

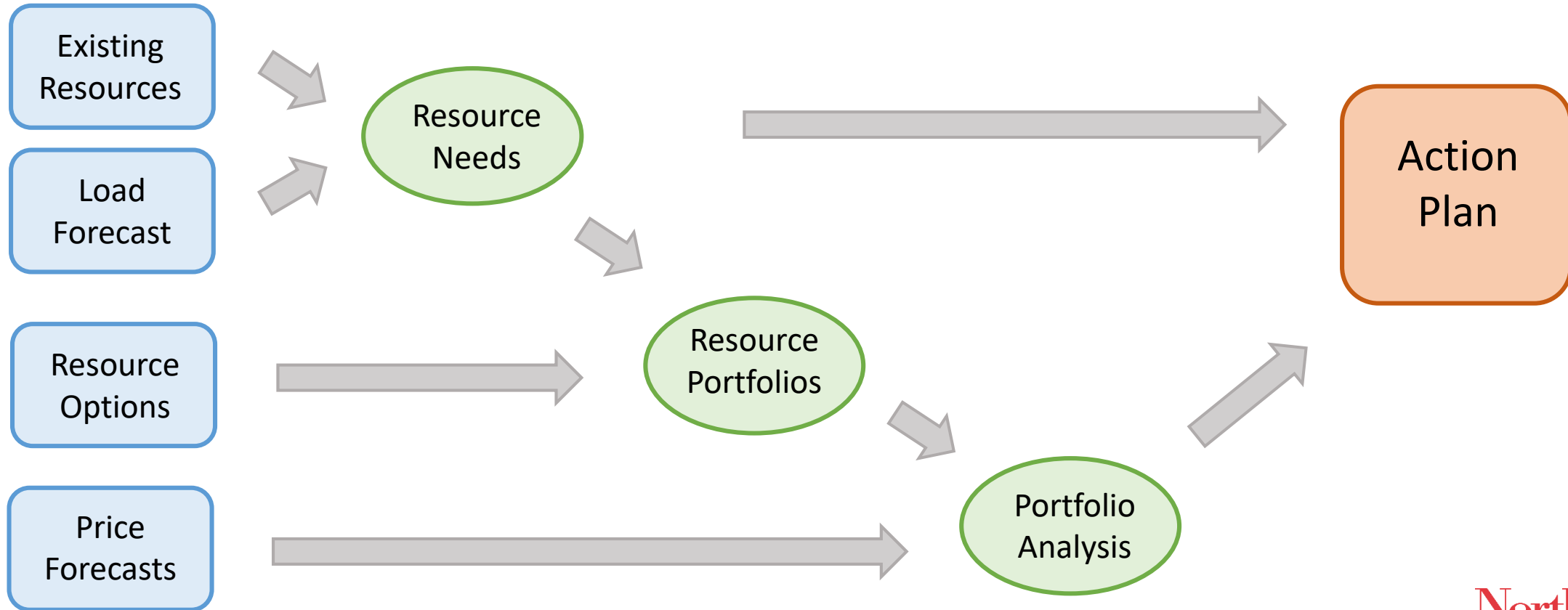


NorthWestern Energy – ETAC Meeting

August 4, 2021

1. Intro and Welcome (9:00-9:10)
2. Resource Types (9:10-10:10)
 - Attributes and Costs
 - Capacity Accreditation
3. Demand-Side Management (10:10-10:40)
 - Current offerings
 - Demand Response at other utilities (Diego Rivas)
- Break (5 min)
4. NorthWestern's Existing Resource Portfolio (10:45-11:45)
 - Break for lunch (11:45-1:15; on your own)
5. Equity in Supply Planning (1:15-1:55)
6. Load Forecast (1:55-2:25)
 - Break (5 min)
7. Resource Adequacy (2:30-4:00)

Electricity Supply – Long-term Planning





Resource Types



Resource Costs –2020 Supplement

Resource	Fixed Cost (\$/kW-mo)	Fuel Delivery Cost (\$/MMBtu)	Variable Operating and Maintenance Costs (\$/MWh)	Fixed Operating Expense* (Million \$/year)	Capital Cost (Million \$)	Capital Cost (\$/kW)	Capital Cost per MW Effective Capacity** (Million \$)
Li-Ion 4-hr Battery 25MW	\$3.03			\$0.48	\$36.4	\$1,455	\$1.45
Pumped Hydro 100MW	\$1.26		\$0.94	\$5.14	\$286.7	\$2,867	\$2.87
RICE 18MW	\$1.67	\$0.53	\$4.87	\$0.76	\$36.5	\$2,029	\$2.14
RICE 9MW	\$2.41	\$0.53	\$2.75	\$0.46	\$23.2	\$2,573	\$2.71
Solar 100MW	\$1.32			\$2.89	\$132.5	\$1,325	\$26.50
Wind 100MW	\$3.54			\$1.68	\$161.1	\$1,611	\$32.22
Solar 100MW + Li-Ion 4-hr 100MW***	\$4.14			\$4.55	\$263.2	\$1,316	\$2.63
Wind 100MW + Li-Ion 4-hr 50MW***	\$6.41			\$2.57	\$228.2	\$1,522	\$4.15

*Fixed operating expenses include costs associated with insurance and local taxes.

**Effective Capacity measured by ELCC for the first incremental addition of each resource type (see Section 3.3.1 Capacity Contributions).

***Respective cost savings of 2.4% and 5.3% are applied for capital cost of hybrid wind + battery and hybrid solar + battery facilities, relative to the sum of the cost of the stand-alone components.



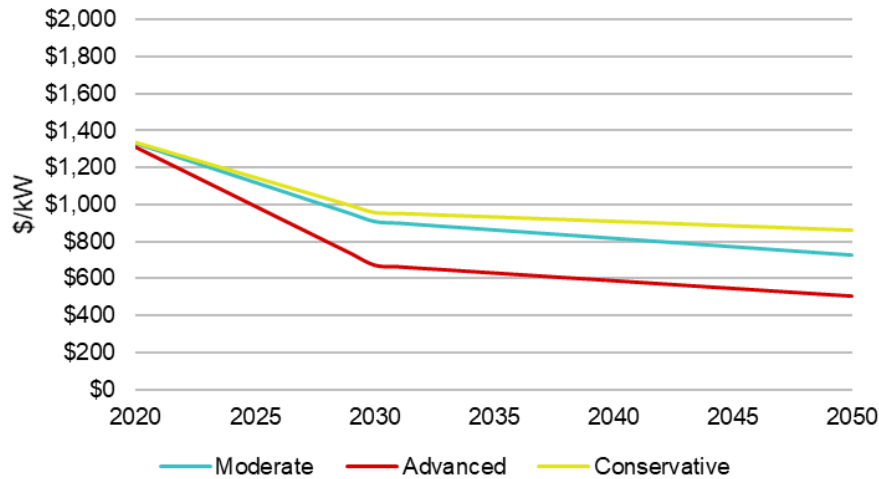
Resource Costs – Update for 2022 Plan

- NREL ATB 2021 Resource Options

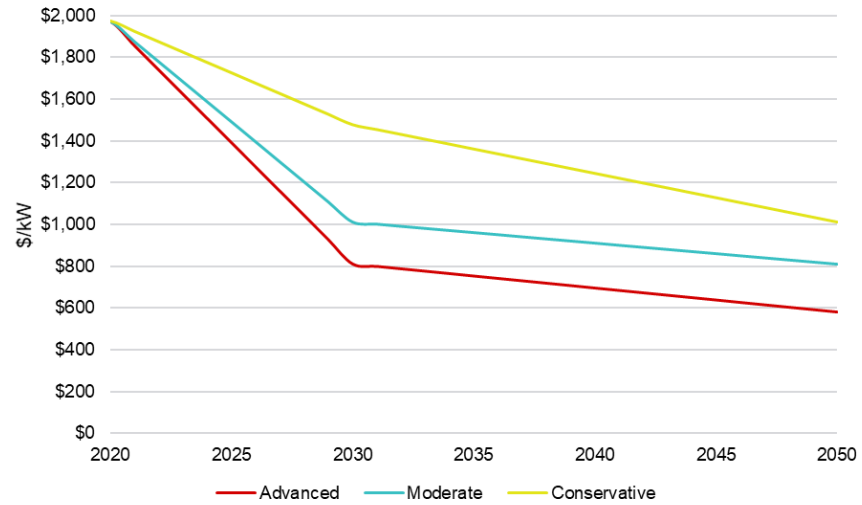
Fuel Type	Technology
Wind	Land-based
	Offshore
Solar	Utility PV
	Commercial PV
	Residential PV
	CSP
Geothermal	Binary
	Flash
	Enhanced
Hydropower	Non-powered dams
	New stream developments
Natural Gas	Combustion turbine
	Combined cycle
Coal	Rankine cycle
Nuclear	Advanced nuclear
Biopower	Biopower
Battery_Storage	Lithium-ion 2-hr
	Lithium-ion 4-hr
	Lithium-ion 6-hr
	Lithium-ion 8-hr
	Lithium-ion 10-hr
PV+Battery	DC-coupled
Pumped Hydro Storage	Closed loop

