



Naughton Plant Heat Rate Improvement Plan
Ntn_2010_HRIP

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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 Naughton Unit 1. 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).
- 4.2. Unit 2- Goals for 10-year plan
Figure 2, in the appendix, shows the ten-year heat rate plan for Naughton Unit 2. The dips in the Planned Net Heat Rate in the years 2011 and 2015 are due to the work that is scheduled to take place during the planned outages in 2011 and 2015 (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 Naughton Unit 3. The dips in the Planned Net Heat Rate in the years 2009 and 2014 are due to the work that is scheduled to take place during the planned outages in 2010 and 2014 (see section 7).

5. Performance against last year's plan

5.1. Unit 1

Planned Net Heat Rate			10,346
Reconciliation to Planned Net Heat Rate	Planned	Actual	
Boiler Losses	(9)	133	142
Turbine Losses	448	71	(377)
Other Losses	(52)	100	152
Actual Net Heat Rate			10,263

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

5.2. Unit 2

Planned Net Heat Rate			10,445
Reconciliation to Planned Net Heat Rate	Planned	Actual	
Boiler Losses	(2)	124	126
Turbine Losses	539	(161)	(700)
Other Losses	(41)	215	257
Actual Net Heat Rate			10,128

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

5.3. Unit 3

Planned Net Heat Rate			10,111
Reconciliation to Planned Net Heat Rate	Planned	Actual	
Boiler Losses	55	40	(15)
Turbine Losses	406	907	501
Other Losses	(207)	54	261
Actual Net Heat Rate			10,859

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	9,957
	Boiler Losses	9
	Turbine Losses	340
	Other Losses	(8)
	<u>Planned Net Heat Rate</u>	<u>10,298</u>

6.2.	Unit 2	
	As-Built Net Heat Rate	9,944
	Boiler Losses	27
	Turbine Losses	345
	Other Losses	67
	<u>Planned Net Heat Rate</u>	<u>10,383</u>

6.3.	Unit 3	
	As-Built Net Heat Rate	9,857
	Boiler Losses	57
	Turbine Losses	295
	Other Losses	25
	<u>Planned Net Heat Rate</u>	<u>10,234</u>

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.

7.3. Unit 3

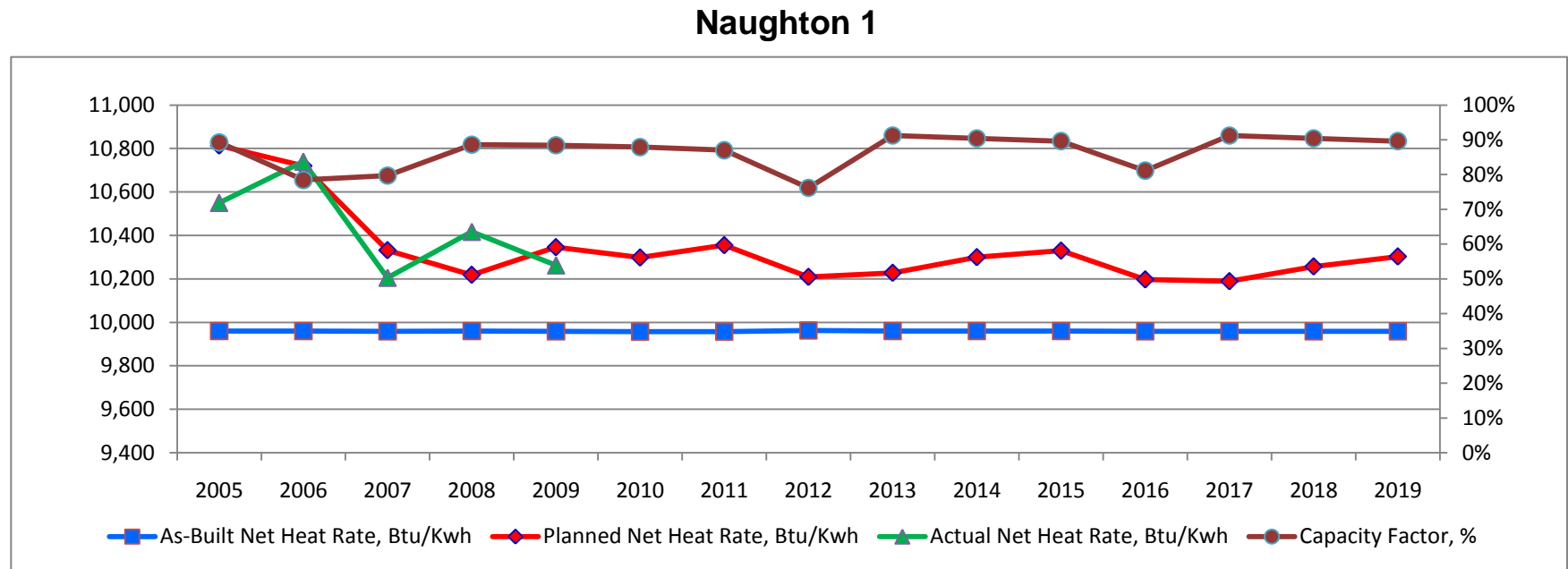
Table 3 shows the capital projects included in the 10-year plan that contribute to the recovery of lost heat rate. Numbers inside parentheses are negative impact on heat rate and represent improvement to the overall unit efficiency.

