



Developing a Sustainable Electricity Portfolio Requires Balanced Approach

PECC Sept 21, 2017
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Electricity Portfolio Objectives

- Lowest long-term cost
- Very high degree of resource adequacy and reliability –
 - customers' needs met in all conditions
- Addresses a multitude of defined risks like fuel price and market, and
- Incorporates environmental considerations.

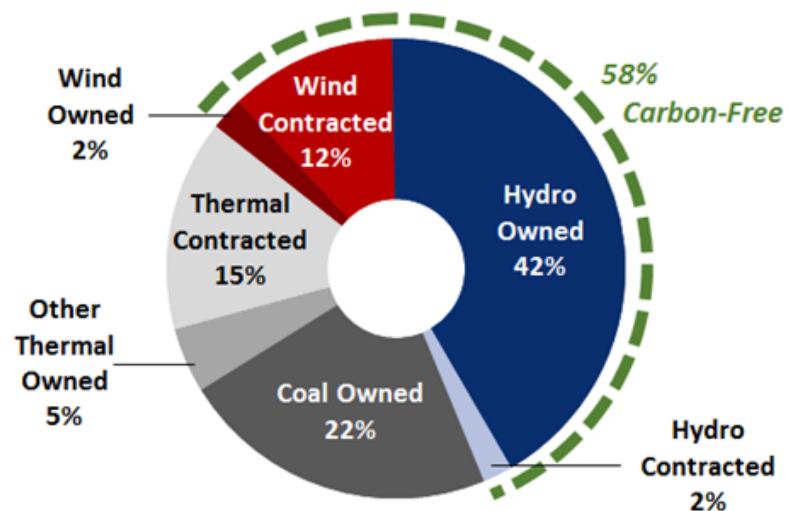
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- Objectives often mutually incompatible
- Requires policy direction

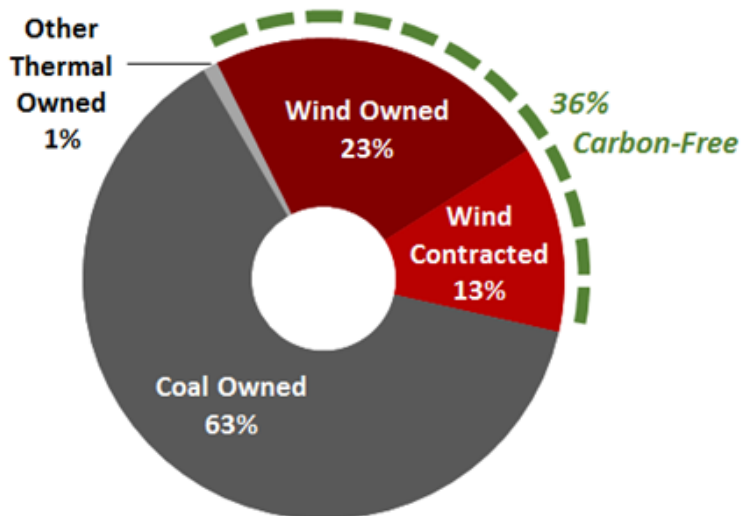


Status: Highly Carbon-Free Supply Portfolio

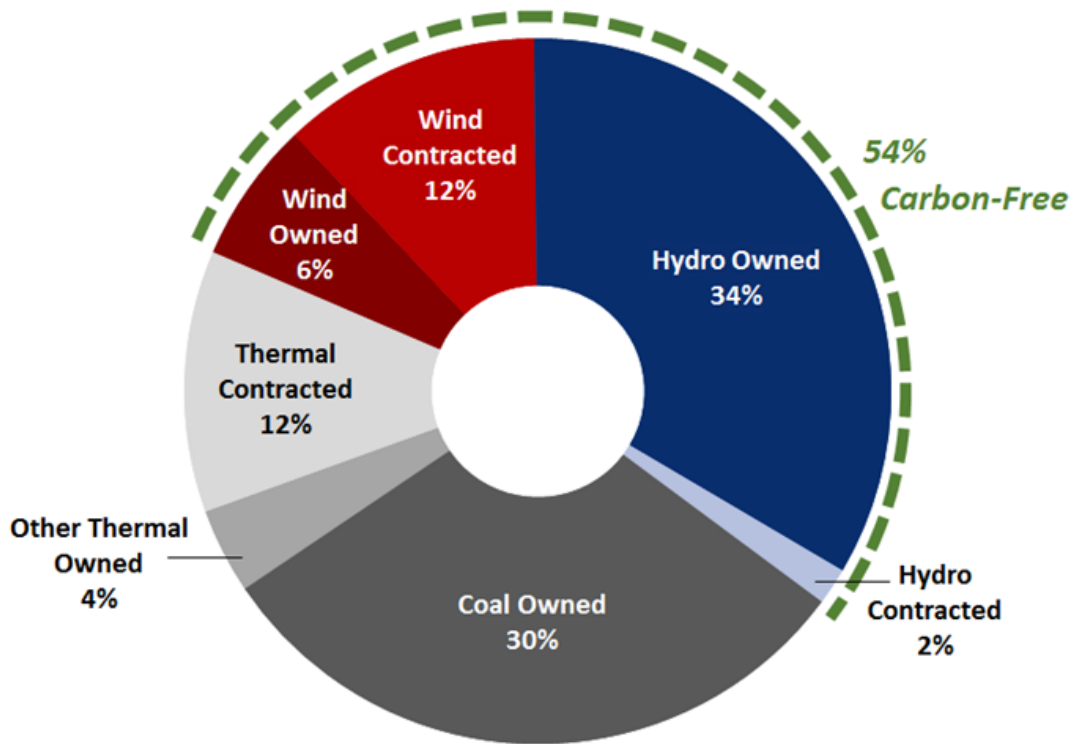
Montana 2016 Electric Generation Portfolio



