

Dave Johnston Plant Heat Rate Improvement Plan DJ\_2010\_HRIP

Version 1.00

Page 1 of 17

Issued: March 31, 2010

# **Table of Contents**

1.		Revision History	3
2.		Revision Control	3
3.		Glossary of Terms	3
3	.1.	Actual Net Heat Rate (Btu/kWh)	3
3	.2.	As-built Net Heat Rate (Btu/kWh)	3
3	.3.	British thermal unit (Btu)	3
3	.4.	Gross Heat Rate (Btu/kWh)	3
3	.5.	Net Generation (kWh)	3
3	.6.	Planned Net Heat Rate (Btu/kWh)	3
4.		Overall Plan and Objectives	3
4.	.1.	Unit 1- Goals for 10-year plan	3
4.	.2.	Unit 2 - Goals for 10-year Plan	4
5.		Performance against last year's plan.	4
5.	.1.	Unit 1	4
5.	.2.	Unit 2	4
5.	.3.	Unit 3	5
5.	4.	Unit 4	5
6.		Major Losses for Current Planned Net Heat Rate	5
6.	1.	Unit 1	5
6.	2.	Unit 2	6
6.	3.	Unit 3	6
6.	4.	Unit 4	6
7.		Major Unit Specific Initiatives	6
7.	1.	Unit 1	6
7.	2.	Unit 2	6
7.	3.	Unit 3	7
7.	4.	Unit 4	7
8.		Annual Review and Update	7
9.		Appendix	
10.		Required Signatures 1	

### 1. Revision History

Version	Status	Author Reason for Issue	Date
1		2010 Plan Issue	March 31, 2010

### 2. Revision Control

This document is maintained by the PacifiCorp Energy Asset Management group.

### 3. Glossary of Terms

3.1. Actual Net Heat Rate (Btu/kWh)

Total actual heat input in Btu's divided by actual net generation.

3.2. As-built Net Heat Rate (Btu/kWh)

Total guaranteed heat input, from the design heat balances in Btu's divided by the guaranteed net generation, corrected for changes in equipment from design. This is the baseline number for the plant personnel when they make their annual reconciliation.

3.3. British thermal unit (Btu)

British thermal unit is defined as the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit.

3.4. Gross Heat Rate (Btu/kWh)

Total actual heat input in Btu's divided by actual gross generation.

3.5. Net Generation (kWh)

Gross generation minus auxiliary or station usage

3.6. Planned Net Heat Rate (Btu/kWh)

Total budgeted heat input in Btu's divided by the budgeted net generation. This number is the annual goal for the plant personnel to achieve.

### 4. Overall Plan and Objectives

4.1. Unit 1- Goals for 10-year plan

Figure 1, in the appendix, shows the ten-year heat rate plan for Dave Johnston unit 1. The dips in the Planned Net Heat Rate in the years 2013 and 2018 are due to the work that is scheduled to take place during the planned outages in 2013 and 2018 (see section 7).

Version 1.00

### 4.2. Unit 2 - Goals for 10-year Plan

Figure 2, in the appendix, shows the ten-year heat rate plan for Dave Johnston unit 2. The dips in the Planned Net Heat Rate in the years 2012 and 2017 are due to the work that is scheduled to take place during the planned outages in 2012 and 2017 (see section 7).

### 4.3. Unit 3 - Goals for 10-year Plan

Figure 3, in the appendix, shows the ten-year heat rate plan for Dave Johnston unit 3. The dips in the Planned Net Heat Rate in the years 2010, 2014, and 2018 are due to the work that is scheduled to take place during the planned outages in 2010, 2014 and 2018 (see section 7).

### 4.4. Unit 4 - Goals for 10-year Plan

Figure 4, in the appendix, shows the ten-year heat rate plan for Dave Johnston unit 4. The dips in the Planned Net Heat Rate in the years 2012 and 2016 are due to the work that is scheduled to take place during the planned outages in 2012 and 2016 (see section 7).

## 5. Performance against last year's plan

### 5.1. Unit 1

Planned Net Heat Rate			10,971
Reconciliation to Planned Net Heat Rate	Planned	Actual	
Boiler Losses	(13)	68	81
Turbine Losses	518	886	368
Other Losses	77	112	34
Actual Net Heat Rate			11,454

Negative numbers in the table above are improvements to heat rate.