2021 ATB – Sample of Resource Cost Curves

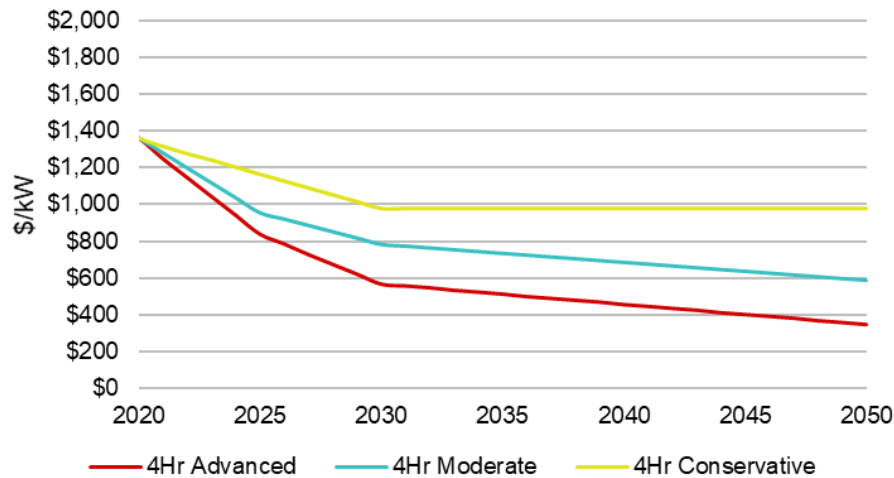
Wind Overnight Capital Costs



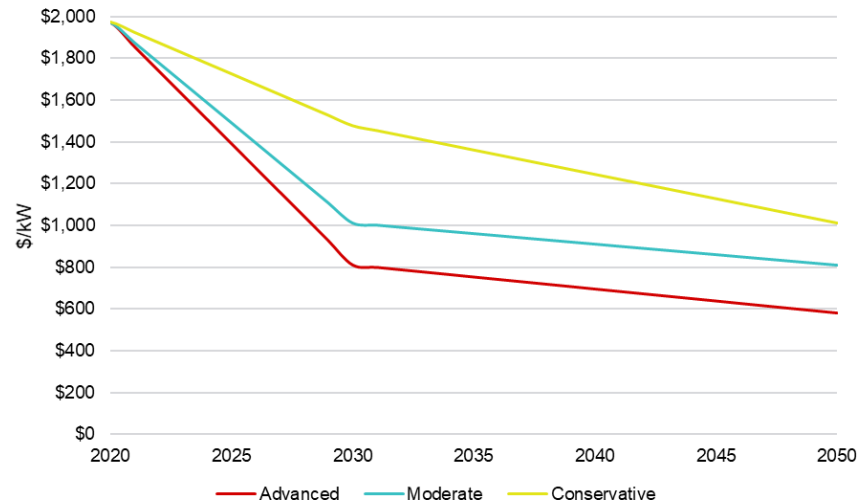
Solar + Storage Overnight Capital Costs



Battery Capital Costs



Solar + Storage Hybrid





Resource Costs –2020 Supplement

Resource	Fixed Cost (\$/kW-mo)	Fuel Delivery Cost (\$/MMBtu)	Variable Operating and Maintenance Costs (\$/MWh)	Fixed Operating Expense* (Million \$/year)	Capital Cost (Million \$)	Capital Cost (\$/kW)	Capital Cost per MW Effective Capacity** (Million \$)
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RICE 9MW	\$2.41	\$0.53	\$2.75	\$0.46	\$23.2	\$2,573	\$2.71
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***Respective cost savings of 2.4% and 5.3% are applied for capital cost of hybrid wind + battery and hybrid solar + battery facilities, relative to the sum of the cost of the stand-alone components.



Resource Attributes

Attribute	Operational Characteristic
Capacity (MW, \$/MW-yr)	<ol style="list-style-type: none">1. Max output of a generator2. Amount of energy likely to be available when needed3. Capital Costs and Fixed Costs
Energy (MWh, \$/MWh)	<ol style="list-style-type: none">1. Amount of electricity produced over a period of time2. Variable costs
Dispatchability	Ability to control timing and level of generation
Flexibility	Ability to modify production in response to prices/load/other gen Speed of ramp-up and down
Weather-Dependence	Variable energy resource
Energy Limitations	Duration of charge/discharge (ride-through)
Carbon Intensity (CO ₂ /MWh)	Emissions from burning of fossil fuels



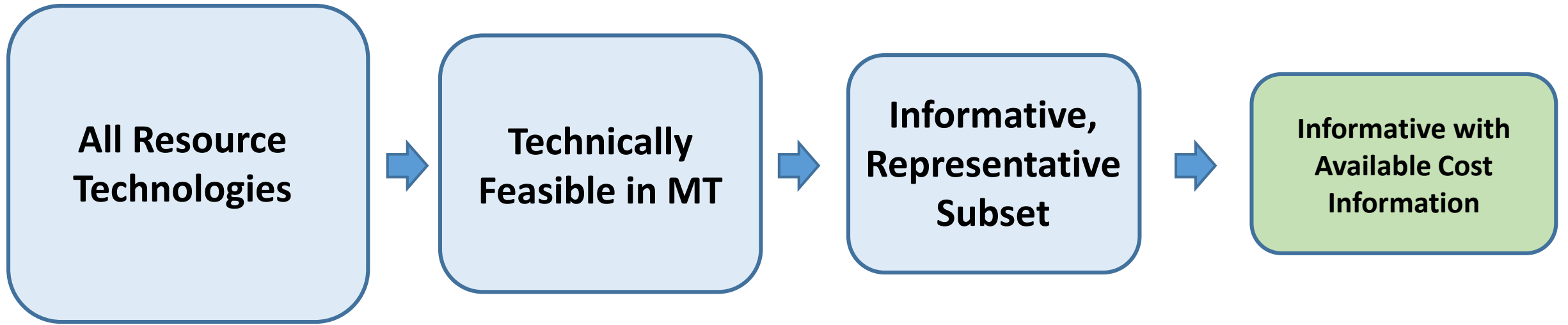
Relative Strengths of Supply-Side Resources

	Natural Gas	Coal	Hydro	Wind	Solar	Geothermal	Li-ion Battery	Flow Battery	Pumped Hydro	Nuclear	Biopower
Capacity	Green	Green	Green	Red	Red	Green	Light Green	Light Green	Light Green	Green	Green
Fixed/Capital Costs	Green	Light Green	Light Green	Green	Green	Red	Light Green	Light Green	Red	Red	Light Green
Variable Costs	Red	Orange	Light Green	Green	Green	Yellow	Orange	Orange	Orange	Yellow	Orange
Dispatchability	Green	Light Green	Green	Red	Red	Light Green	Green	Green	Light Green	Yellow	Light Green
Flexibility	Light Green	Orange	Green	Red	Red	Yellow	Green	Green	Green	Orange	Orange
Weather-Dependence	Green	Green	Yellow	Red	Red	Green	Light Green	Light Green	Light Green	Green	Green
Energy Limitations	Green	Green	Yellow	Green	Green	Green	Red	Red	Red	Green	Green
Carbon Intensity	Orange	Red	Green	Green	Green	Green	Light Green	Light Green	Light Green	Green	Yellow

Note: Illustrative example of relative strengths only. Attributes of technologies vary according to a wide range of project-specific characteristics.



