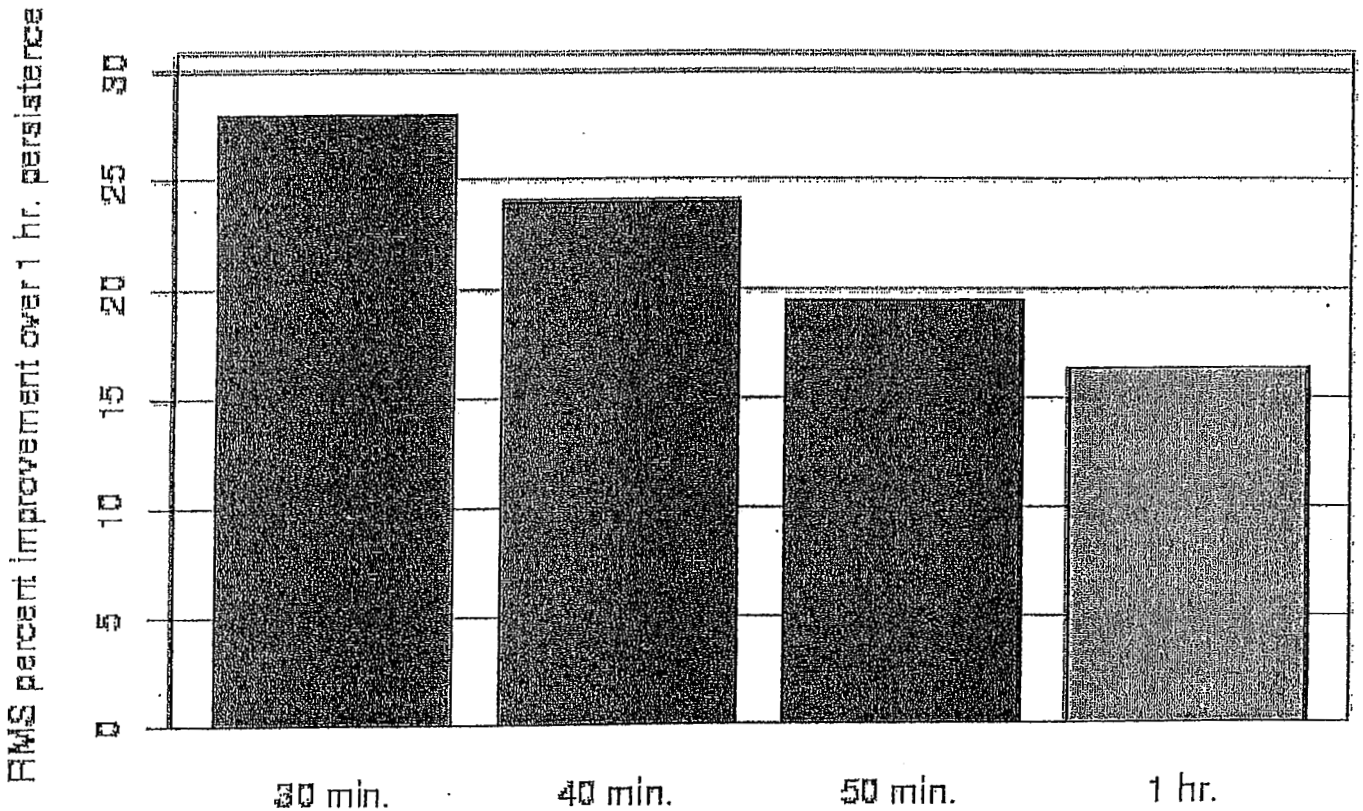


1 hr. persistence RMS = 30 MW = 22.3 %

This plot shows the percent improvement over persistence for the hour ahead forecasts made 30, 40, 50, and 60 minutes before the start of the hour. The actual RMS error of hour ahead persistence in MW is provided on the figure.

