Northwestern Energy ETAC Meeting # 5
2025 MT IRP Planning Cycle

December 9, 2024

Modeling Inputs

Base Portfolio

- NorthWestern's current generation portfolio
  - Includes 222MW Avista acquisition and 370MW Puget Acquisition in Colstrip Units 3 and 4 starting January 2026
    - Colstrip operates until 2042
  - Does not include QF's in the current queue as NorthWestern cannot accurately project which QFs will ultimately be constructed

Depreciable life of owned assets or expiration of contracted assets

- Capacity Position Spreadsheet
  - CAO August 2024
    - https://reddi.mt.gov/prweb/PRAuth2/app/reddi/69MPqGeS_UTZWHGFH6YedHAuE3yJxESf*/!STANDARD

Candidate Resources

		Generation	Storage		
No.	Resource Type	Scale (MW_{ac})	Scale (MW_{ac})	Duration (hours)	Capability (MWh)
1	Wind	100	-	-	-
2	Wind	300	-	-	-
3	Solar PV	100	-	-	-
4	Solar PV	300	-	-	-
5	BESS	-	25	2	50
6	BESS	-	25	5	125
7	BESS	-	50	4	200
8	BESS*	-	50	5	250
9	BESS	-	50	8	400
10	BESS	-	100	5	500
11	Wind + BESS	100	50	5	250
12	Solar + BESS	100	50	5	250
13	Solar + BESS	100	100	5	500
14	Solar + BESS	300	150	5	750
15	PHES	-	100	8	800
16	Geothermal	20	-	-	-
17	SC CT - Aero*	50	-	-	-
18	SC RICE*	50	-	-	-
19	SC RICE*	150	-	-	-
20	CCCT	250	-	-	-

Forward Curves

- Gas
  - AECO
  - CIG
- Electric
  - Mid-C Heavy Load
  - Mid-C Light Load
- Coal

Accreditations

- Western Resource Adequacy Program – Qualifying Capacity Contributions

- WRAP Business Practice Manuals
  - Primarily WRAP BPM 105-Qualifying Resources
  - https://www.westernpowerpool.org/private-media/documents/V1.0_BPM_105_Forward_Showing_Qualifying_Resources_12-07-2023.pdf

Constraints

- Transmission
- Technology
- Overbuild

Load Forecasting

New Resource Cost Modeling

2023 MT IRP New Resource Chart

		Nameplate Capacity				Summer WRAP ELCC			Winter WRAP ELCC		
No.		Generation (MW_{ac})	Storage (MW_{ac})	Installed Overnight[1,2] ($/kW)	Installed Overnight w/ IRA Tax Credits[7] ($/kW)	Qualifying Capacity Credit (MW_{QCC})	RR + Fixed O&M ($/$kW_{QCC}$-yr)	RR w/ IRA Tax Credits + Fixed O&M[7] ($/$kW_{QCC}$-yr)	Qualifying Capacity Credit (MW_{QCC})	RR + Fixed O&M ($/$kW_{QCC}$-yr)	RR w/ IRA Tax Credits + Fixed O&M[7] ($/$kW_{QCC}$-yr)
1	Wind	100	-	$ 1,970	$ 1,379	14.2	$ 1,652.85	$ 1,243.19	10.0	$ 782.35	$ 588.54
2	Wind	300	-	$ 1,764	$ 1,235	42.6	$ 1,457.77	$ 1,091.02	90.0	$ 690.01	$ 516.41
3	Solar PV - SAT	100	-	$ 1,864	$ 1,305	30.4	$ 732.45	$ 535.58	2.7	$ 8,246.83	$ 6,030.27
4	Solar PV - SAT	300	-	$ 1,662	$ 1,163	91.2	$ 653.15	$ 477.70	8.1	$ 7,354.04	$ 5,378.52
5	BESS - Li-Ion[3] - 2hr duration	-	25	$ 1,242	$ 869	10.0	$ 382.43	$ 278.30	10.0	$ 382.43	$ 278.30
6	BESS - Li-Ion - 3hr duration	-	25	$ 2,570	$ 1,799	25.0	$ 322.09	$ 235.87	25.0	$ 322.09	$ 235.87
7	BESS - Li-Ion - 4hr duration	-	50	$ 1,984	$ 1,389	40.0	$ 311.64	$ 228.46	40.0	$ 311.64	$ 228.46
8	BESS - Li-Ion - 5hr duration	-	50	$ 2,398	$ 1,679	50.0	$ 302.36	$ 221.92	50.0	$ 302.36	$ 221.92
9	BESS - Li-Ion - 8hr duration	-	50	$ 3,576	$ 2,503	50.0	$ 454.07	$ 334.12	50.0	$ 454.07	$ 334.12
10	BESS - Li-Ion - 5hr duration	-	100	$ 2,237	$ 1,566	100.0	$ 283.94	$ 208.88	100.0	$ 283.94	$ 208.88
11	Wind + BESS - 5hr duration	100	50	$ 3,147	$ 2,203	42.8	$ 895.39	$ 666.41	53.3	$ 718.55	$ 534.70
12	Solar + BESS[4] - 5hr duration	100	50	$ 2,993	$ 2,095	53.6	$ 679.95	$ 497.69	35.1	$ 1,037.34	$ 759.29
13	Solar + BESS - 5hr duration	100	100	$ 4,009	$ 2,806	65.2	$ 756.55	$ 554.48	51.4	$ 960.60	$ 704.03
14	Solar + BESS - 5hr duration	300	150	$ 2,673	$ 1,871	160.8	$ 610.03	$ 447.25	105.4	$ 930.68	$ 682.33
15	PHES (Slice of Larger Project)	-	100	$ 3,561	$ 2,493	100.0	$ 348.82	$ 249.42	100.0	$ 348.82	$ 249.42
16	Geothermal	20	-	$ 4,038	$ 2,827	19.0	$ 621.58	$ 482.10	19.0	$ 621.58	$ 482.10
17	SC CT - Aero[5]	50	-	$ 1,867	$ 1,867	49.3	$ 226.68	$ 226.68	49.3	$ 226.91	$ 226.91
18	SC RICE[5]	50	-	$ 2,141	$ 2,141	49.3	$ 265.20	$ 265.20	49.6	$ 263.59	$ 263.59
19	SC RICE[5]	150	-	$ 1,719	$ 1,719	147.8	$ 208.14	$ 208.14	148.7	$ 206.88	$ 206.88
20	CCCT[6]	250	-	$ 1,640	$ 1,640	246.5	$ 200.73	$ 200.73	246.3	$ 200.93	$ 200.93

