FREQUENTLY ASKED QUESTIONS

Q. I see the terms capacity and energy being used a lot in the plan. What is the difference between energy and capacity?

A. Electricity is measured in both capacity and energy. Capacity is measured in watts, kilowatts (kW), and megawatts (MW). In this plan we most often use megawatts (MW) when talking about capacity. Energy is measured in kilowatt-hours (kWh) and megawatt-hours (MWh). In this plan, we most often use the term megawatt-hours (MWh). The terms capacity and energy are used to describe generation characteristics of resources, and are also used to describe customers' loads. Understanding the difference between energy and capacity is critical to understanding the resource needs of our customers and the generation capabilities of different types of generation.

The term "capacity" is used in many different ways, but the two primary definitions used when describing a generation facility are 1.) nameplate capacity, which is the maximum output (MW) a generation facility can physically produce, and 2.) peaking capacity, which is the reliable level of output (MW) that a generation facility is able to produce during a peak load event. Most generators do not operate at their full nameplate capacity except in limited circumstances.

Most generators do not operate at their full capacity all the time.
For example, for a small hydro facility with a nameplate capacity of 19 MW, the facility may be capable of producing at the full 19 MW for every hour in a day during the month of May when runoff is high. However, on a cold day in January, when loads are at their

highest (peaking) and stream flows are lower, the facility may only be capable of producing 9 MW during the highest load hours of the day. If so, it would be appropriate to say that that facility has a peaking capacity of 9 MW, or that it has a peak capability of 47% (peaking capacity divided by nameplate, or 9 MW / 19 MW).

The term "energy" refers to the amount of electricity a generation facility produces over a specific period of time, normally over an hour, month or year. Energy production is generally less than maximum capability for most of the year.

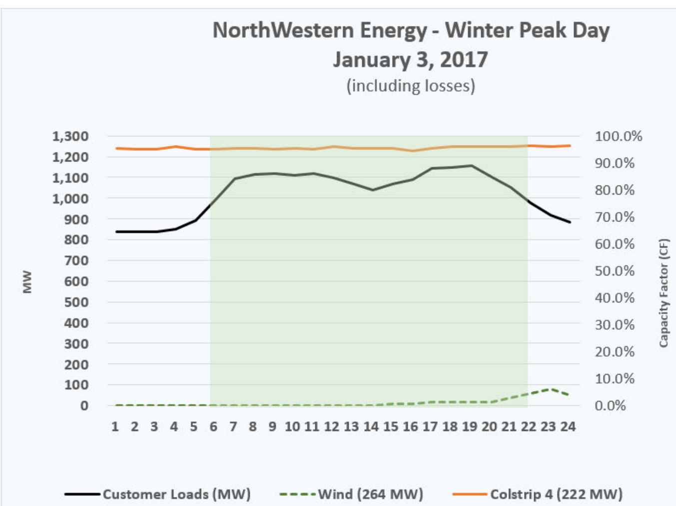
For example, using the same 19 MW hydro facility producing at the full 19 MW per hour for every hour during a day in May when runoff is high, it would be appropriate to say that that facility produced 456 MWh on that day (19 MW x 24 hours). On a day in January, when stream flows are lower, the facility might produce an average of 8 MW for every hour in a day. If so, it would be appropriate to say that the facility produced 192 MWh on that day (8 MW x 24 hours).

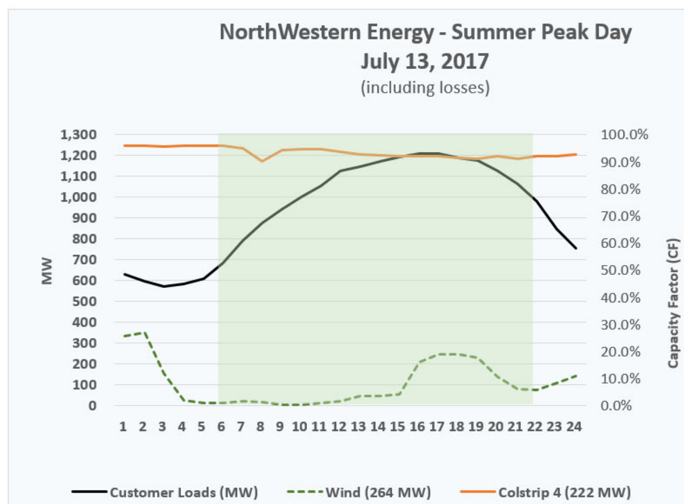
Q. Wind and solar appear to be a low-cost resources. Why does your model select natural gas generation over wind and solar?

A. Wind and solar are capable of providing low-cost energy but are generally not available to provide capacity when customers need it most, like after sunset on the coldest winter days in December and January.