### 5.2. Unit 2

Planned Net Heat Rate			10,987
Reconciliation to Planned Net Heat Rate	Planned	Actual	
Boiler Losses	10	99	89
Turbine Losses	635	952	317
Other Losses	(42)	93	135
Actual Net Heat Rate			11,528

Negative numbers in the table above are improvements to heat rate.

Version 1.00 Page 4 of 17 Issued: March 31, 2010

### 5.3. Unit 3

		11,476
Planned	Actual	
31	137	106
608	594	(14)
347	251	(96)
		11,472
	31 608	31 137 608 594

ative numbers in the table above are improvements to heat rate.

### 5.4. Unit 4

Planned Net Heat Rate			10,563
Reconciliation to Planned Net Heat Rate	Planned	Actual	
Boiler Losses	(65)	13	78
Turbine Losses	424	855	431
Other Losses	(41)	205	246
Actual Net Heat Rate			11,318

Negative numbers in the table above are improvements to heat rate.

# 6. Major Losses for Current Planned Net Heat Rate

This section of the heat rate plan identifies the reconciliation of the items that have the most impact between the As-built Net Heat Rate and the Planned Net Heat Rate.

### 6.1. Unit 1

As-Built Net Heat Rate	10,390
Boiler Losses	(9)
Turbine Losses	619
Other Losses	106
Planned Net Heat Rate	11,106

Version 1.00 Page 5 of 17 Issued:

### 6.2. Unit 2

As-Built Net Heat Rate	10,389
Boiler Losses	14
Turbine Losses	598
Other Losses	37_
Planned Net Heat Rate	11,038

### 6.3. Unit 3

As-Built Net Heat Rate	10,506
Boiler Losses	31
Turbine Losses	580
Other Losses	355
Planned Net Heat Rate	11,473

### 6.4. Unit 4

As-Built Net Heat Rate	10,242
Boiler Losses	(64)
Turbine Losses	416
Other Losses	(135)
Planned Net Heat Rate	10,459

# 7. Major Unit Specific Initiatives

This section identifies the major planned capital and operational activities to improve or regain lost heat rate for the current 10-year plan.

### 7.1. Unit 1

Table 1 shows the capital projects included in the 10-year plan that contribute to the recovery of lost heat rate. Numbers inside parentheses are negative impact on heat rate and represent improvement to the overall unit efficiency.

### 7.2. Unit 2

Table 2 shows the capital projects included in the 10-year plan that contribute to the recovery of lost heat rate. Numbers inside parentheses are negative impact on heat rate and represent improvement to the overall unit efficiency.

Version 1.00 Page 6 of 17 Issued: March 31, 2010

### 7.3. Unit 3

Table 3 shows the capital projects included in the 10-year plan that contribute to the recovery of lost heat rate. Numbers inside parentheses are negative impact on heat rate and represent improvement to the overall unit efficiency.

### 7.4. Unit 4

Table 4 shows the capital projects included in the 10-year plan that contribute to the recovery of lost heat rate. Numbers inside parentheses are negative impact on heat rate and represent improvement to the overall unit efficiency.

# 8. Annual Review and Update

This plan will be reviewed and updated annually by the Dave Johnston plant management team by March 31.

