Assuring a bright future for our customers

# 2007

# Integrated Resource Plan Update

OPUC Cross 4

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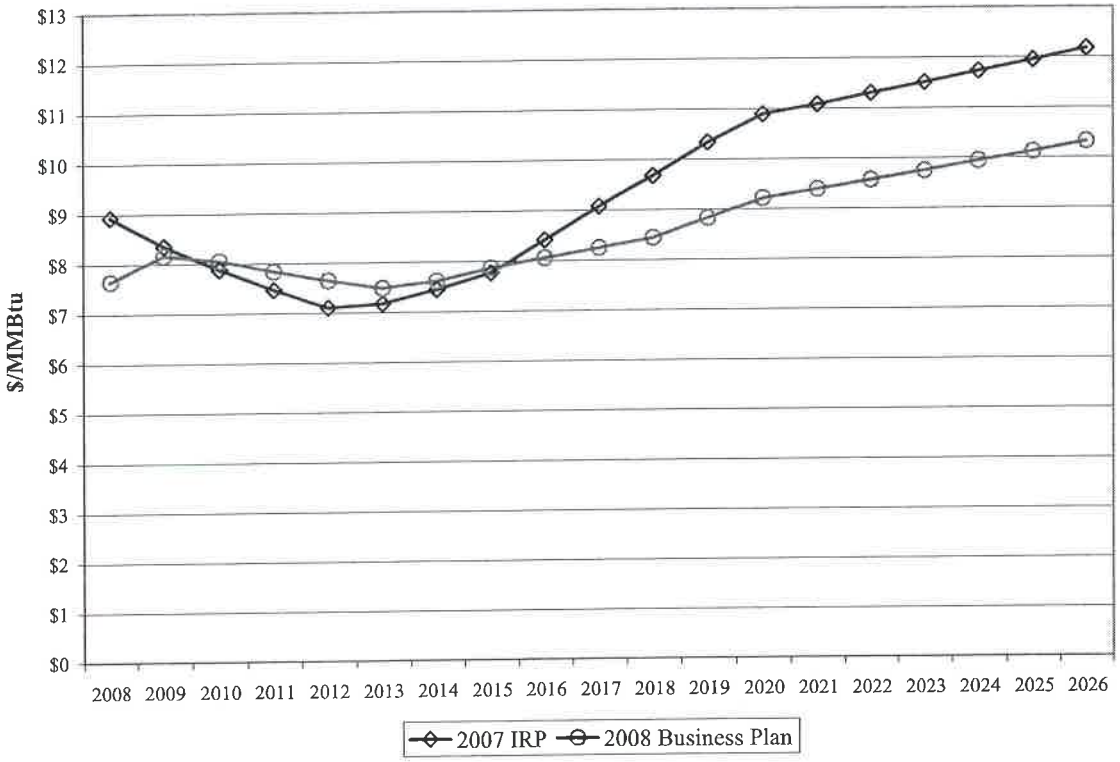
A MIDAMERICAN ENERGY HOLDINGS COMPANY

Pacific Power | Rocky Mountain Power | PacifiCorp Energy

**Figure 1 – Henry Hub Natural Gas Prices (Nominal)**



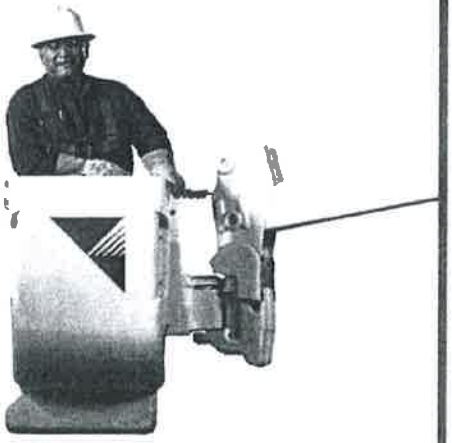

## Electricity Market Prices

Electricity prices are a blend of 72 months of market forwards and a fundamentals price projection developed with MIDAS – an hourly chronological dispatch model for the Western Electricity Coordination Council (WECC). As with natural gas prices, the 2007 IRP reflects market forwards for electricity as of August 31, 2006 and the 2008 business plan reflects market forwards as of September 7, 2007. Beyond the market portion of the electricity curve, the MIDAS price forecast reflects the same fundamentals natural gas price projections described in the Natural Gas Markets section above.