Definitions: RR = Revenue Requirement, QCC = Qualified Capacity Credit

Notes

1. Overnight installed costs include direct and indirect EPC project costs and owner's cost but exclude AFUDC, electric transmission network upgrades, and bulk gas system upgrades, as applicable.
2. Overnight installed ($/kW) and fixed O&M ($/kW-yr) costs expressed based on dividing total costs by the renewable component output.
3. BESS resources based on lithium ion technology, 365 equivalent cycles per year, and capacity augmentation throughout the study period.
4. Solar + BESS hybrid resources based on dc-connected, SAT solar PV.
5. O&M costs for simple cycle configurations assume a dispatch profile of 100 starts per year and 1,000 hours of operation per year.
6. O&M costs for combined cycle configurations assume a dispatch profile of 150 starts per year and 4,000 hours of operation per year.
7. This table presents IRA credits as a 30% reduction to the cost estimates

Construction Timelines

General Estimating Assumptions					
Resource Type	**Cost Estimate (Year)**	**Earliest NTP (Year)**	**Earliest In-Service (Year)**	**Construction Schedule (Months)**	**Owner's Costs (%)**
Wind	2022	2024	2026	24	10
Solar PV	2022	2024	2025	18	10
BESS	2022	2024	2025	14	5
Wind + BESS	2022	2024	2026	24	10
Solar + BESS	2022	2024	2025	18	10
PHES	2022	2024	2029	60	14
Geothermal	2022	2024	2027	36	14
SC CT - Aero	2022	2024	2026	22	12
SC RICE	2022	2024	2026	22	15
CCCT	2022	2024	2027	36	14

Modeling Scenarios

2023 MT IRP Scenarios

No.	Scenario	Description
1	Base Case	NorthWestern's current portfolio including the Colstrip 222 MW acquisition beginning Jan 1, 2026.
2	Colstrip Retirement in 2030	Colstrip 222 MW acquisition occurs in 2026 and then Colstrip retires in 2030. The model indicates replacement resources.
3	Colstrip Retirement in 2035	Colstrip 222 MW acquisition occurs in 2026 and then Colstrip retires in 2035. The model indicates replacement resources.
4	Colstrip Retirement in 2025 with renewable replacements	Colstrip retires in 2025. The model can only select wind, solar, and energy storage for future procurements. The scenario was provided by the Joint Environmental Group[36] in comments for ETAC.
5	Colstrip Retirement in 2035 with SMR replacement	Colstrip 222 MW acquisition occurs in 2026 and then Colstrip retires in 2035. A 320 MW SMR replaces Colstrip.

PowerSimm Access

Required Information for PowerSimm Access

- Full Name
- Email Address
- Cell Phone Number

- Access to authenticator app

Questions/Comments?