8. Annual Review and Update

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

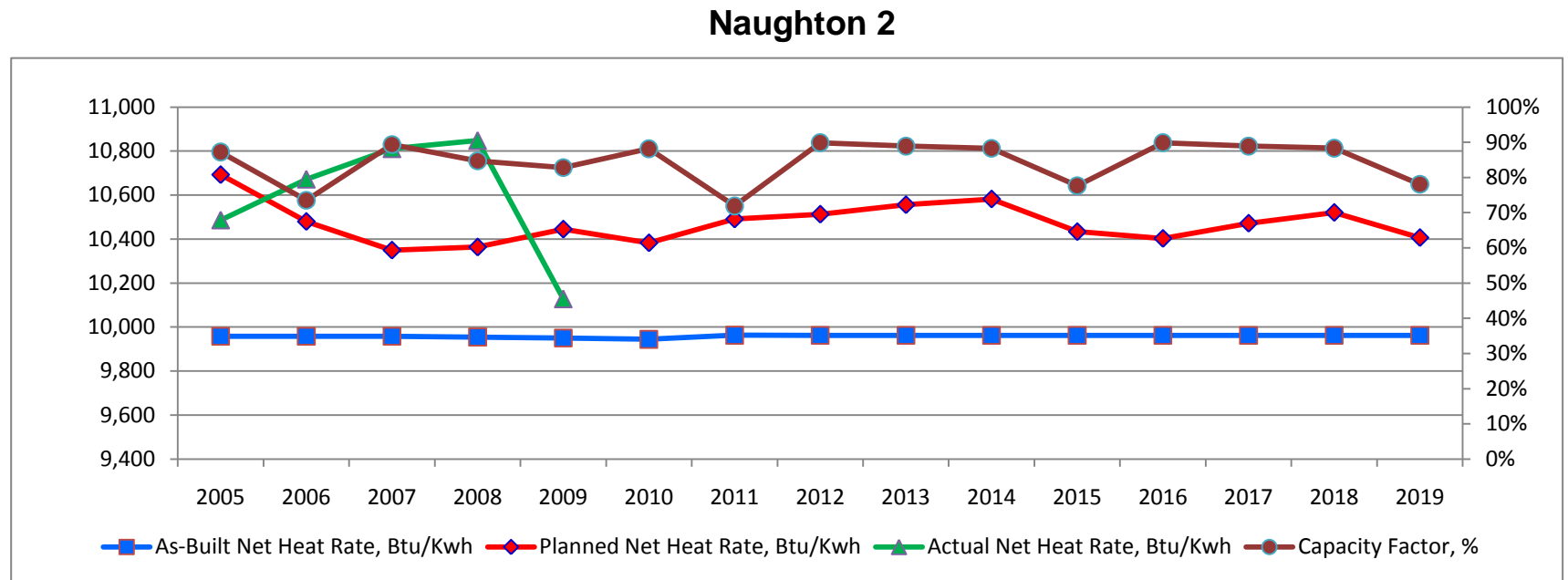
9. Appendix

Figure 1
Naughton Unit 1
10-year Plan Heat Rate Goals



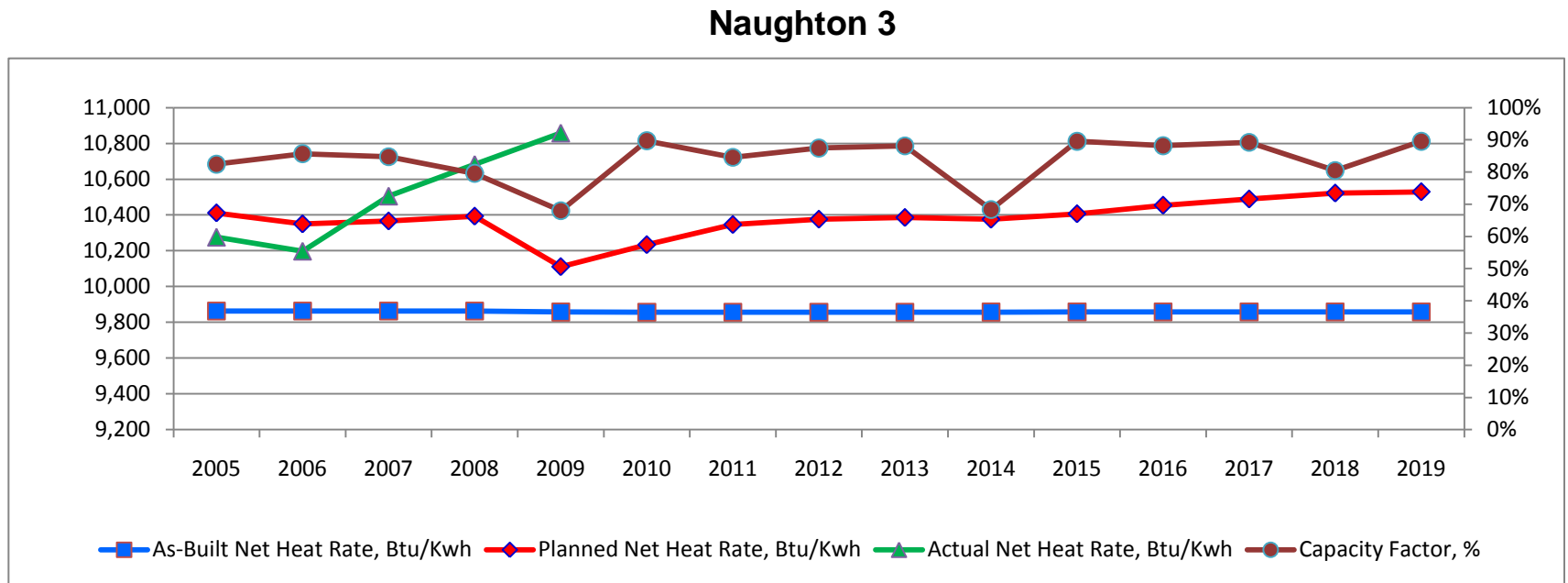
Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
As-Built Net Heat Rate, Btu/Kwh	9,960	9,960	9,959	9,960	9,959	9,957	9,957	9,963	9,960	9,960	9,960	9,959	9,959	9,959	9,959
Planned Net Heat Rate, Btu/Kwh	10,814	10,720	10,332	10,219	10,346	10,298	10,355	10,209	10,228	10,300	10,330	10,197	10,189	10,257	10,303
Actual Net Heat Rate, Btu/Kwh	10,550	10,740	10,206	10,417	10,263										
Capacity Factor, %	89.2%	78.4%	79.7%	88.6%	88.4%	87.9%	87.0%	76.2%	91.2%	90.4%	89.6%	81.1%	91.2%	90.4%	89.6%

Figure 2
Naughton Unit 2
10-year Plan Heat Rate Goals



Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
As-Built Net Heat Rate, Btu/Kwh	9,958	9,958	9,958	9,955	9,950	9,944	9,963	9,962	9,962	9,962	9,962	9,962	9,962	9,962	9,962