Selecting a Subset of Resources to Model





Capacity Accreditation

- Effective Load Carrying Capacity (ELCC)
- Metric to measure capacity contribution of weather-driven resources (wind, solar, hydro) and energy-limited resources (batteries and pumped hydro)
- ELCC is the quantity of ‘perfect’ (100% reliable) capacity that could be replaced while providing equivalent system reliability



E3 ELCCs from 2020 Supplement

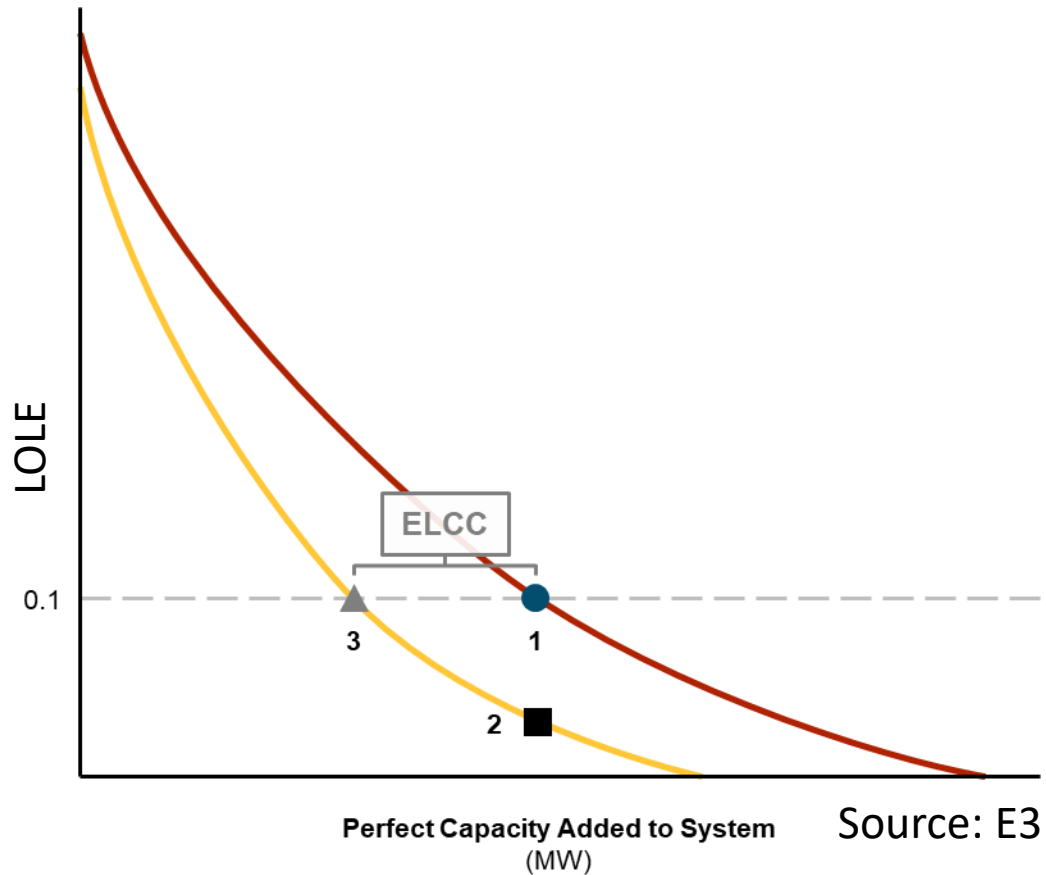
- NorthWestern to update for 2022 Plan

Figure 20. ELCCs of Incremental Resource Additions to NorthWestern's Resource Portfolio

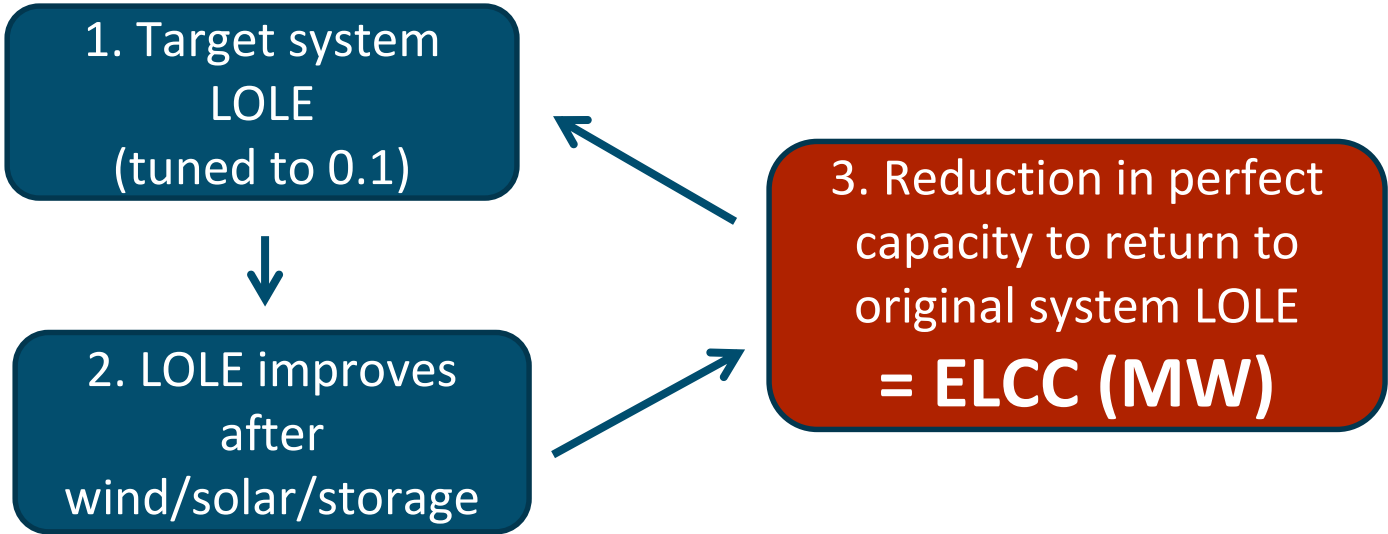
Incremental ELCC Provided by Different Resources, 2020			A	B	C	D	E		
Additional Nameplate Capacity (MW)	Charging From	25 MW	50 MW	100MW	200MW	300MW	400MW	500MW	
Standalone Storage	3hr	Grid	100%	100%	99%	82%	65%	54%	47%
	4hr	Grid	100%	100%	100%	91%	72%	61%	53%
	6hr	Grid	100%	100%	100%	98%	84%	70%	59%
	8hr	Grid			100%	100%	92%	76%	65%
	10hr	Grid			100%	100%	97%	81%	69%
Solar PV	Simulated		5%	4%	3%	2%			
	Simulated With Snow Losses		4%	3%	3%	2%			
	Historical		2%	2%	1%	1%			
Wind	Historical		6%	5%	5%	5%			
	Simulated		11%	10%	9%	8%			
4-Hr Storage + Solar	25% of Solar PV	Grid			29%				
	50% of Solar PV	Grid			54%				
	100% of Solar PV	Grid			100%				
	100% of Solar PV	Solar			66%				
4-Hr Storage + Wind	50% of Wind	Grid			54%				
	25% of Wind	Grid			30%				
	50% of Wind	Wind			46%				

Note: values in red boxes were used as the basis for modeling new resource additions.