Figure 2 shows the average annual flat electricity price at Mid-Columbia as used in the 2007 IRP and in the 2008 business plan. Figure 3 shows average annual flat electricity prices at Palo Verde. For both markets, price differences through about 2013 are driven largely by movements in the forward electricity markets between August 2006 and September 2007. Over this period, the relative increase in electricity prices was larger than the increase in natural gas prices, indicating growth in implied market heat rates. Variations in long-term prices beyond the market period are largely influenced by the changes to long-term natural gas prices between August 2006 and September 2007.

*Let's turn the answers on.*

# 2008 Update
# Integrated Resource Plan



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**March 31, 2010**

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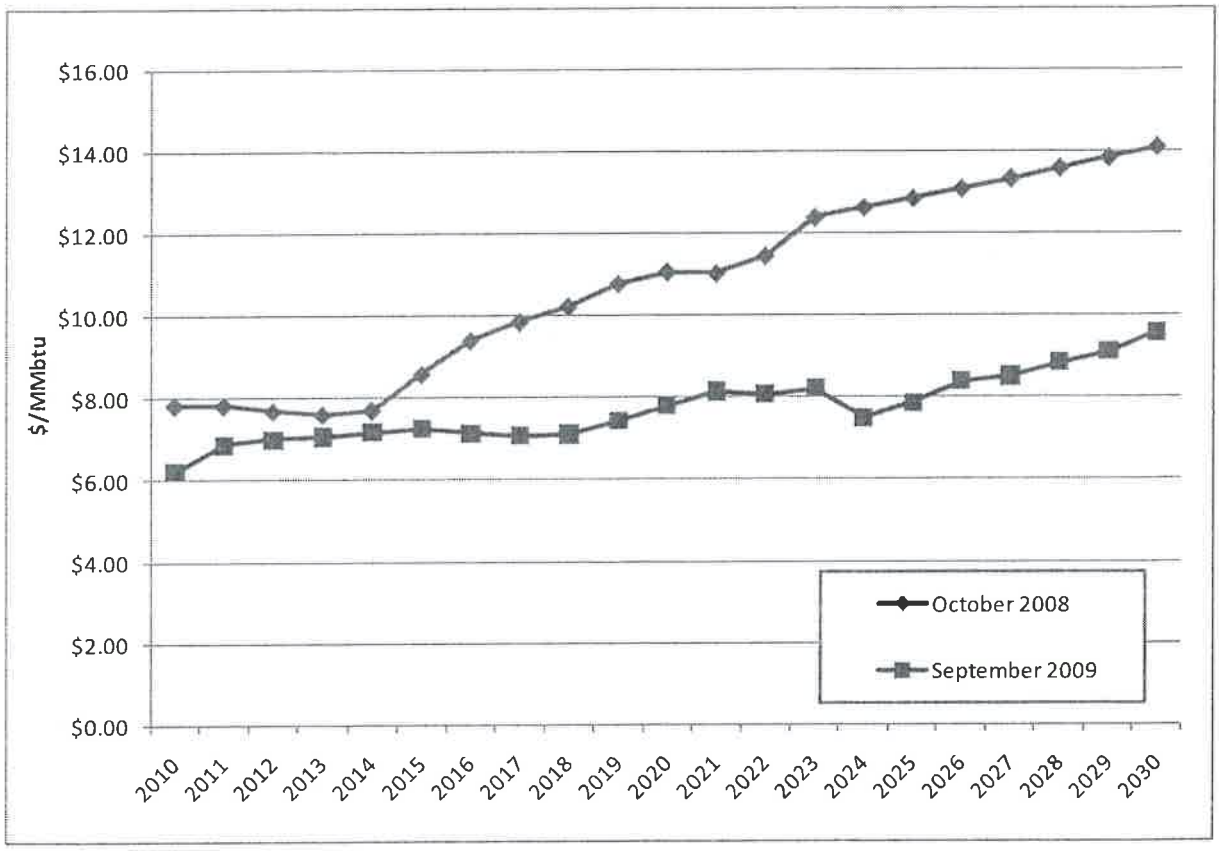
**Figure 4.1 – Henry Hub Natural Gas Prices (Nominal)**