3Tier Environmental Forecast Group versus Persistence Forecast

Judith Gap Hour Ahead Forecast January 2008

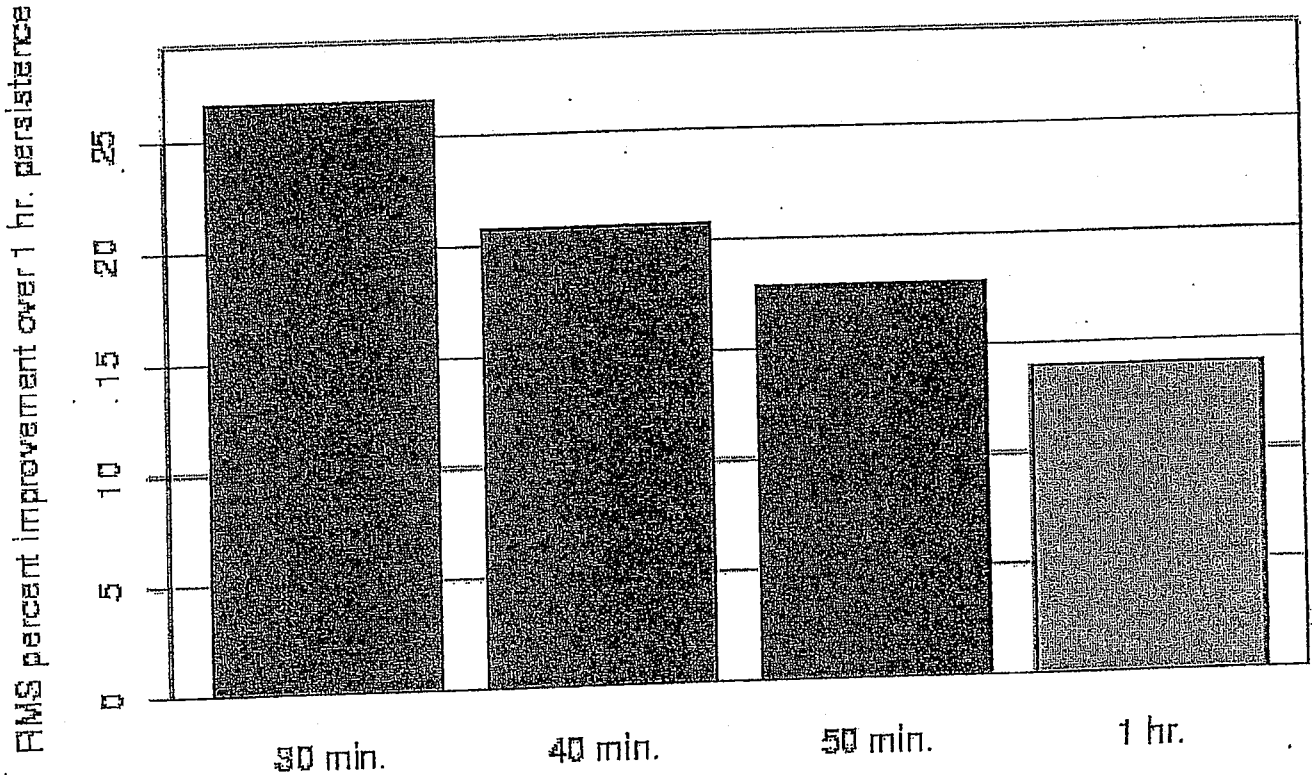


1 hr. persistence RMS = 31.1 MW = 23 %

This plot shows the percent improvement over persistence for the hour ahead forecasts made 30, 40, 50, and 60 minutes before the start of the hour. The actual RMS error of hour ahead persistence in MW is provided on the figure.

3Tier Environmental Forecast Group versus Persistence Forecast

Judith Gap Hour Ahead Forecast December 2007



1 hr. persistence RMS = 33.2 MW = 24.6 %

This plot shows the percent improvement over persistence for the hour ahead forecasts made 30, 40, 50, and 60 minutes before the start of the hour. The actual RMS error of hour ahead persistence in MW is provided on the figure.