Capacity Accreditation



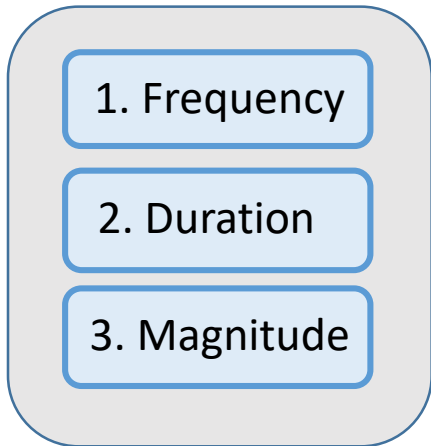
Source: E3





Reliability Metrics

Three Dimensions of Deficits



Reliability Metric	Units	Definition	Dimension Captured	Example Reliability Target
Loss-of-Load Probability (LOLP)	%	Probability of system demand exceeding available generation capacity over a year	Frequency	
Expected Unserved Energy (EUE)	MWh /year	Average quantity of unserved energy over a year	Magnitude	16 MWh/year (equivalent to 0.1 LOLE for NWE system)
Loss-of-Load Hours (LOLH)	hours /year	Average number of hours per year where system demand exceeded available generation capacity	Duration	2.4 hours/year
Loss-of-Load Expectation (LOLE)	days/ year	Average number of days with loss of load (at least once during the day)	Frequency	0.1 day/year

Calculating Loss of Load

Simulate Multiple Times

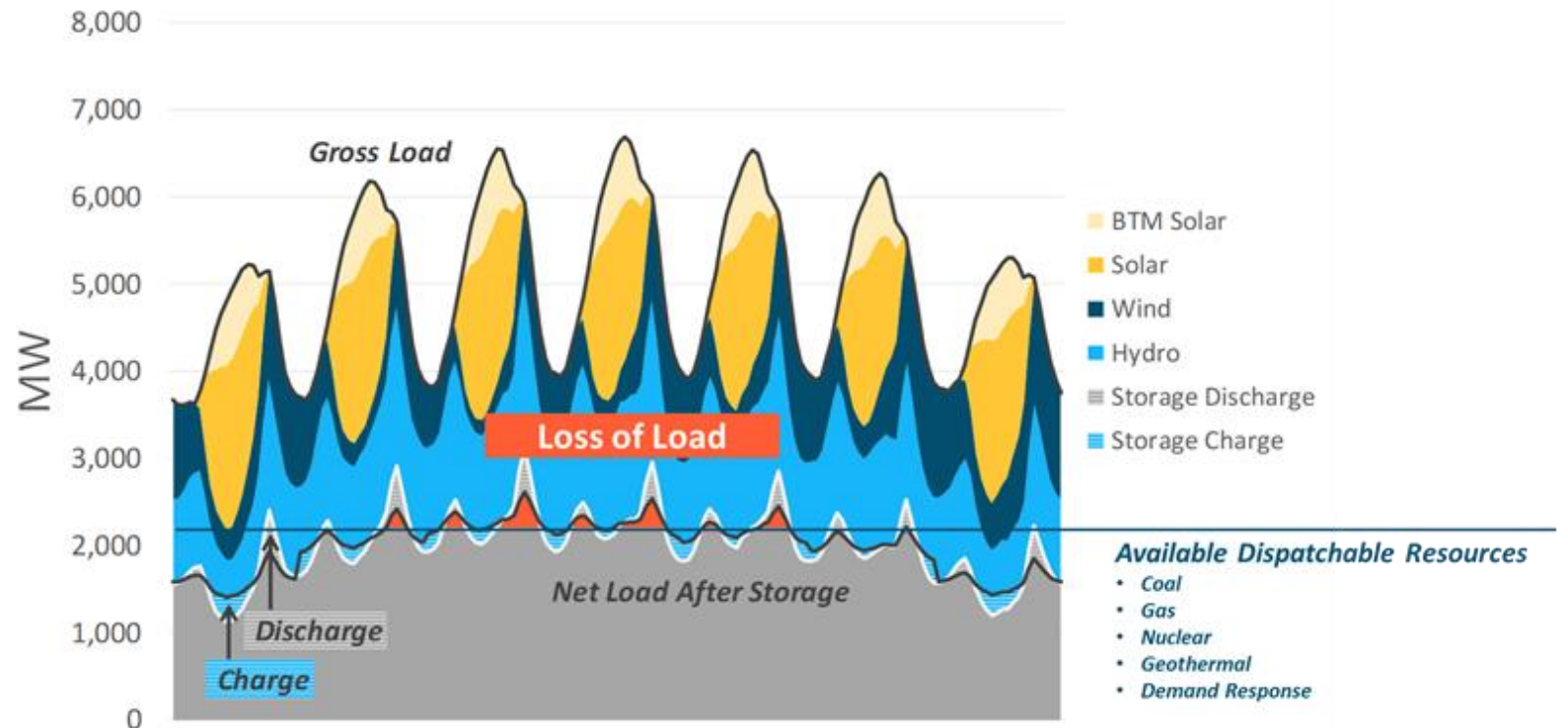
1. Calculate Gross Load

2. Generate VER & Hydro Profiles

3. Dispatch Thermal Gen

4. Dispatch Storage

5. Calculate Loss of Load





Daily Shape of LOLH by Month

		Month											
		1	2	3	4	5	6	7	8	9	10	11	12
Hour of Day	0	0.002	0.006	0.002	-	-	-	-	-	-	-	-	-
	1	-	0.004	-	-	-	-	-	-	-	-	-	-
	2	-	0.004	-	-	-	-	-	-	-	-	-	-
	3	-	0.002	-	-	-	-	-	-	-	-	-	-
	4	-	0.002	-	-	-	-	-	-	-	-	-	0.004
	5	0.023	0.012	0.004	-	-	-	-	-	-	-	0.006	0.019
	6	0.125	0.062	0.015	-	-	-	0.002	0.004	0.002	0.002	0.025	0.217
	7	0.448	0.106	0.035	-	-	-	-	0.006	0.002	0.004	0.017	0.285
	8	0.496	0.096	0.008	-	-	-	-	0.002	0.002	-	0.008	0.254
	9	0.363	0.071	0.004	-	-	-	0.010	0.004	0.002	-	0.002	0.169
	10	0.338	0.044	-	-	-	-	0.015	0.004	0.002	-	-	0.150
	11	0.292	0.027	-	-	-	-	0.029	0.023	0.004	-	0.002	0.117
	12	0.204	0.019	-	-	-	-	0.038	0.038	-	-	-	0.092
	13	0.167	0.025	-	-	-	-	0.063	0.052	0.004	-	0.002	0.081
	14	0.158	0.027	-	-	-	-	0.081	0.102	0.002	-	-	0.096
	15	0.187	0.040	0.002	-	-	-	0.071	0.106	0.002	0.002	0.013	0.148
	16	0.456	0.090	-	-	-	-	0.075	0.096	-	0.006	0.023	0.575
	17	0.910	0.217	0.019	-	-	-	0.056	0.065	-	0.002	0.035	0.710
	18	0.729	0.262	0.069	-	-	-	0.038	0.056	0.002	0.004	0.038	0.654
	19	0.467	0.175	0.063	-	-	-	0.046	0.046	0.002	0.002	0.037	0.406
	20	0.262	0.119	0.038	-	-	-	0.010	0.015	-	0.004	0.023	0.252
	21	0.150	0.069	0.023	-	-	-	0.006	0.008	-	0.002	0.010	0.158
	22	0.048	0.023	0.008	-	-	-	-	-	-	0.002	0.002	0.056
	23	0.017	0.006	0.004	-	-	-	-	-	-	-	-	0.012