**Power Market Prices**

The electricity price fundamentals forecast is developed with the MIDAS model, an hourly chronological dispatch model for the Western Interconnect. The natural gas fundamentals forecast described above is a key input to the MIDAS model, and consequently, the decline in electricity prices from the October 2008 curve to the September 2009 curve is consistent with the decline in natural gas prices. Figures 4.2 through 4.4 compare the average annual electricity prices for the Palo Verde and Mid-Columbia market hubs from the October 2008 and September 2009 curves.

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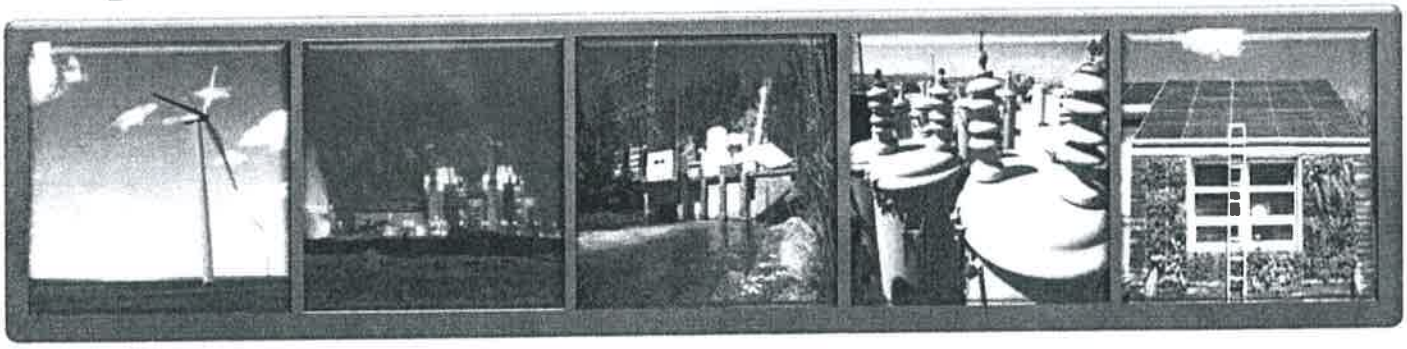
# 2011 Integrated Resource Plan Update