Version 1.00 Page 7 of 17 Issued: March 31, 2010

9. Appendix

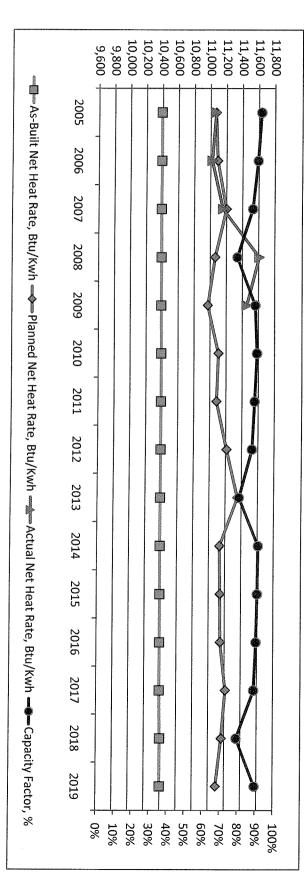
Version 1.00

Page 8 of 17

Issued: March 31, 2010

Figure 1 10-year Plan Heat Rate Goals Dave Johnston Unit 1

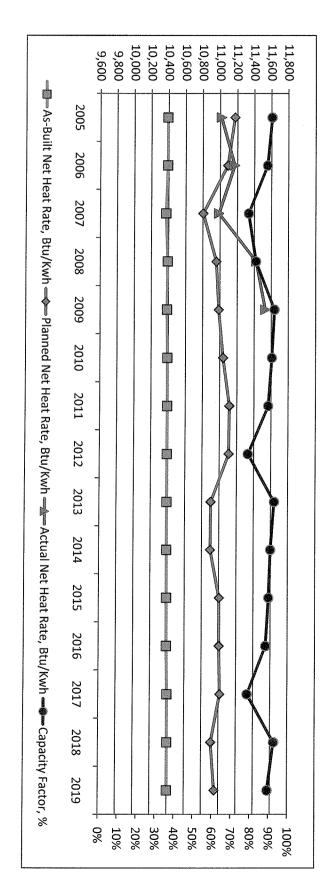




Capacity Factor, %	Actual Net Heat Rate, Btu/Kwh	Planned Net Heat Rate, Btu/Kwh	As-Built Net Heat Rate, Btu/Kwh 1	Year
92.4%	11,066	11,068	10,390	2005
90.6%	11,020	11,090	10,390	2006
87.7%	11,156	11,201	10,389	2007
79.0%	11,610	11,061	10,390	2008
89.2%	11,454	10,971	10,389	2009
90.2%		11,106	10,390	2010
88.9%		11,083	10,390	2011
87.6%		11,213	10,390	2012
80.5%		11,352	10,390	2013
91.4%		11,134	10,390	2014
91.0%		11,141	10,390	2015
90.4%		11,147	10,390	2016
89.2%		11,211	10,390	2017
79.5%		11,165	10,399	2018
89.8%		11,095	10,399	2019

Figure 2
Dave Johnston Unit 2
10-year Plan Heat Rate Goals

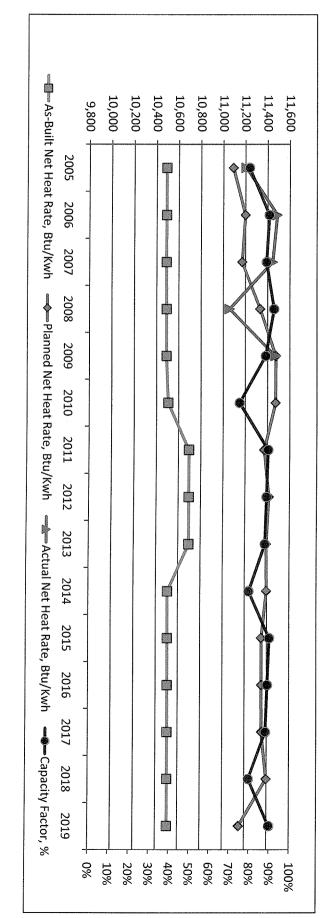
# Dave Johnston 2



Capacity Factor, % 91.2%	Actual Net Heat Rate, Btu/Kwh	Planned Net Heat Rate, Btu/Kwh	As-Built Net Heat Rate, Btu/Kwh	Year
		11,171	10,390	2005
88.9%	11,169	71 11,090 1	90 10,390 1	2006
78.9%	10,987	0,804	0,371	2007
82.7%	11,421	10,959	10,390	2008
92.6%	11,528	10,987	10,384	2009
91.3%		11,038	10,389	2010
89.4%		11,113 11,108	10,389	2011
78.7%			10,389	2012
92.8%		10,902	10,389	2013
90.8%		10,899	10,389	2014
89.9%		11,003	10,389	2015
88.4%		11,002	10,389	2016
78.6%		11,013	10,398	2017
92.8%		10,911	10,398	2018
89.4%		10,951	10,398	2019