Wind is typically only producing about five percent of its maximum capability on those days (5% of nameplate capacity). Theoretically, this means NorthWestern would need to build a wind facility that is about twenty times larger than a natural gas facility to obtain about the same amount of capacity needed to serve customers during peak loads. However, the capacity provided by a wind facility is not reliable enough to plan on being available during peak loads and in periods when twenty times larger isn't enough to provide reliable service.

To illustrate this point, the graphs below show NorthWestern's peak load days for 2017. The black line represents customer load (shown as megawatts on the left hand scale), while the dashed green line shows wind production (from the 364 MW of wind that we have to serve customers) as percentage of its nameplate capacity on the right hand scale. The orange line represents Colstrip 4 production, also shown as a percentage of its nameplate capacity on the right hand scale.



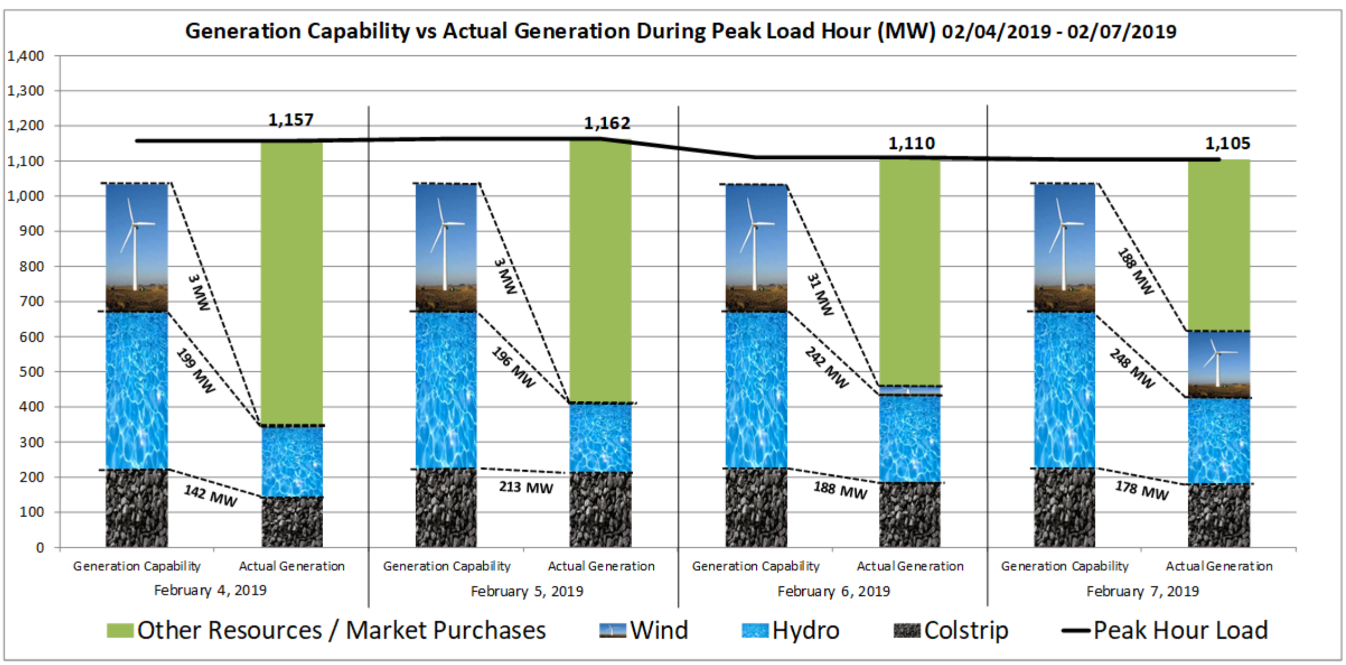


- Heavy Load Hours

As illustrated in the graphs, wind contributed very little of its maximum generation capability (especially on the critical winter peak day), while Colstrip 4 generated at 90 to 95 percent of its maximum capability. During peak load periods, customers need resources that NorthWestern can call upon as needed, 24 hours a day, 7 days a week. One way to increase the reliability of wind to provide capacity during peak load periods is to add battery storage. However, adding the battery storage needed makes the wind/battery combination much more expensive.

NorthWestern didn't include solar on the above graph because we did not have very much solar operating on our system in 2017. However, we have modeled solar production and have found that when compared to wind solar has a higher capacity contribution during the summer, but provides no capacity contribution during the winter when peak load hours occur after sunset.

Another example comes from the recent cold spell the week of February 4th, 2019. The figure below shows that wind generation contributed very little to NorthWestern Energy's peak load capacity need during that cold weather period. During the peak load hours on February 4th and 5th, wind was generating at 1% or less of its total nameplate capacity (3.2 MW and 2.5 MW respectively out of a nameplate capacity of 364 MW).