*Let's turn the answers*

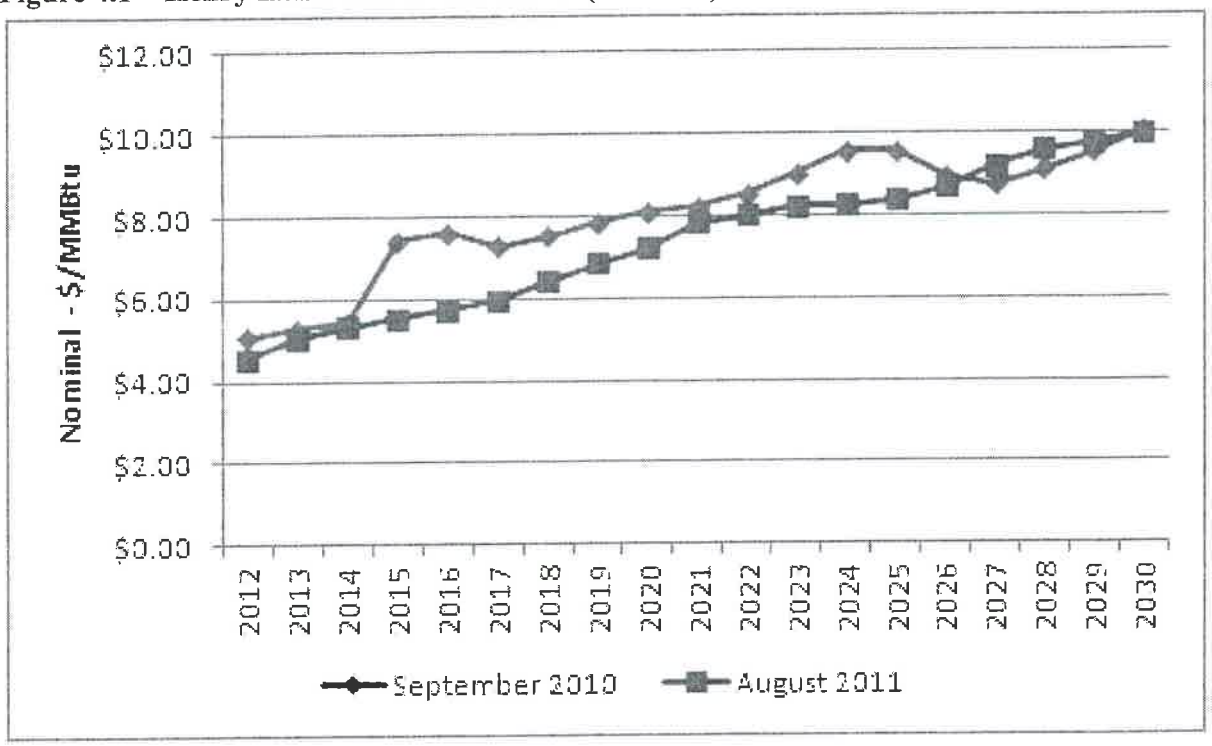
## Redacted Version

March 30, 2012

The August 2011 natural gas curve is based on a long-term natural gas forecast issued in April 2011, and assumes carbon pricing starts in 2021. Both forecasts assume a considerable portion of natural gas demand is met by unconventional shale production. For the September 2010 forecast used for the 2011 IRP, 38% of natural gas demand by 2020 was assumed to be met with shale production, while 45% is included for the August 2011 forecast.

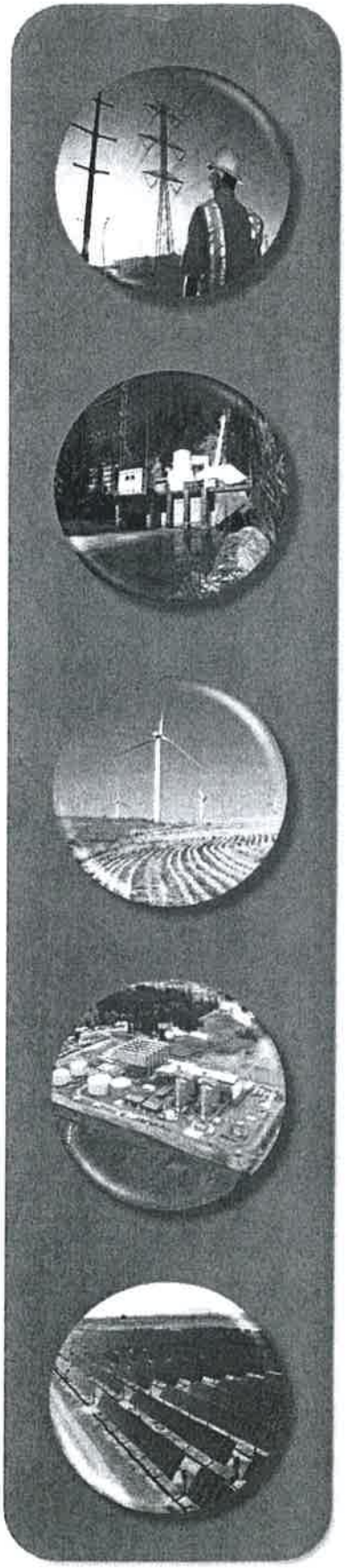
Figure 4.1 compares the nominal annual Henry Hub natural gas prices from the September 2010 and August 2011 curves.