NWE Base Portfolio

Annual Expected Loss of Load Hours
= 13.6



Daily Shape of EUE by Month

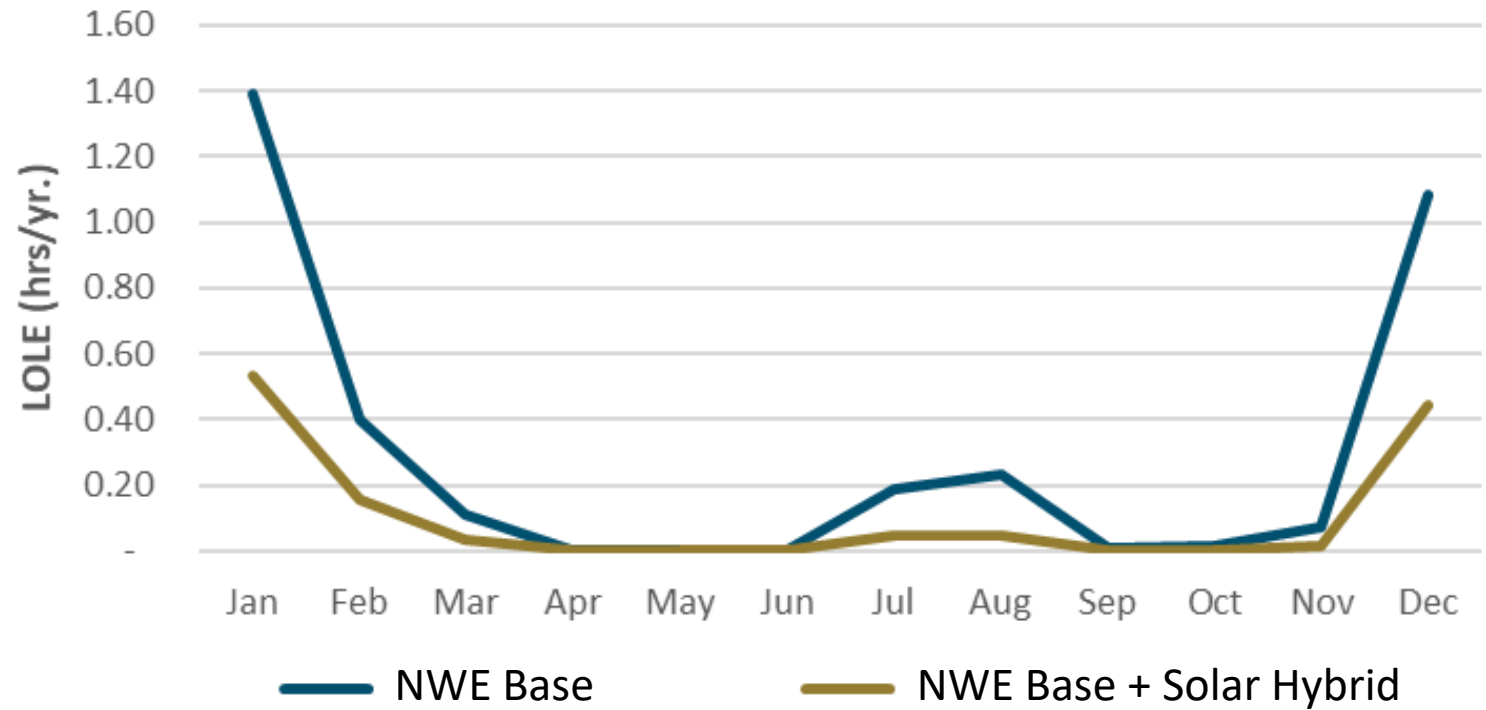
Hour of Day	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
0	0.02	0.24	0.01	-	-	-	-	-	-	-	-	-
1	-	0.04	-	-	-	-	-	-	-	-	-	-
2	-	0.11	-	-	-	-	-	-	-	-	-	-
3	-	0.15	-	-	-	-	-	-	-	-	-	-
4	-	0.18	-	-	-	-	-	-	-	-	-	0.33
5	0.67	0.86	0.04	-	-	-	-	-	-	-	0.16	1.36
6	8.18	4.44	0.54	-	-	-	0.01	0.12	0.04	0.05	1.35	11.84
7	29.98	7.48	1.63	-	-	-	-	0.23	0.00	0.05	0.88	17.16
8	38.18	6.51	0.37	-	-	-	-	0.19	0.03	-	0.30	16.56
9	27.84	4.77	0.05	-	-	-	0.26	0.28	0.04	-	0.03	11.34
10	26.51	3.61	-	-	-	-	0.82	0.31	0.10	-	-	10.95
11	23.27	2.64	-	-	-	-	1.45	0.97	0.03	-	0.02	9.20
12	16.43	2.36	-	-	-	-	1.72	1.51	-	-	-	7.09
13	11.83	2.01	-	-	-	-	3.02	2.70	0.19	-	0.02	6.89
14	12.54	1.78	-	-	-	-	4.03	5.40	0.06	-	-	8.09
15	15.85	2.93	0.11	-	-	-	4.51	4.90	0.09	0.06	0.46	11.91
16	35.87	7.68	-	-	-	-	4.73	4.42	-	0.32	1.98	46.21
17	70.70	19.71	0.91	-	-	-	4.40	3.96	-	0.22	2.71	62.19
18	58.12	20.24	3.17	-	-	-	3.21	3.57	0.06	0.24	3.16	60.79
19	38.17	12.13	3.68	-	-	-	2.61	1.46	0.03	0.16	2.76	33.05
20	19.12	7.76	2.20	-	-	-	0.68	0.56	-	0.20	1.67	20.39
21	11.38	4.59	1.60	-	-	-	0.19	0.21	-	0.11	0.63	11.90
22	4.05	1.54	0.69	-	-	-	-	-	-	0.04	0.07	3.22
23	1.17	0.30	0.51	-	-	-	-	-	-	-	-	0.51