It's important to note that wind generation can vary several MW from hour-to-hour or even within the hour. NorthWestern cannot control the output from wind generation like we can with other resources. Because of this, NorthWestern must set aside (reserve) the generation capability of other resources on our system to balance variations in wind. Colstrip is one of our primary resources used to offset variations in wind and load; therefore, NorthWestern cannot simply maintain Colstrip at its maximum generation capability of 222 MW.

Q. As I read the Plan, I see that the lowest cost 20-year portfolio is the Base model, which adds a lot of natural-gas generation over the planning horizon. Is NorthWestern planning to build natural gas generation?

A. No. NorthWestern is not planning to build a bunch of natural gas fired generation. NorthWestern is required to model a number of portfolios to evaluate the costs and risks of different potential future conditions. Given the information currently available, natural gas appears to be a low cost resource. However, NorthWestern will use a series of competitive solicitation processes (also known as requests-for-proposals or RFPs), which will be conducted, monitored, evaluated and scored by an independent evaluator, to acquire the necessary resources to serve our customers. This method ensures all viable technologies or resources can submit proposals and each will be evaluated in orter to determine which can most cost-effectively and reliably serve our customers. During the competitive solicitations, bidders will be able to submit proposals for a wide variety of resources including:

- Purchases from existing generation facilities,
- Solar generation combined with energy storage,
- Wind generation combined with energy storage,
- Energy storage technologies(pumped hydro, battery, compressed air),
    -
- Natural gas generation facilities, and
- Demand response (paying participants to curtail energy use during times of peak loads).

Q. You say that you are going to provide for customers' needs using competitive solicitations. What kind of resources do you expect to be bid into a competitive solicitation?

A. NorthWestern conducted a competitive solicitation in 2017 and received proposals from a number of different resource technologies, including:

- Wind plus battery,
- Solar plus battery,
- Wind and solar,
- Wind and solar plus battery,
- Battery storage technologies,
- Pumped hydroelectric storage,
- Existing hydroelectric resources,
- Compressed air energy storage plus battery,
- Reciprocating engine technologies,
- Combustion turbine technologies, and
- Combustion turbine plus battery.

We anticipate receiving proposals from a similar, if not greater, range of technologies during the competitive solicitation process that will be initiated following the filing of this plan. The resources chosen from the process will be based on costs and performance.

Q. Why doesn't the plan include an early closure for Colstrip 4 as a scenario?

A. First and foremost, Colstrip 4 is a valued generation resource that provides continued value to customers over the twenty year planning horizon of this plan. This is a "lowest reasonable cost" resource plan in which we have included and modeled a number of scenarios to test the viability of alternative resources. An early closure of Colstrip 4 could not possibly result in overall savings to the resource portfolio, and could not result in a lowest reasonable cost future.

To date, all announced closures of regional coal plants have closure dates that are well into future. NorthWestern would expect no different treatment for Colstrip 3 and 4. NorthWestern anticipates that any announcement would allow enough time to plan and seek alternative resources, should that occur. Potentially, NorthWestern could hold one or more resource planning cycles to evaluate alternative resources.

Q. The resource plan has a lot of abbreviations and terms that I am unfamiliar with. Do you have a way for me to translate?

A. Yes. At the back of the plan we have included a list of abbreviations and a glossary defining many, if not all, of the terms used in the plan.

Q. The resource plan includes a chapter on transmission and its criticality to serving load. What would happen if the Colstrip Transmission System and/or the Colstrip generation facility were not available?

A. As noted in the Transmission Chapter, the transmission system and the generation system were developed together and rely upon each other to provide reliable service to our customers. A reduced or total shutdown of the Colstrip generation facility will place much more burden on the Colstrip Transmission System and the rest of NorthWestern's system to import power into Montana during critical peaking periods, potentially exceeding import limits. This could lead to reliability issues and a lack of supply resources to meet customers' energy needs. Additionally, the Colstrip Transmission system is the backbone of the Montana transmission system, and it provides NorthWestern with a very strong path from east to west across the state with which to reliably serve all of our Montana customers.

Q. If reducing exposure to the market is one of the goals of acquiring resources, why is NorthWestern joining the Energy Imbalance Market (EIM)?

A. NorthWestern's customers already have exposure to increased market prices for energy and capacity because we are short capacity needed during peak load times. Currently, NorthWestern transacts bilaterally with other companies, meaning that it makes purchase or sale arrangements directly with those companies. The EIM will change how some transactions are conducted, but it won't increase the market exposure that NorthWestern's customers already have.

Q. You discuss the possibility of NorthWestern eventually being part of a full organized market such as a Regional Transmission Organization (RTO), and that this market would likely have a specific capacity reserve requirement. Could NorthWestern avoid the need to procure capacity by choosing not to join an RTO?

A. No. NorthWestern already has the need for capacity. The rules of an RTO would specify how to calculate this need, and how different types of resources are counted toward meeting this need, but joining an RTO would not fundamentally change the need to have capacity in place.