South Dakota 2016 Electric Generation Portfolio



2016 Electric Generation Portfolio



Based upon 2016 MWH's of owned and long-term contracted resources. Approximately 54% of our total company owned and contracted supply is carbon-free.



NWE Solar and Wind Generation (under contract or Order)





Cost comparison of wind and thermal plant

- Note – Illustrative, information needs to be refreshed

- “Apples to Oranges”

- NWE wind plant \$46.09 /MWh
- Colstrip 4 \$62.92 /MWh
- Difference (\$16.83 /MWh)



- “Apples to Apples” – bring wind capacity to 90%

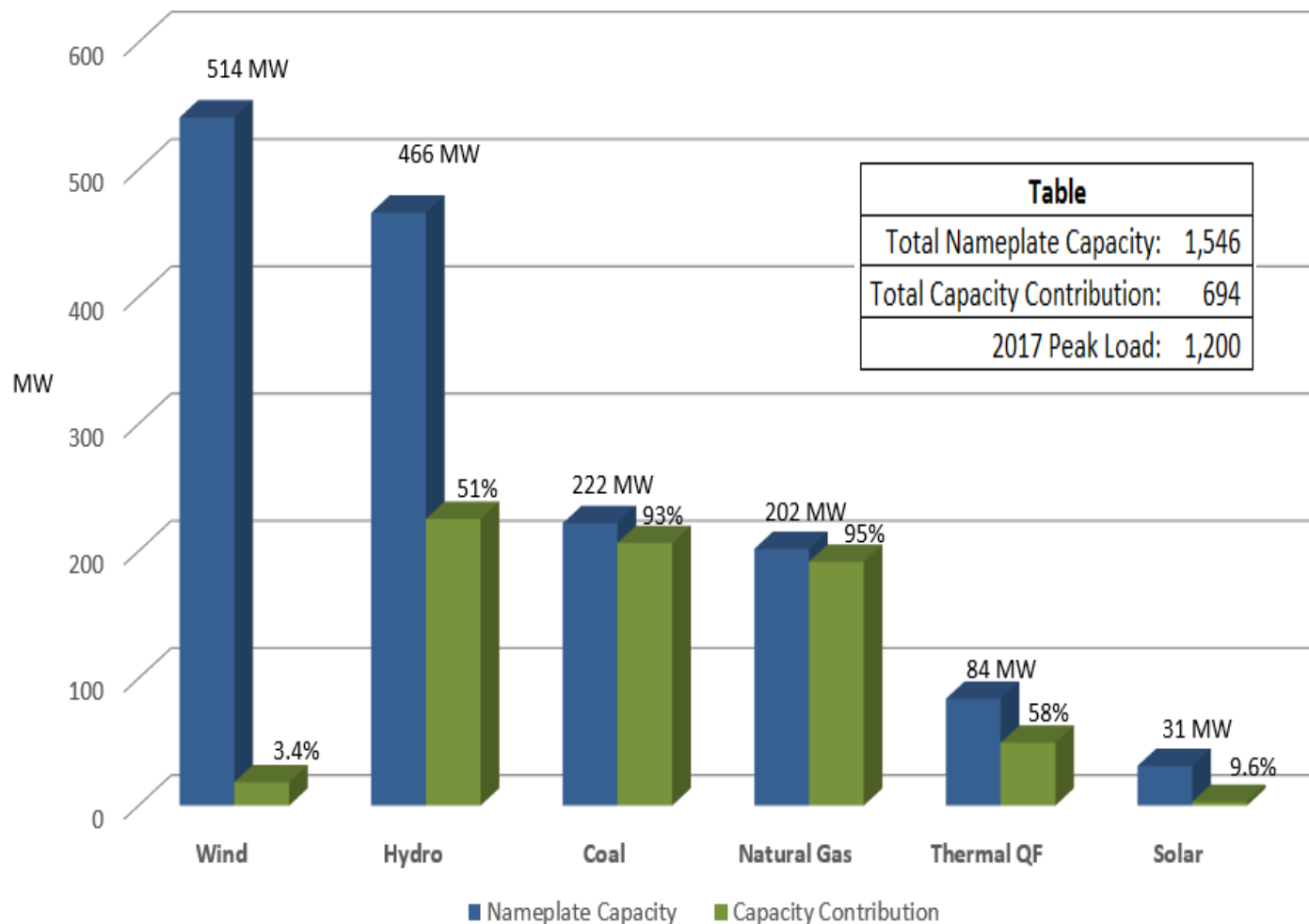
- NWE wind plant+ CCCT \$63.57 /MWh
- Colstrip 4 \$62.92 /MWh
- Difference \$0.65 /MWh