Figure 3
Dave Johnston Unit 3
10-year Plan Heat Rate Goals

# Dave Johnston 3

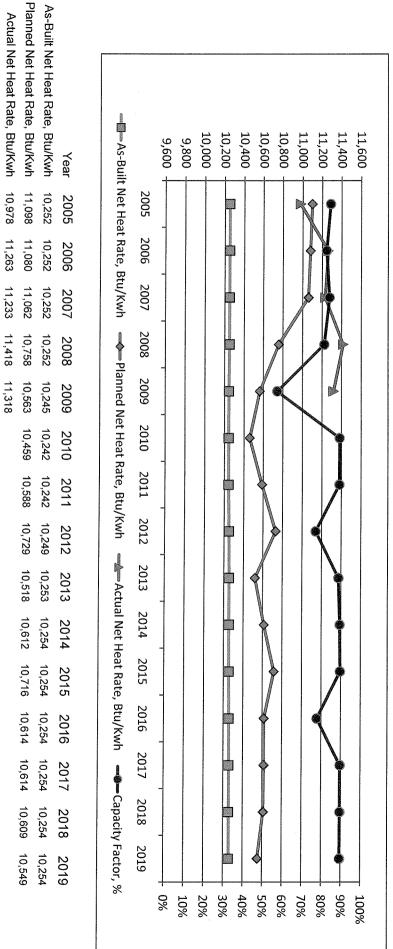


Capacity Factor, %	Actual Net Heat Rate, Btu/Kwh	Planned Net Heat Rate, Btu/Kwh		Year
79.9%	11,207	11,091	0,490	2005
89.8%	11,487	11,200	10,490	2006
88.4%	11,447	11,171	10,48	2007
92.2%	11,058		),490	800
88.1%	11,472	11,476	0,490	2009
75.0%		11,473	,506	010
89.3%		11,372	10,694	2011
88.6%		11,415 11,392	10,694	2012
87.9%		11,392	10,694	2013
79.8%		11,396	10,505	2014
90.1%		11,351	10,504	2015
89.1%		11,351	10,504	2016
88.3%		11,353	10,504	2017
79.7%		11,396	10,504	2018
90.0%		11,149	10,504	2019

Version 1.00

Figure 4 Dave Johnston Unit 4 10-year Plan Heat Rate Goals





Version 1.00

Capacity Factor, %

84.4%

82.3%

83.9%

81.2%

57.1%

89.0%

89.0%

76.9%

88.7%

89.4%

89.6%

77.7%

89.6%

89.6%

89.4%

Table 1 10-year Plan Heat Rate Improvement Projects **Dave Johnston Unit 1** Budgeted / Planned Auxiliary Load Changes Budgeted / Planned Net Dependable Rating Changes, (Net Basis) **Total Capacity Changes** Projects Budgeted / Planned Heat Rate Changes, Net basis (Improvements are negative) Total Auxiliary Load Changes Hg Capture (100 kw in 2018) Total adjustments related ಠ Capital

MW **M** 

Btu/kWh

₹ ⋛

 Btu/kWh

Version 1.00

Table 2

Dave Johnston Unit 2

10-year Plan Heat Rate Improvement Projects

-	Total adjustments related to Capital	(2008)	Pulverizer/PA Fan Controls Replace -	Net basis (Improvements are negative)	
Btu/kWh		Btu/kWh			
-20		-20			2010
-20 -20		-20			2010 2011 2012 2013 2014
		-20			2012
-20		-20			2013
-20		-20			2014
-20		-20			2015
-20		-20	-		2016
-20		-20 -20 -20 -20	-		2017
-20		-20			2018
-20		-20	100000		2019

Total Auxiliary Load Changes	Hg Capture (100 kw in 2017)	/ Planned Heat Rate Changes	Reduced auxiliary load benefit of Budgeted	Budgeted / Planned Auxiliary Load Changes
KW	KW	KW.	3.	
-13		-13		
-13 -13 -13 -13		-13 -13 -13		
-13		-13		
-13		-13		
-13		-13		
-13		-13		
-13		-13	200	
87	100	-13	A THE CONTRACTOR OF THE CONTRA	
87	100	<u>-</u> .		
87	100	-13		

l otal Capacity Changes		Budgeted / Planned Net Dependable Rating Changes, (Net Basis)
MW	WW	
0		
0		
0		
0		
0		
0		
0		
0		
0		
0		