Planned Net Heat Rate, Btu/Kwh	10,693	10,480	10,350	10,364	10,445	10,383	10,491	10,513	10,556	10,582	10,434	10,403	10,472	10,521	10,407
Actual Net Heat Rate, Btu/Kwh	10,487	10,672	10,810	10,848	10,128										
Capacity Factor, %	87.2%	73.5%	89.3%	84.7%	82.8%	88.2%	71.9%	89.9%	88.9%	88.3%	77.6%	89.9%	88.9%	88.3%	78.1%

Figure 3
Naughton Unit 3
10-year Plan Heat Rate Goals



Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
As-Built Net Heat Rate, Btu/Kwh	9,863	9,863	9,863	9,863	9,857	9,857	9,857	9,857	9,856	9,857	9,858	9,858	9,858	9,858	9,858
Planned Net Heat Rate, Btu/Kwh	10,411	10,350	10,366	10,393	10,111	10,234	10,346	10,376	10,386	10,376	10,407	10,454	10,489	10,522	10,529
Actual Net Heat Rate, Btu/Kwh	10,276	10,198	10,506	10,683	10,859										
Capacity Factor, %	82.4%	85.7%	84.7%	79.6%	68.0%	89.7%	84.6%	87.4%	88.1%	68.3%	89.5%	88.2%	89.2%	80.5%	89.5%