Reliability: Capacity Contribution Assumptions

NorthWestern Energy 2017 Resource Mix

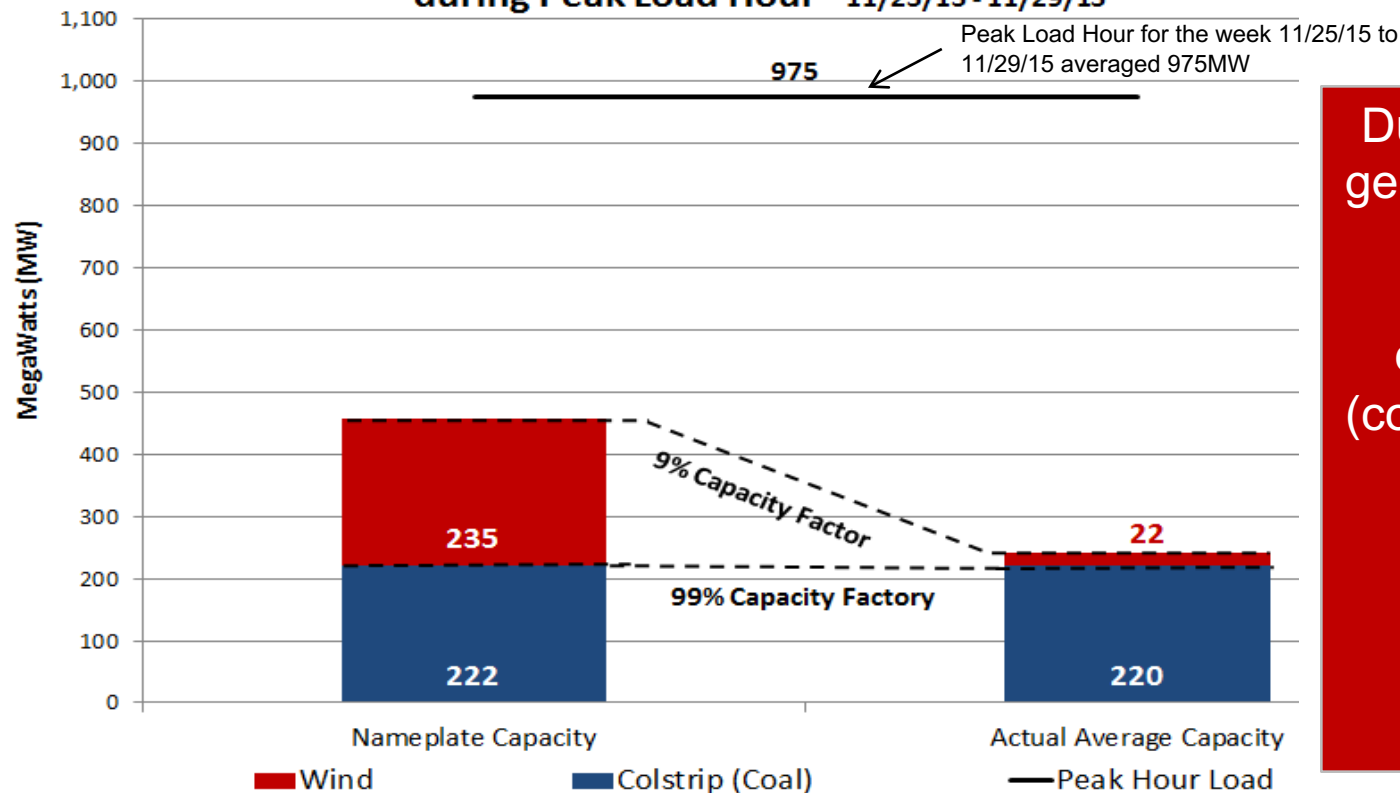
(Including contracted and pending final order)