Dkt. No. D2009.1.4

PSC Set 1 – 008(d)

Attachment 1

NorthWestern
Docket D2009.1.4
Response to PSC-008d

NWE 2009 Regulating Reserve Annual Costs for Electric Supply Function Reguarding Scheduling and Forecasting Wind Output

Available Regulating Reserves (MW)	Number of Months Available Annually	Annual MW-Months	Regulating Reserves Total Costs	Transmission Total Costs	Annual Cost ($)
31	4	124	$944,880	$289,400	$1,234,280
15	2.5	38	$285,750	$86,275	$372,025
16	2.5	40	$596,000	$268,840	$864,840
31	5.5	171	$1,299,210	$397,925	$1,697,135
	Totals:	373			$4,168,280

Weighted Average Cost ($/MW-Month)= $11,175

Dkt. No. D2008.5.45/D2009.5.62

PSC Set 1 – 025(d)

Attachment 2

NorthWestern Energy
Historical Regulation Cost
Total Energy Supply Held Contracts Only

Table 1

		Regulating Reserve Capacity Component					Regulating Reserve Transmission Component					Energy Balancing	
Counterparty	Contract Date	MWs of Regulating Reserves	Length in Months	Rate in $/kW mo	Rate in $/MW mo	Capacity Charge $	Trans-mission Provider	Pt to Pt MW's	Pt to Pt $/kW mo	Rates in $/MW mo	Trans-mission $	Balance MWh	Balance Cost
2005 Regulation													
Avista	12/1 to 12/31	15	1.0	$6.18	$6,180	$92,700	Avista	8	$1.40	$1,400.00	$11,200	218	$27,857.49
							NWE	7	$3.40	$3,400.00	$23,800		
						$92,700					$35,000.00		
											Annual Total:		$155,557
2006 Regulation													
BPA	1/1 to 12/31	35	12.0	$0.91	$914	$384,000	BPA	35	$0.00	$0.00	$0		
One Way Service							NWE	0	$0.00	$0.00	$0		
Avista	1/1 to 5/14	15	5.5	$6.18	$6,180	$506,760	Avista	8	$1.40	$1,400.00	$61,227	4,651	$138,948.60
							NWE	7	$3.40	$3,400.00	$130,107		
Avista	6/15 to 7/15	25	1.0	$8.54	$8,540	$213,500	Avista	13	$1.40	$1,400.00	$18,200	1,560	$85,742.01
							NWE	12	$3.40	$3,400.00	$40,800		
Avista	7/15 to 12/31	25	5.5	$6.18	$6,180	$847,258	Avista	13	$1.40	$1,400.00	$99,806	1,651	$147,227.53
							NWE	12	$3.40	$3,400.00	$223,742		
						$1,951,518					$350,140		
											Annual Total:		$2,897,318
2007 Regulation													
BPA	1/1 to 12/31	35	12.0	$0.91	$914	$384,000	BPA	35	$0.00	$0	$0		
One Way Service							NWE	0	$0.00	$0	$0		
Avista	1/1 to 4/30	25	4.0	$6.18	$6,180	$618,000	Avista	13	$1.40	$1,400	$72,800	(1,239)	($63,279.98)
							NWE	12	$3.40	$3,400	$163,200		
Avista	5/1 to 11/30	15	7.0	$6.18	$6,180	$648,900	Avista	8	$1.40	$1,400	$78,400	3,503	$190,212.70
							NWE	7	$3.33	$3,330	$163,170		
Avista	12/1 to 12/31	25	1.0	$6.18	$6,180	$154,500	Avista	13	$1.40	$1,400	$18,200	(325)	($20,703.30)
							NWE	12	$3.33	$3,330	$39,960		