NWE Base Portfolio

Annual Expected Unserved Energy =
1,011 MWh



Resource Addition Impact on LOLE





Demand-Side Management



Demand-Side Management – Current Offerings

Discussion, see www.NorthWesternEnergy.com/Eplus



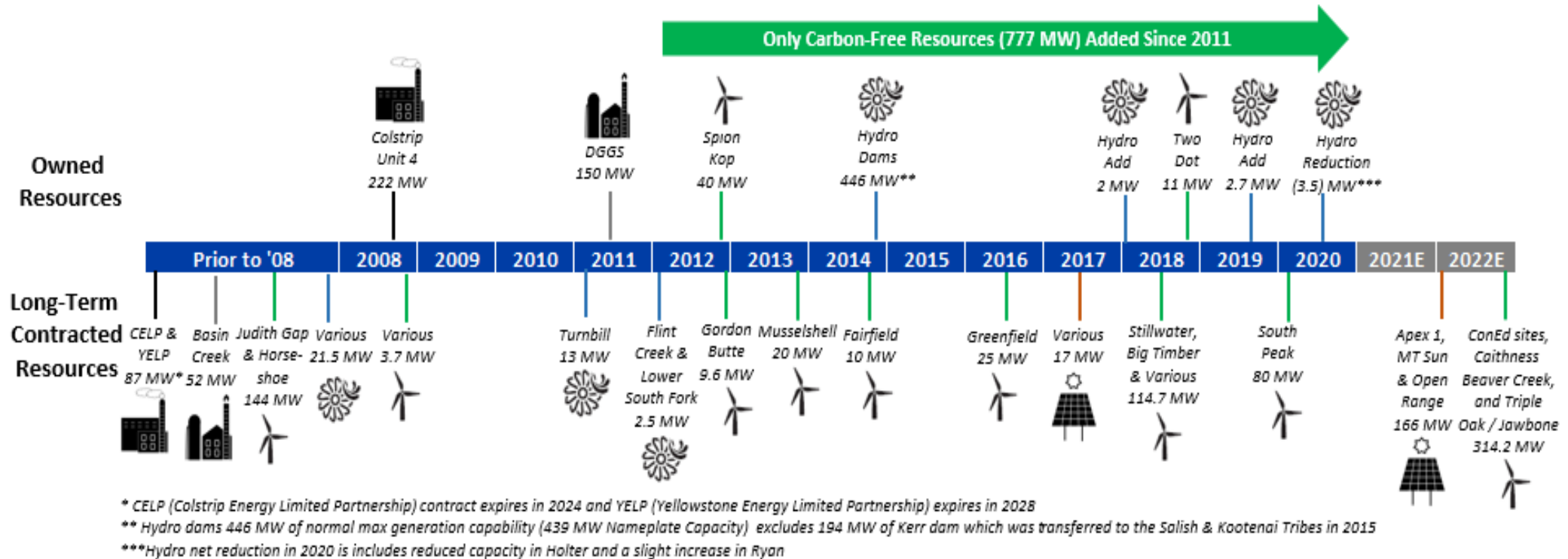
Demand-Side Management

Demand Response at other utilities – Diego Rivas



NorthWestern's Existing Resource Portfolio

Current Portfolio Timeline

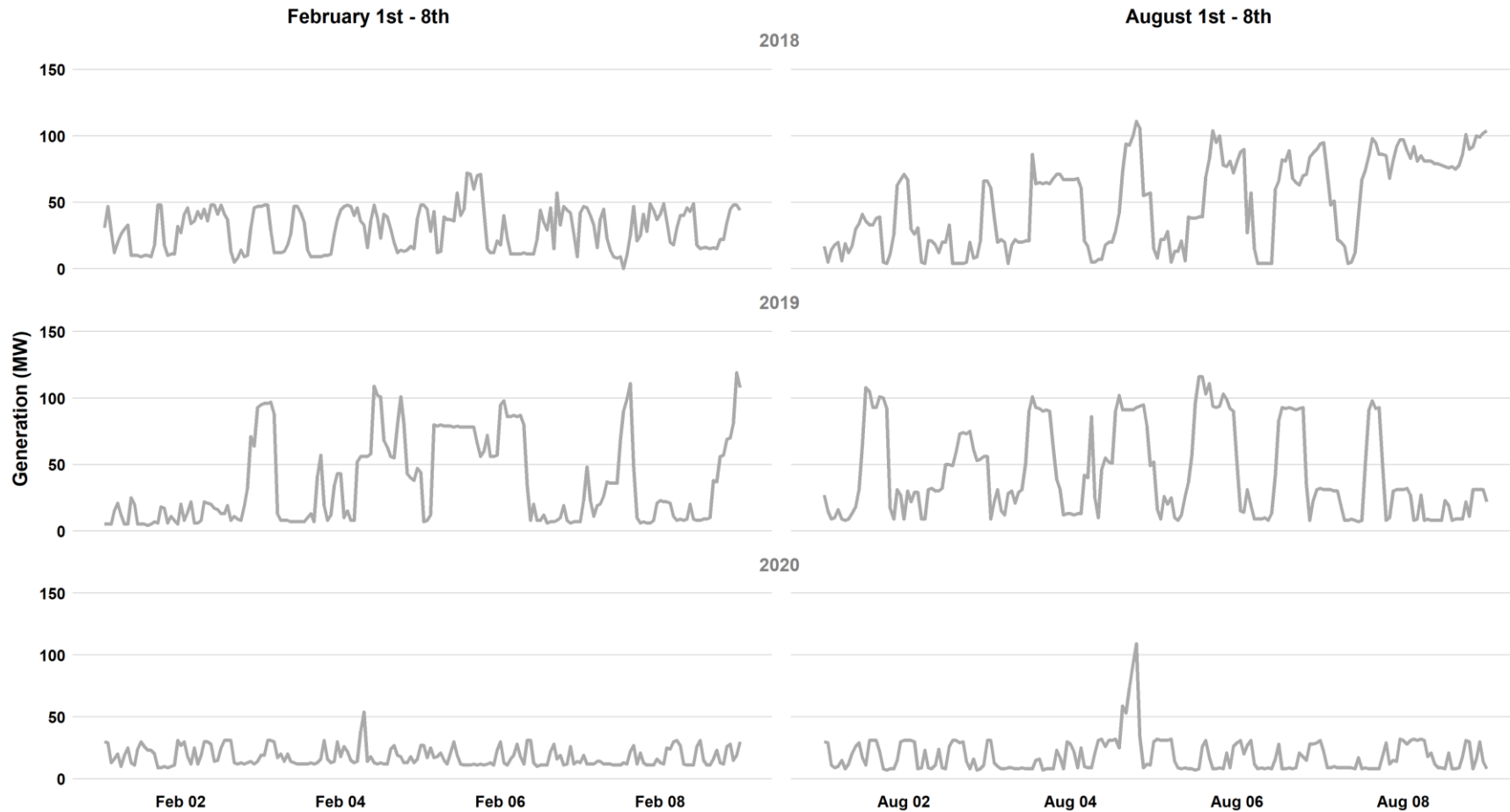


Online Thermal

Thermal/Natural Gas Facility	Capacity (MW)	Expiration	Peak Load Contribution (MW)
Basin Creek	52	6/30/2036	49.4
DGGS 1	50	Rate Based	
DGGS 2	50	Rate Based	145.5
DGGS 3	50	Rate Based	
Total	202		197

Thermal/Coal Facility	Capacity (MW)	Expiration	Peak Load Contribution (MW)
Colstrip	222	Rate Based	203.7
Yellowstone Energy Limited Partnership (BGI)	52	12/31/2028	50.4
Colstrip Energy Limited Partnership	35	6/30/2024	34.0
Total	309		288