Reliability: Wind Contribution to Peak Load Hours

NamePlate Supply Capacity versus Actual Average Capacity during Peak Load Hour - 11/25/15 - 11/29/15



During peak hours wind generated on average 22 MW, which is ~ 9% capacity factor. In comparison, Colstrip (coal) produced at a 99% capacity factor.

	11/25/2015	11/26/2015	11/27/2015	11/28/2015	11/29/2015	Average for Week
Peak Load Hour (Time)	6pm	7pm	7pm	7pm	7pm	7pm
Peak Load Hour (MW)	1,003	989	1,012	934	938	975

Wind

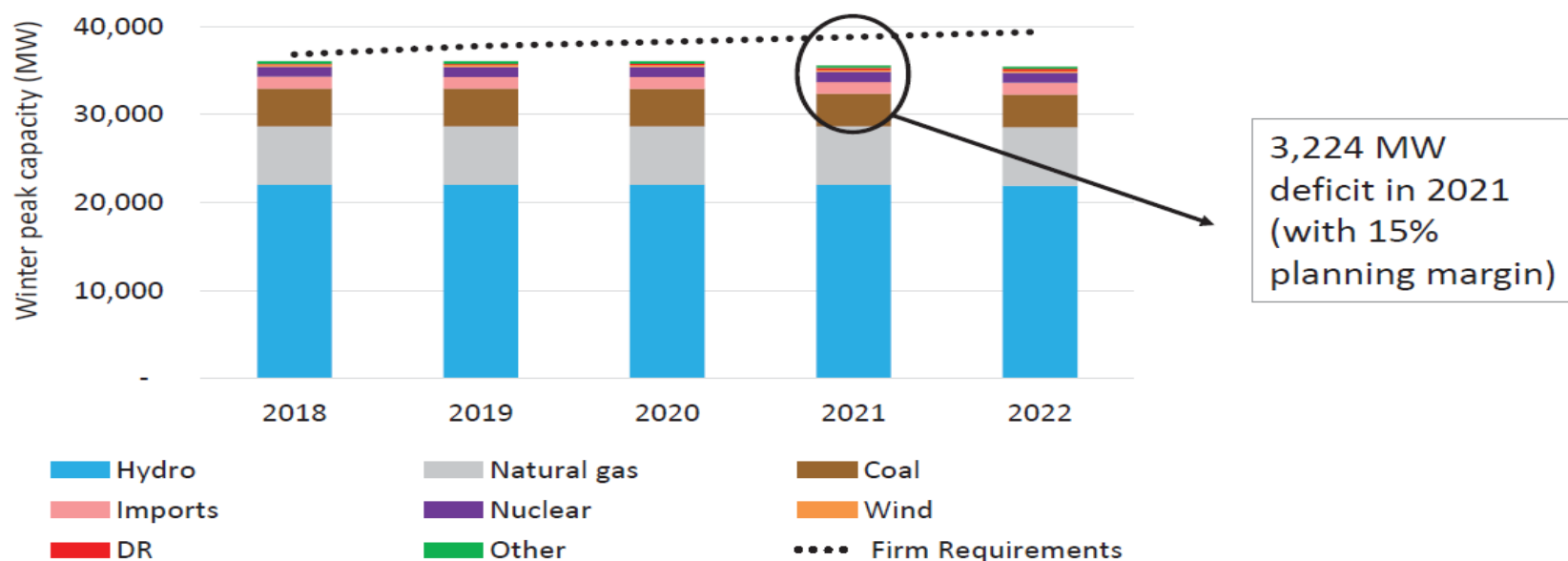
Nameplace Capacity (MW)	235	235	235	235	235	235
Actual Capacity (MW)	5	2	7	70	26	22
Capacity Factor (CF)	2.1%	0.9%	3.0%	29.8%	11.1%	9.4%

Colstrip (Coal)

Nameplace Capacity (MW)	222	222	222	222	222	222
Actual Capacity (MW)	219	221	221	220	220	220
Capacity Factor (CF)	98.6%	99.5%	99.5%	99.1%	99.1%	99.2%

Market purchases contain price and availability risks

Winter peak has capacity deficit



February 2017, draft

January, critical water, Northwest utility firm resources only. 12%¹² planning margin in 2018 that grows 1% per year.



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