						$1,805,400					$495,770		
											Annual Total:		$2,447,359
2008 Regulation													
Avista	1/1 to 4/30	25	4.0	$7.26	$7,260	$726,000	Avista	13	$1.40	$1,400.00	$72,800	5,205	$403,221.30
							NWE	12	$3.33	$3,330.00	$159,840		
Avista	5/1 to 7/15	15	2.5	$7.26	$7,260	$270,494	Avista	8	$1.40	$1,400.00	$27,819	3,620	$141,573.37
							NWE	7	$3.33	$3,330.00	$57,899		
Powerex	5/1 to 7/15	10	2.5	$14.90	$14,900	$372,500	BC & BPA	10	$6.72	$6,721.00	$168,025	6,535	$282,803.02
One Way Service							NWE	0	$0.00	$0.00	$0		
Avista	7/16 to 7/24	25	0.3	$7.26	$7,260	$52,694	Avista	13	$1.40	$1,400.00	$5,284	416	$26,069.20
							NWE	12	$3.33	$3,330.00	$11,801		
Avista	7/25 to7/31	35	0.2	$7.26	$7,260	$57,377	Avista	18	$1.40	$1,400.00	$5,590	324	$20,276.04
10MW for 7 days							NWE	17	$3.59	$3,590	$13,781		
Avista	8/1 to 8/26	25	0.8	$7.26	$7,260	$152,226	Avista	13	$1.40	$1,400	$15,265	1,225	$89,290.21
							NWE	12	$3.33	$3,330	$33,515		
Avista	8/27 to 8/31	35	0.2	$7.26	$7,260	$40,984	Avista	18	$1.40	$1,400	$4,065	236	$17,171.20
10MW for 5 days							NWE	17	$3.33	$3,330	$9,131		
Avista	9/1 to 12/31	25	4.0	$7.26	$7,260	$726,000	Avista	13	$1.40	$1,400	$72,800	(5,860)	($306,555.26)
							NWE	12	$3.33	$3,330	$159,840		
						$2,398,274					817,354		
											Annual Total:		$3,889,478
2009 Regulation													
Avista	1/1 to 4/30	31	4.0	$7.62	$7,620	$944,880	Avista	16	$1.40	$1,400	$89,600	0	$0.00
							NWE	15	$3.33	$3,330	$199,800		
Avista	5/1 to 7/15	15	2.5	$7.62	$7,620	$285,750	Avista	8	$1.40	$1,400	$28,000	0	$0.00
							NWE	7	$3.33	$3,330	$58,275		
Powerex	5/1 to 7/15	16	2.5	$14.90	$14,900	$596,000	BC & BPA	16	$6.72	$6,721	$268,840	0	$0.00
One Way Service							NWE	0	$0.00	$0	$0		
Avista	7/16 to 12/31	31	5.5	$7.62	$7,620	$1,299,210	Avista	16	$1.40	$1,400	$123,200	0	$0.00
							NWE	15	$3.33	$3,330	$274,725		
						$3,125,840					1,042,440		
											Annual Total:		$4,168,280
2010 Regulation													
Avista	1/1 to 4/30	31	4.0	$7.62	$7,620	$944,880	Avista	16	$1.40	$1,400	$89,600	0	$0.00
							NWE	15	$3.33	$3,330	$199,800		
Avista	5/1 to 7/15	15	2.5	$7.62	$7,620	$285,750	Avista	8	$1.40	$1,400	$28,000	0	$0.00
							NWE	7	$3.33	$3,330	$58,275		
Powerex	5/1 to 7/15	16	2.5	$14.90	$14,900	$596,000	BC & BPA	16	$6.72	$6,721	$268,840	0	$0.00
One Way Service							NWE	0	$0.00	$0	$0		
Avista	7/16 to 1/6	31	5.7	$7.62	$7,620	$1,344,930	Avista	16	$1.40	$1,400	$127,535	0	$0.00
							NWE	15	$3.33	$3,330	$284,393		
						$3,171,560					1,056,443		
											Annual Total:		$4,228,003