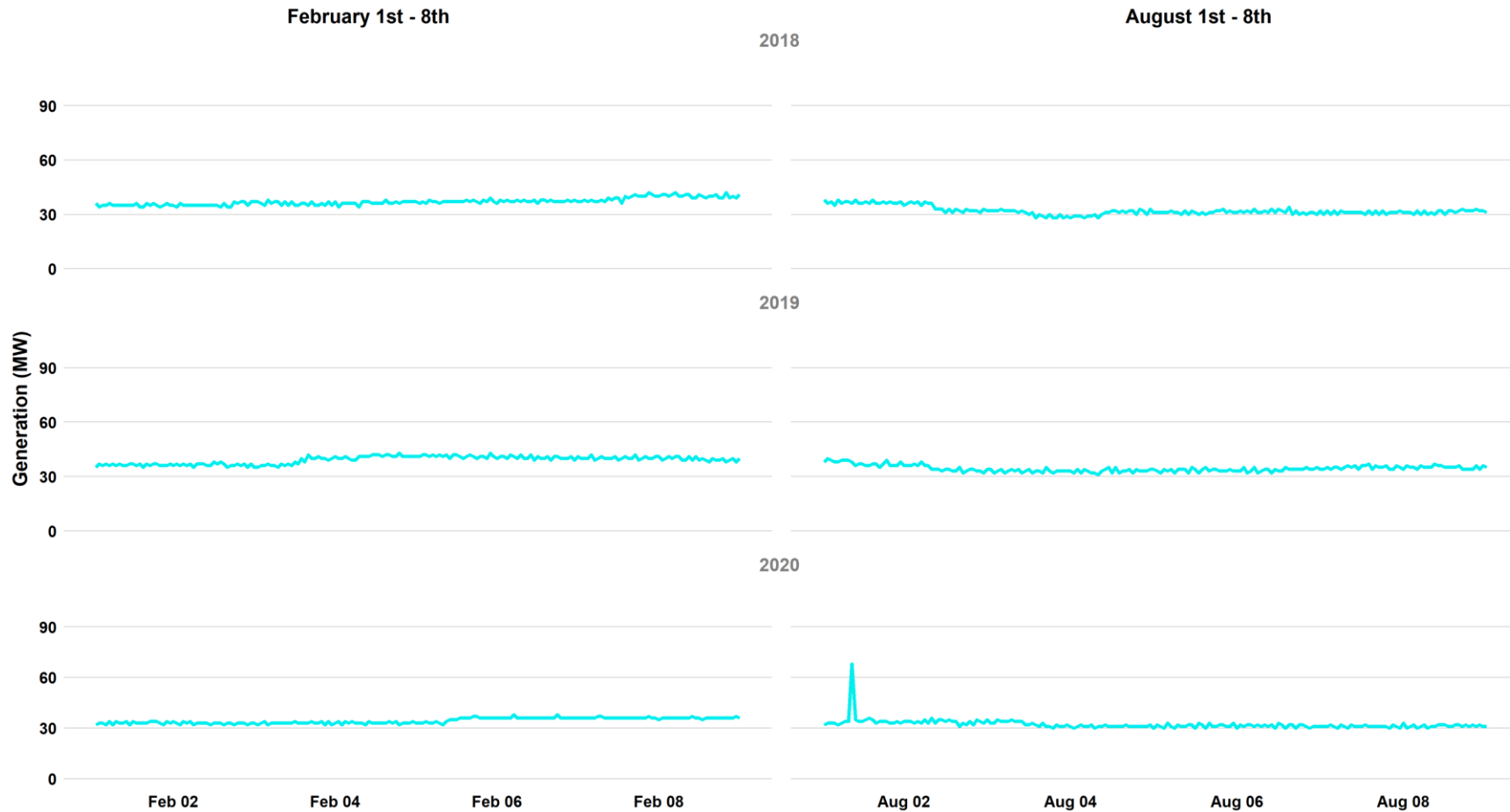




Online Hydro

Hydro Facility	Capacity (MW)	Expiration	Peak Load Contribution (MW)
Thompson Falls	94	Rate Based	56.4
Cochrane	62	Rate Based	37.2
Ryan	71	Rate Based	42.6
Rainbow	64	Rate Based	38.4
Holter	53	Rate Based	31.8
Morony	49	Rate Based	29.4
Black Eagle	21	Rate Based	12.6
Hauser	19	Rate Based	11.4
Mystic	12	Rate Based	7.2
Madison	8	Rate Based	4.8
Small Hydro	37		22
Turnbull Hydro LLC	13	12/31/2032	7.8
State of MT DNRC (Broadwater Dam)	10	6/30/2024	6.0
Tiber Montana LLC*	7.5	5/31/2024	4.5
Flint Creek Hydroelectric LLC	2	1/16/2037	1.2
Hydrodynamics Inc (South Dry Creek)	1.2	TBD - Renewal	0.7
Wisconsin Creek LTD LC	0.6	Annual	0.3
Boulder Hydro Limited Partnership	0.5	TBD - Renewal	0.3
Lower South Fork LLC	0.5	1/16/2037	0.3
Ross Creek Hydro LC	0.5	6/30/2032	0.3
Gerald Ohs (Pony Generating Station)	0.4	1/31/2025	0.2
Allen R. Carter (Pine Creek)	0.3	6/30/2024	0.2
Donald Fred Jenni (Hanover Hydro)	0.2	6/30/2034	0.1
Hydrodynamics Inc (Strawberry Creek)	0.2	6/30/2023	0.1
James Walker Sievers (Cascade Creek)	0.1	2/28/2035	0.0
James Walker Sievers (Barney Creek)	0.1	2/28/2035	0.0
Mammoth Hydro***	0.2	Owned by YNP	0.1
Total	490		294





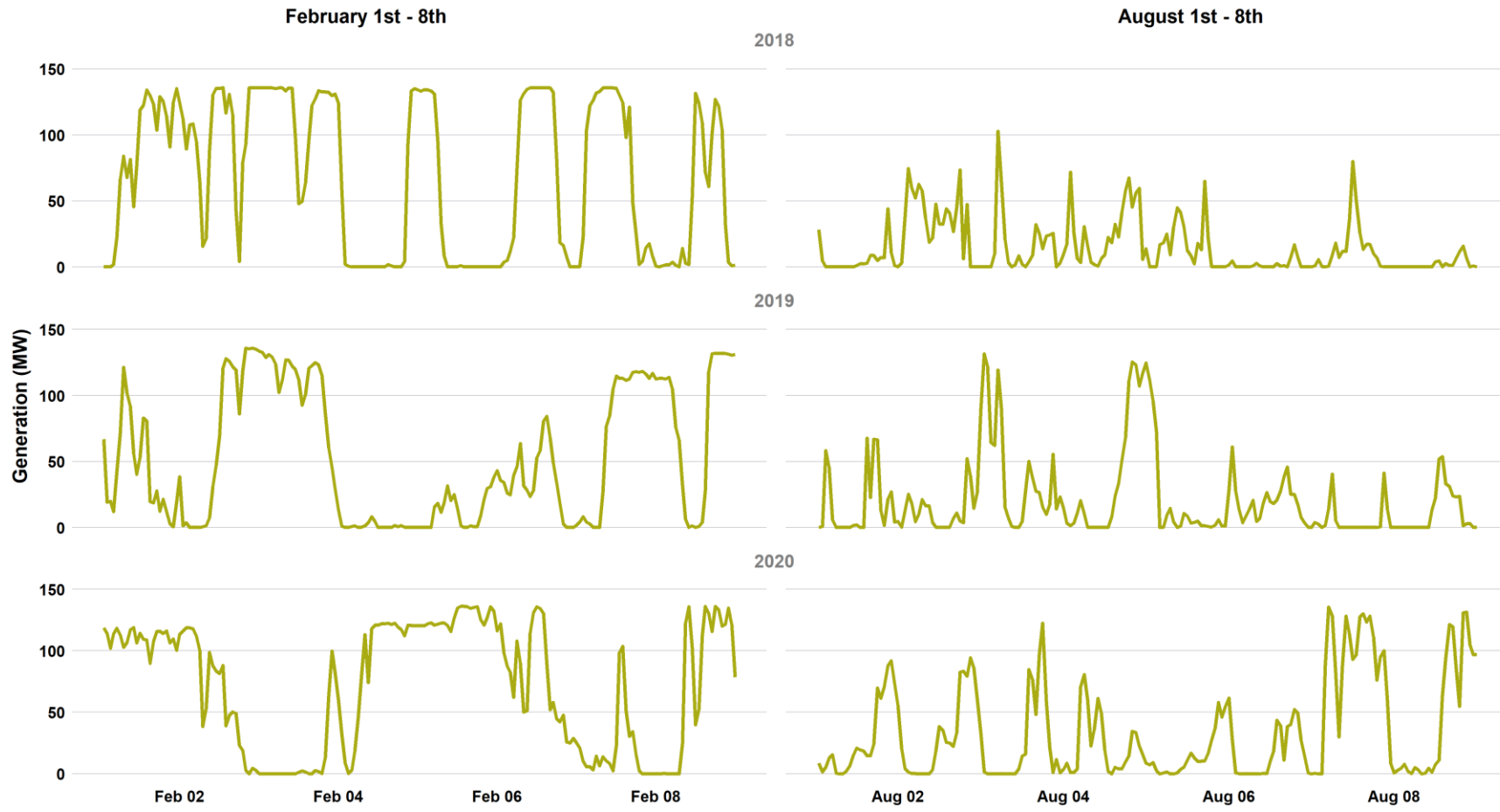


Online Wind

Wind Facility	Capacity (MW)	Expiration	Peak Load Contribution (MW)
Judith Gap Energy LLC	135	12/31/2026	17.6
Stillwater Wind LLC (WKN)	80	10/31/2043	10.4
South Peak Wind LLC	80	4/30/2035	10.4
Spion Kop Wind	40	Rate Based	5.2
Greenfield Wind LLC	25	10/31/2041	3.3
Big Timber Wind LLC (Greycliff)	25	3/31/2043	3.3
Two Dot Wind Farm LLC	11	Rate Based	1.5
Fairfield Wind LLC (Greenbacker)	10	12/31/2033	1.3
Musselshell Wind Project LLC	10	3/24/2036	1.3
Musselshell Wind Project Two LLC	10	3/24/2036	1.3
Gordon Butte Wind LLC	9.6	3/21/2036	1.2
71 Ranch LP	2.7	12/31/2043	0.4
DA Wind Investors LLC	2.7	12/31/2043	0.4
Oversight Resources LLC	2.7	12/31/2043	0.4
Small Wind	11		1.4
Cycle Horseshoe Bend Wind LLC	9	8/31/2025	1.2
Two Dot Wind LLC (Broadview East Wind)	1.6	10/31/2043	0.2
Total	455		59