**Figure 4.1 – Henry Hub Natural Gas Prices (Nominal)**




## Power Market Prices

The natural gas fundamentals forecast described above is a key input to the MIDAS model, and consequently, the gas curve shape is reflected in electricity prices from the September 2010 and August 2011 curves. Figures 4.2 through 4.4 compare the average annual electricity prices for the Palo Verde and Mid-Columbia market hubs from the September 2010 and August 2011 curves.



2013

# Integrated Resource Plan Update

## REDACTED

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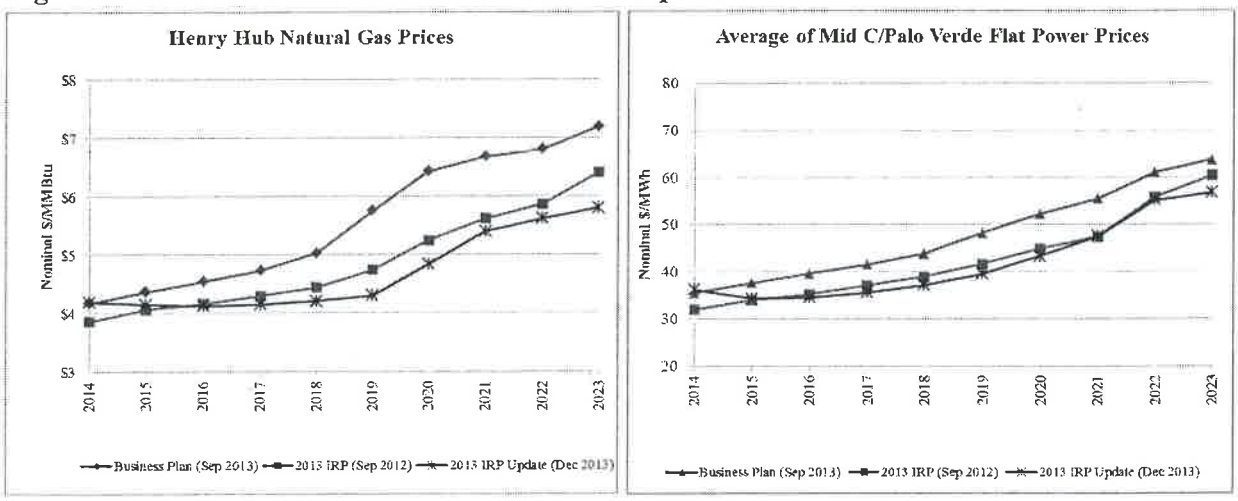
March 31, 2014

*Let's turn the answers*

- Figure ES.2 shows that forecast natural gas and energy prices have declined from those assumed in the 2013 IRP and the fall 2013 ten-year business plan. Domestic gas price forecasts continue to be driven down by growth in unconventional shale gas plays. This in turn (combined with lower forecast regional loads) impacts forward market power prices.

**Figure ES.2 – Power and Natural Gas Price Comparisons**




- With a reduced coincident system peak forecast and lower market prices, the updated resource portfolio continues to show that customer loads over the front ten years of the planning horizon will be met with front office transactions (firm market purchases) and through energy efficiency. PacifiCorp continues to pursue acceleration of cost-effective energy efficiency consistent with its 2013 IRP Action Plan.

- The Energy Gateway transmission project continues to play an important role in the Company's commitment to provide safe, reliable, reasonably priced electricity to meet the needs of our customers. Several Energy Gateway developments have occurred since the Company's 2013 IRP was filed, including reaching construction and permitting milestones, adjusting in-service dates for future segments, and developing activities on joint-development projects. Accordingly, in-service dates have been updated relative to those assumed for the 2013 IRP. These date adjustments coincide with revised permitting dates, generation facility needs and updated load growth assumptions.