Note: The columns formerly labeled "Annual MW's" have been removed from the table.
The column formerly labeled "Annual $ (E * G)" has been labeled (Capacity Charge $).
The column formerly labeled "Pt to Pt Annual" has been labeled as "Transmission $".

Dkt. No. D2008.5.45/D2009.5.62

PSC Set 1 – 025(d)

Attachment 3

NorthWestern Energy
Docket D2009.1.4
United Materials of Great Falls, Inc.

Montana Public Service Commission (PSC)
PSC Set 2 (009-014)

NWE (009-0013)

Data Requests received February 12, 2009

PSC-013

Regarding: Judith Gap hourly schedules
Witness: unknown

Please explain whether the Judith Gap hourly schedules shown in response to data request PSC-007(a) are strictly the forecasts generated by 3-Tier or whether they reflect adjustments to the 3-Tier forecasts made by NWE's real-time schedulers.

RESPONSE:

Hourly schedules of Judith Gap production are always subject to adjustment by NWE's real-time schedulers and may or may not be based strictly on the 3Tier forecast.

Dkt. No. D2008.5.45/D2009.5.62

PSC Set 1 – 025(d)

Attachment 4

NorthWestern Energy
Docket D2009.1.4
United Materials of Great Falls, Inc.

Montana Public Service Commission (PSC)
PSC Set 3 (015-025)

Data Requests received March 05, 2009

PSC-015

Regarding: Mid-C purchases, scheduling,
Witness: David Fine

a. On p. 3, lines 15-16, you state that standard Mid-C index purchases provide a firm 25 MW hourly delivery schedule, including contingency reserves. Please explain whether all index purchases must be in 25 MW blocks and if so why.
b. If NWE needs less than 25 MW to balances its loads and resources in the real-time scheduling period, are NWE's alternatives limited to submitting a schedule that is either long or short resources and, consequently, out of balance? If not, please explain NWE's other alternatives.
c. Please explain whether the implication of your statement (referred to in part (a) of this data request) is that NWE Energy Supply is constrained during the real time scheduling period to buying and selling blocks of 25 MW when attempting to balance its retail supply load with resources.
d. Regarding your testimony on p. 5 line13 through p. 6 line 13, please clarify whether 3Tier forecasts are used only in the pre-schedule process, or whether specific 3Tier forecasts of next-hour output are used in the real-time scheduling process.

e. Has NWE's Energy Supply ever analyzed the accuracy of its actual real-time Judith Gap schedules compared to either an un-modified 3Tier next-hour forecast or an un-modified persistence forecast? If so, please identify when the analysis was conducted

RESPONSE:

a.

b.

c.

d. 3Tier is used for both pre-schedule and real time scheduling of estimated energy production from Judith Gap.

NorthWestern Energy
Docket D2009.1.4
United Materials of Great Falls, Inc.

Montana Public Service Commission (PSC)
PSC Set 3 (015-025)

Data Requests received March 05, 2009

PSC-015 (con't)

e.

Dkt. No. D2008.5.45/D2009.5.62

PSC Set 1 – 025(d)

Attachment 5

NorthWestern Energy
Docket D2009.1.4
United Materials of Great Falls, Inc.

Montana Public Service Commission (PSC)
PSC Set 3 (015-025)

Data Requests received March 05, 2009

PSC-023

Regarding:
Witness: Casey Johnston/David Fine

a. Please refer to Mr. Pascoe's response to data request PSC-003a. Do you agree that NWE's regulating reserve requirements are determined by the net effect of deviations of scheduled loads and resources compared to actual loads and resources? If not, please explain why not.

b. If on average real-time schedules for hourly output from Judith Gap based on 3Tier forecasts are closer to actual hourly Judith Gap output than real-time schedules for hourly output based on persistence forecasts, would NWE need a smaller amount of regulating reserve capacity if Judith Gap were scheduled using the 3Tier forecast than it would if Judith Gap were scheduled using a persistence forecast, other things being equal?

c. In general do more accurate real-time schedules of loads and resources translate into a reduced need for regulating reserve capacity? If so, please explain why.

d. Please refer to NWE's response to data request PSC-012c. If one were to calculate the two variances suggested in the question for an entire year, should the average of the variances associated with the 3Tier-based schedules be smaller than the average of the variances associated with the persistence forecast-based schedules?

e. Regarding the data included in the updated response to data request PSC-007a, please clarify whether the balancing authority load schedules in column C equal NWE's actual expectations for balancing authority load or whether the load schedule data reflect adjustments to account for uni-directional regulation services from certain providers.

RESPONSE:

a.

b. No. Wind energy forecasts, regardless of how they are prepared, contain errors relative to actual wind energy production. Additionally, forecasts do not account

Montana Public Service Commission (PSC)
PSC Set 3 (015-025)

Data Requests received March 05, 2009

PSC-023 (con't)

for inter-hour wind production variability that can be as much as the amount of installed wind farm capacity.

c.

d.

e.