Table 1
Naughton Unit 1
10-year Plan Heat Rate Improvement Projects

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Budgeted / Planned Heat Rate Changes, Net basis (Improvements are negative)											
Install Intelligent soot blowing (2016)	Btu/kWh			0	0	0	0	-25	-25	-25	-25
CO&O2 Grid (2012)	Btu/kWh			-13	-13	-13	-13	-13	-13	-13	-13
Condenser Replacement (2012)	Btu/kWh			-20.1	-30	-30	-30	-30	-30	-30	-30
SO3 Injection System (2010)	Btu/kWh	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25
Scrubber Addition (-2.58Mw Aux Load) (2012)	Btu/kWh			163.2	163.2	163.2	163.2	163.2	163.2	163.2	163.2
Total adjustments related to Capital Projects	Btu/kWh	-25	-25	105.1	95.2	95.2	95.2	70.2	70.2	70.2	70.2
Budgeted / Planned Auxiliary Load Changes											
Reduced auxiliary load benefit of Budgeted / Planned Heat Rate Changes	KW	-26	-26	111	101	101	101	74	74	74	74
Cooling Tower VFD's (2012)	KW			-38	-75	-75	-75	-75	-75	-75	-75
Air Compressor Upgrade (2009)	KW	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27
Total Auxiliary Load Changes	KW	-53	-53	47	-1	-1	-1	-27	-27	-27	-27
Budgeted / Planned Net Dependable Rating Changes, (Net Basis)											
Scrubber Addition (-2.58Mw Aux Load) (2012)	MW			-2.58	-2.58	-2.58	-2.58	-2.58	-2.58	-2.58	-2.58
Total Capacity Changes	MW	0	0	-2.58	-2.58	-2.58	-2.58	-2.58	-2.58	-2.58	-2.58

Table 2
Naughton Unit 2
10-year Plan Heat Rate Improvement Projects

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Budgeted / Planned Heat Rate Changes, Net basis (Improvements are negative)											
Install intelligent soot blowing (2008)	Btu/kWh	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25
CO&O2 grid (2011)	Btu/kWh		-5	-13	-13	-13	-13	-13	-13	-13	-13
SO3 Injection System (2010)	Btu/kWh	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25
Scrubber Addition (2011 -4.71MW)	Btu/kWh		228	228	228	228	228	228	228	228	228
Total adjustments related to Capital Projects	Btu/kWh	-50	173	165	165	165	165	165	165	165	165
Budgeted / Planned Auxiliary Load Changes											
Reduced auxiliary load benefit of Budgeted / Planned Heat Rate Changes	KW	-75	259	247	247	247	247	247	247	247	247
Cooling Tower VFD's (2008)	KW	-134	-134	-134	-134	-134	-134	-134	-134	-134	-134
Air Compressor Upgrade (2009)	KW	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27
Total Auxiliary Load Changes	KW	-236	98	86	86	86	86	86	86	86	86
Budgeted / Planned Net Dependable Rating Changes, (Net Basis)											
Scrubber Addition (2011 -4.71MW)	MW		-4.71	-4.71	-4.71	-4.71	-4.71	-4.71	-4.71	-4.71	-4.71
Total Capacity Changes	MW	0	-4.7	-4.71	-4.71	-4.71	-4.71	-4.71	-4.71	-4.71	-4.71

**Table 3
Naughton Unit 3
10-year Plan Heat Rate Improvement Projects**

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Budgeted / Planned Heat Rate Changes, Net basis (Improvements are negative)											
CO&O2 grid (2014)	Btu/kWh				-12	-25	-25	-25	-25	-25	-25
Install intelligent soot blowing (2009)	Btu/kWh	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25
Increased CAI load (-4.55MW 2014)	Btu/kWh					80	137.8	137.8	137.8	137.8	137.8
Total adjustments related to Capital Projects	Btu/kWh	-23	-22	-22	-34	33	90	90	91	91	91
Budgeted / Planned Auxiliary Load Changes											
Reduced auxiliary load benefit of Budgeted / Planned Heat Rate Changes	KW	-45	-44	-43	-66	64	176	177	178	178	178
Cooling Tower VFD's (2014)	KW					-90	-180	-180	-180	-180	-180
Condensate Pump Upgrade (2008)	KW	-160	-160	-160	-160	-160	-160	-160	-160	-160	-160
Air Compressor Upgrade (2009)	KW	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27
Total Auxiliary Load Changes	KW	-231	-230	-230	-253	-213	-191	-190	-189	-189	-189
Budgeted / Planned Net Dependable Rating Changes, (Net Basis)											
Increased CAI load (-4.55MW 2014)	MW					-4.6	-4.6	-4.6	-4.6	-4.6	-4.6
Total Capacity Changes	MW	0.0	0.0	0.0	0.0	-4.6	-4.6	-4.6	-4.6	-4.6	-4.6

10. Required Signatures

Performance Engineer – Naughton Plant			
Signature:		Date:	

Manager, Engineering – Naughton Plant		Rodger Holt	
Signature:	(on file)	Date:	31Mar10

Managing Director – Naughton Plant		Angie Skinner	
Signature:	(on file)	Date:	31Mar10