- The Environmental Protection Agency (EPA) partially approved and partially rejected the Wyoming Regional Haze state implementation plan (SIP) and issued a federal implementation plan (FIP) to cover those areas of SIP disapproval in January 2014. This action established compliance requirements and schedules for specific Wyoming coal units under the Regional Haze program, including a requirement for installation of selective catalytic reduction (SCR) at Wyodak by early March 2019. For purposes of the 2013 IRP Update, the resource needs assessment and updated resource portfolio reflects the continued operation of Wyodak as a coal-fired generating asset through the planning

2015

# Integrated Resource Plan Update

*Let's turn the answers*

March 31, 2016

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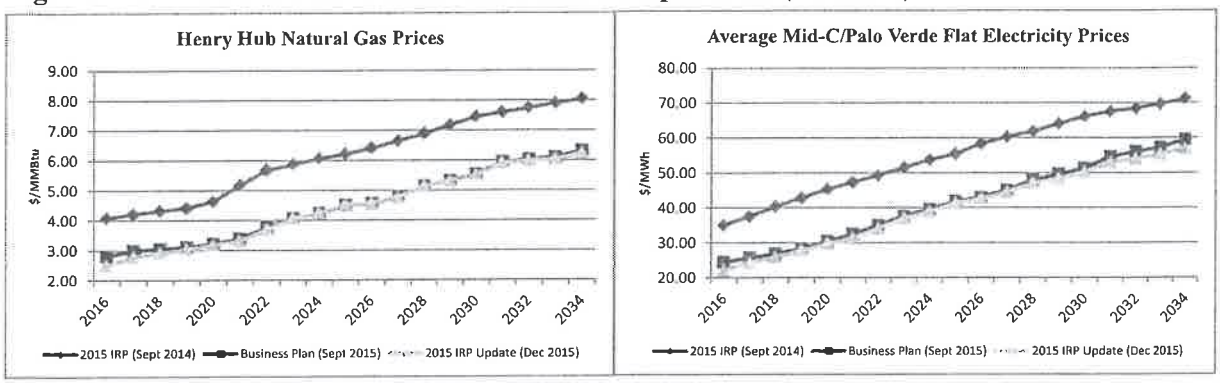
- Figure ES.2 shows that forecasted natural gas and energy prices have declined from those assumed in the 2015 IRP. Domestic gas price forecasts continue to be driven down by growth in unconventional shale gas plays. This in turn (combined with lower forecast regional loads) impacts forward market power prices.