Table 3

Dave Johnston Unit 3

10-year Plan Heat Rate Improvement Projects

		2010	2011	2012	2013	2014	2014 2015	2016	2017	2018	2019
Budgeted / Planned Heat Rate Changes, Net basis (Improvements are negative)											
3C Mill PA Flow indication 2010	Btu/kWh	<b>ე</b>	-10	-10	-10	-10	-10	-10	10	-10	-10
) LNB	Btu/kWh	204.6 2	204.6	204.6	204.6 204.6 204.6 204.6 204.6 204.6 2	204.6	204.6	204.6	204.6	204.6 204.6	204 6
Total adjustments related to Capital					-		2000				
Projects	Btu/kWh	199.6	194.6	194.6   194.6   194.6	194.6	194.6	194.6	194.6	194.6   194.6   194.6   194.6   194.6	194.6	194.6

Total Auxiliary Load Changes	/ Planned Heat Rate Changes	Reduced auxiliary load benefit of Budgeted	Budgeted / Planned Auxiliary Load Changes
W	<b>X</b> ¥		
377	377	1.	
	367		
367 367 367	367		
367	367		
367	367		
367	367		
367	367		
367	367		
367	367		
367	367		

Total Capacity Changes	(2014 +10MWn)	Clean Air Initiative - DFGD (85%) LNB	Budgeted / Planned Net Dependable Rating Changes, (Net Basis)
MW	MW	MW	
-4.2		-4.21	
-4.21		-4.21	
-4.21		-4.21	
-4.2     -4.21     -4.21     -4.21		<i>-4.21 -4.21 -4.21 -4.21</i>	
5.79	10	-4.21	
5.79	10	-4.21	
5.79	10	-4.21	
5.79	10		
5.79	10	-4.21 -4.21 -4.21	
5.79	10	-4.21	

Table 4
Dave Johnston Unit 4
10-year Plan Heat Rate Improvement Projects

		2010	2010 2011 2012	2012	2013 20	2014	14 2015	2016	2017	2018	2019
Budgeted / Planned Heat Rate Changes,											
Net basis (Improvements are negative)											
Digital Control System	Btu/kWh	-70	-70	-70	-70	-70	-70	-70	-70	-70	-70
FW Heater Level Controls Replace	Btu/kWh	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15
AH Basket Replacement	Btu/kWh	-25	-25	-20	-20	-10	-10				
AH Sootblowers	Btu/kWh	-15	-15	-15	-15	-15		-15	-15	-15	15
Clean Air Initiative - DFGD (90%), BH, LNB	Btu/kWh			92.1	138.1	138.1   138.1		138.1	138.1	138.1	138.1
Total adjustments related to Capital											
Projects	Btu/kWh	-125	-125	-28	18.1	28.1	28.1 38.1		38.1 38.1		38.1

Budgeted / Planned Auxiliary Load         Changes         Changes         Section of English
illiary Load  of Budgeted KW -321 -321 -72 46 72 72 98 98
KW -321 -321 -72 46 72 72 98 98 KW -321 -321 -72 46 72 72 98 98
1 -72 46 72 72 98 98 1 -72 46 72 72 98 98
1 -72 46 72 72 98 98 1 -72 46 72 72 98 98
72 72 98 98 72 72 98 98
72 72 98 98 72 72 98 98
72 98 98 72 98 98
98 88
98 88
98 98 98
98
Better Betternes to you

Total Capacity Changes	Clean Air Initiative - DFGD (90%), BH, LNB	Budgeted / Planned Net Dependable Rating Changes, (Net Basis)
MW	WW	
0		
0		
4	-4.4	
-4	-4.4	
-4	-4.4	
-4	-4.4	
-4	-4.4	
-4	-4.4	
-4	-4.4	
4	-4.4	

# 10. Required Signatures

Performance Engineer	- Dave Johnston Plant	Teresa Jorris	
Signature:	11/2	Date:	4/9/10
Engineering Manager -	Dave Johnston Plant		
Signature:	oli An	Date:	4 /21/2010
:			
Managing Director, Ac	ting – Dave Johnston Plant	Gary Harris	
Signature:	Lary Flarris	Date:	4/9/10