**Figure ES.2 – Power and Natural Gas Price Comparisons (Nominal)**



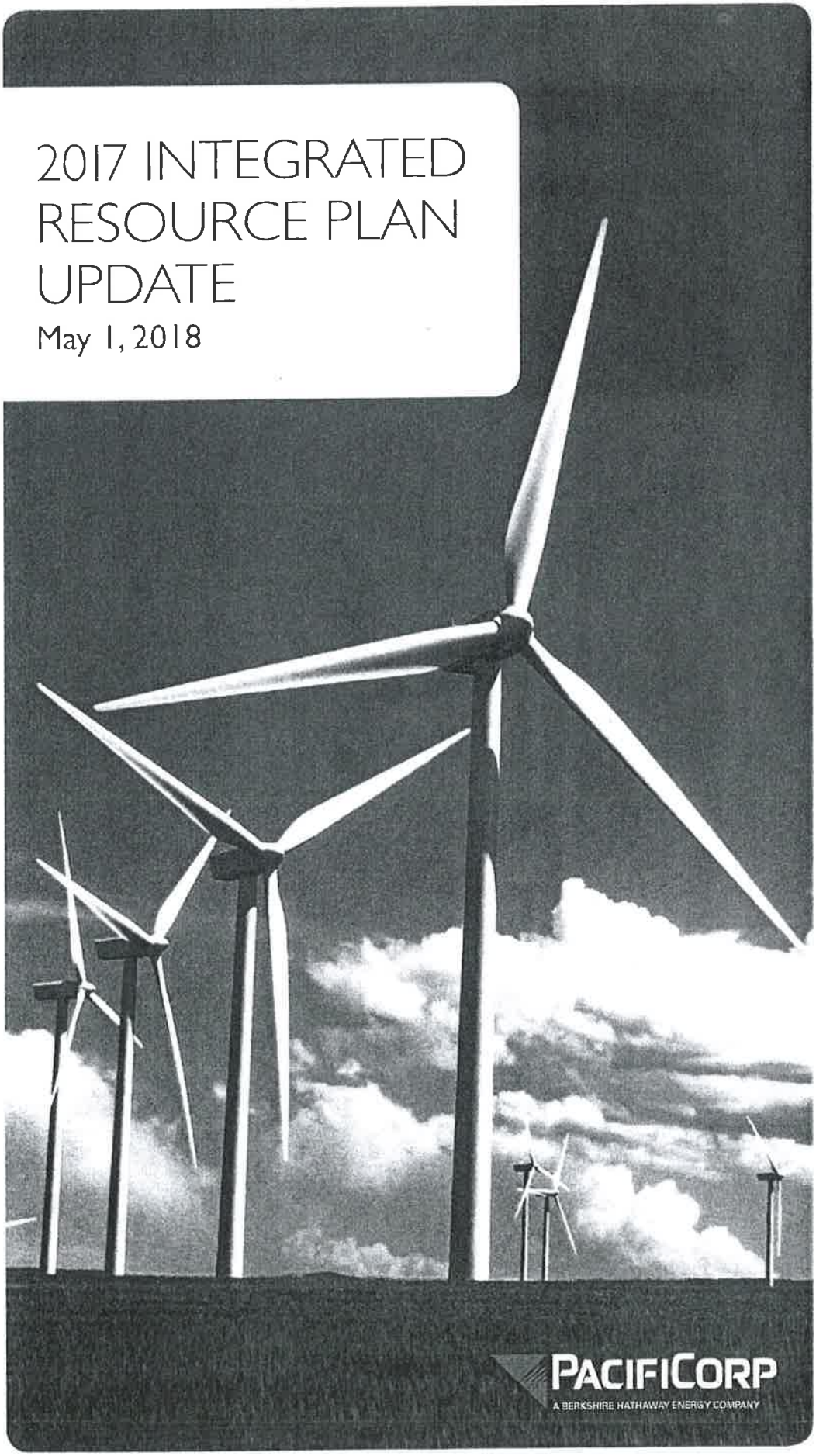

- PacifiCorp's updated resource portfolio continues to show that customer loads over the front ten years of the planning horizon will be met with front office transactions (firm market purchases) and energy efficiency. Over the front ten years of the planning period (2016 through 2025), accumulated acquisition of incremental energy efficiency resources meets 87% of projected load growth.

- PacifiCorp refreshed its analysis of Regional Haze compliance alternatives for Naughton Unit 3, which was assumed to convert to a natural gas-fired facility by mid-2018 in the 2015 IRP. With reduced load, lower market prices, and increased costs for gas conversion, the refreshed analysis shows that retiring Naughton Unit 3 at the end of 2017 is a lower cost alternative than the assessed gas conversion approach. As such, the capacity of the converted Unit 3 is no longer included in the 2015 IRP Update resource portfolio after year-end 2017. However, recognizing that Naughton Unit 3 is an important generation resource to the state of Wyoming and PacifiCorp's customers, PacifiCorp will continue to review emerging technologies, re-assess traditional gas conversion technologies and costs, and consider other potential alternatives that could be applied to Naughton Unit 3 to allow continued operation beyond year-end 2017.

- The state of Arizona issued a regional haze state implementation plan (SIP) requiring, among other things, the installation of $SO_2$, $NO_X$ and particulate matter controls on Cholla Unit 4, which is owned by PacifiCorp but operated by Arizona Public Service. The U.S. Environmental Protection Agency (EPA) approved in part, and disapproved in part, the Arizona SIP and issued a federal implementation plan (FIP) requiring the installation of selective catalytic reduction (SCR) equipment on Cholla Unit 4. PacifiCorp filed an appeal regarding the FIP as it relates to Cholla Unit 4, and the Arizona Department of Environmental Quality and other affected Arizona utilities filed separate appeals of the FIP as it relates to their interests. With respect to the Cholla FIP requirements, the court has placed the appeals in abeyance while parties attempt to agree on an alternative compliance approach. In October 2015, EPA acknowledged receipt of the state of Arizona's re-assessed regional haze SIP that commits to ceasing operation of Cholla Unit 4 as a coal fueled

# 2017 INTEGRATED RESOURCE PLAN UPDATE

May 1, 2018



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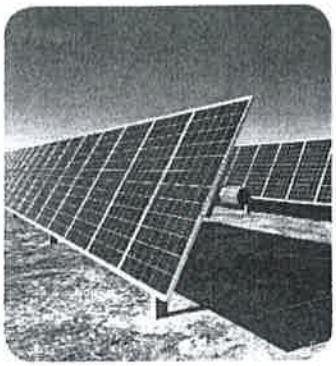
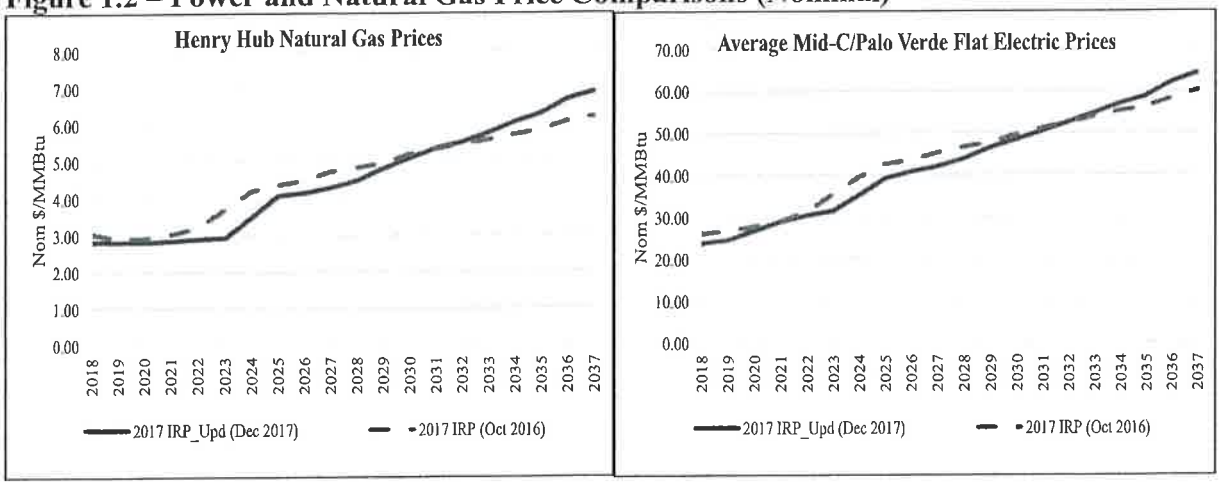



**Figure 1.2 – Power and Natural Gas Price Comparisons (Nominal)**




## Load-and-Resource Balance

Figure 1.3 summarizes the 2017 IRP Update capacity load-and-resource balance, before acquiring new resources and making firm market purchases, alongside the load-and-resource balance from the 2017 IRP. The load-and-resource balance capacity need has decreased by an average of 408 MW, relative to the 2017 IRP, reflecting a lower load forecast and an increase in qualifying facility contracts. The capacity need in both the 2017 IRP and the 2017 IRP Update increases at the end of January 2019 due to the assumed early retirement of Naughton Unit 3 and at the end of 2020 due to the assumed early retirement of Cholla Unit 4. The 2017 IRP Update load-and-resource balance continues to show a capacity need throughout the planning period, but this need has been reduced relative to the 2017 IRP by 204 MW in 2018 rising to 539 MW by 2027.