Judith Gap



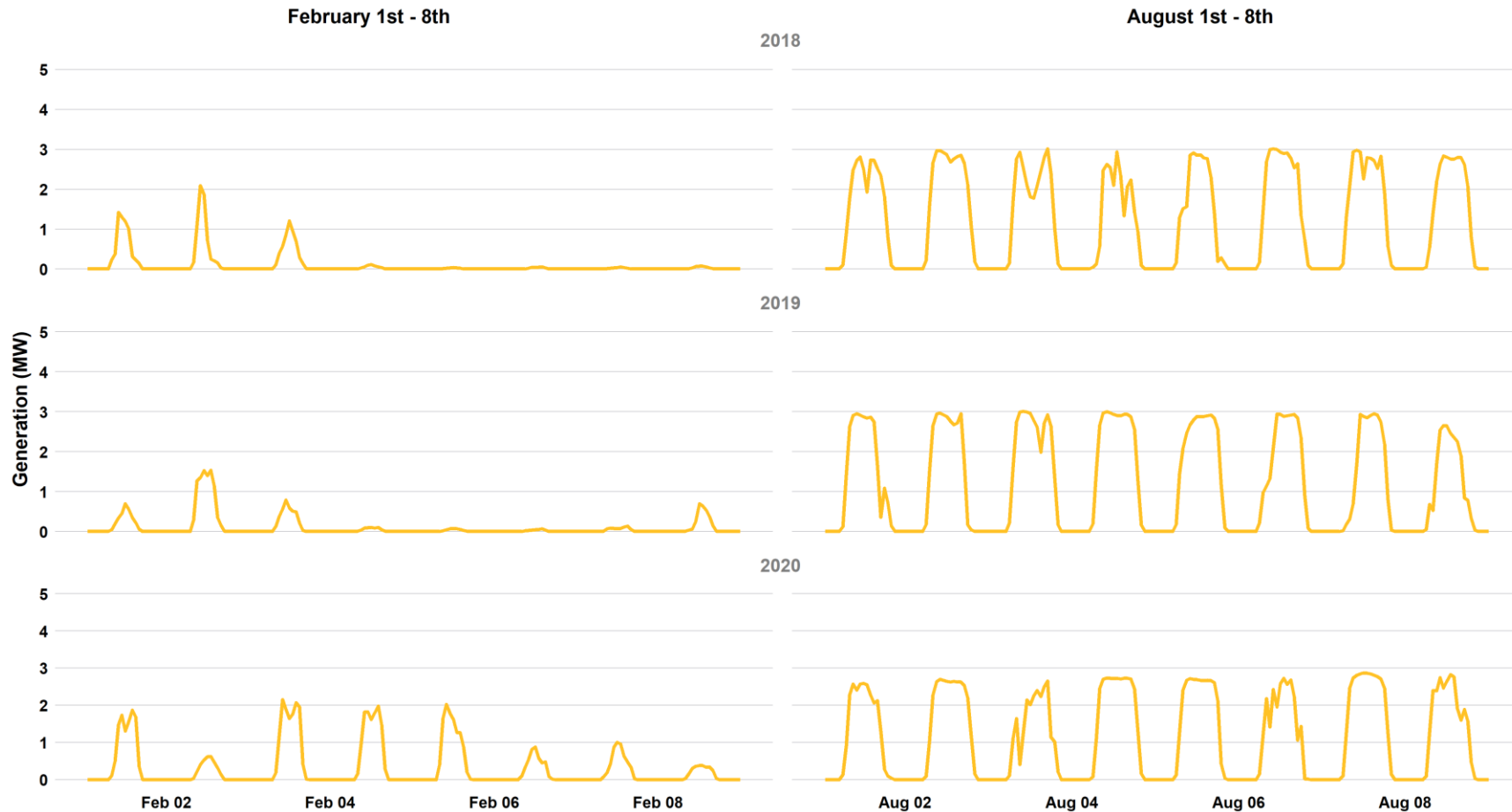
Online Solar

Solar Facility	Capacity (MW)	Expiration	Peak Load Contribution (MW)
Green Meadow Solar LLC	3	3/31/2042	0.2
South Mills Solar 1 LLC	3	3/31/2042	0.2
Black Eagle Solar LLC	3	9/30/2042	0.2
Great Divide Solar LLC	3	9/30/2042	0.2
Magpie Solar LLC	3	9/30/2042	0.2
River Bend Solar LLC	2	3/31/2042	0.1
Total	17		1

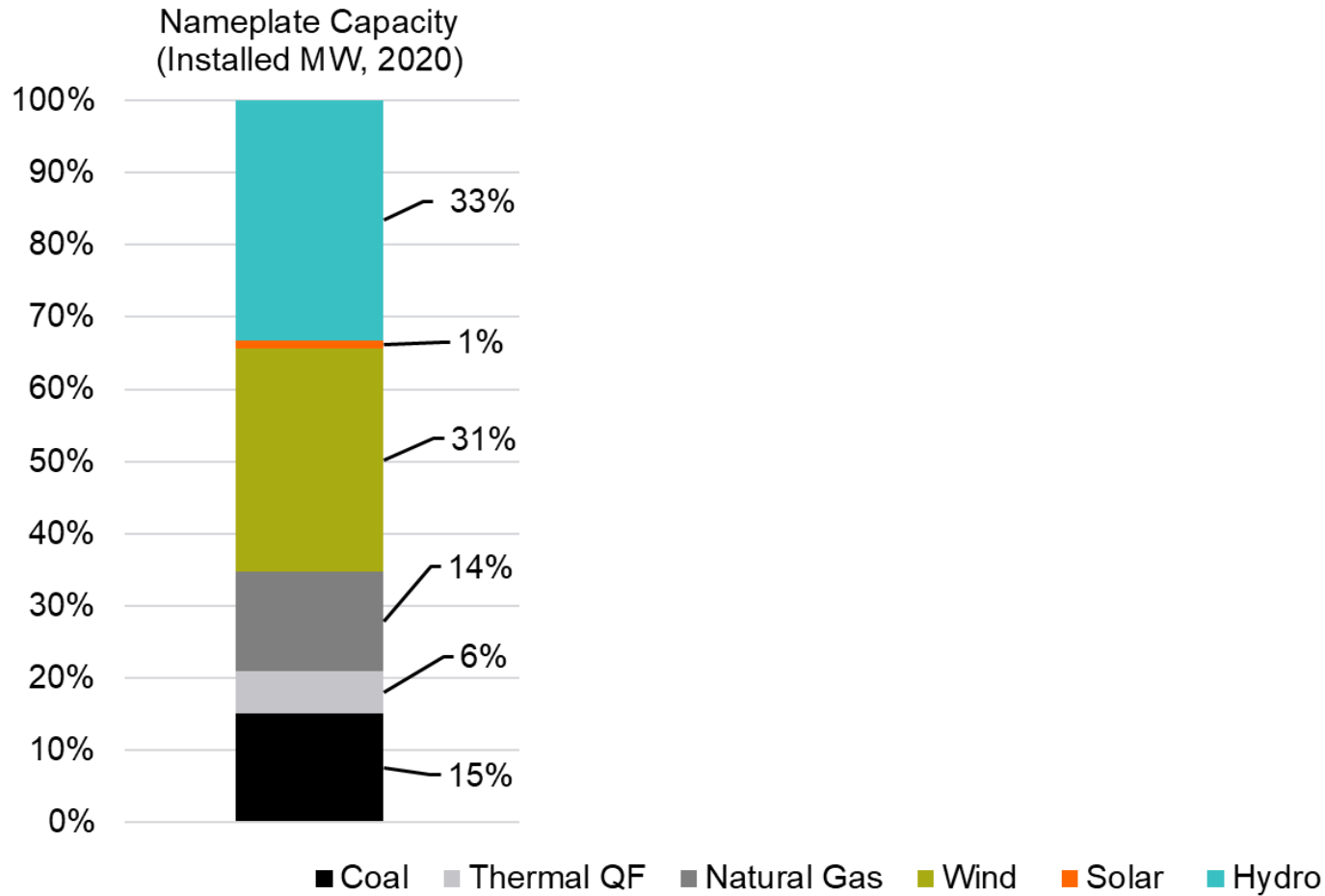




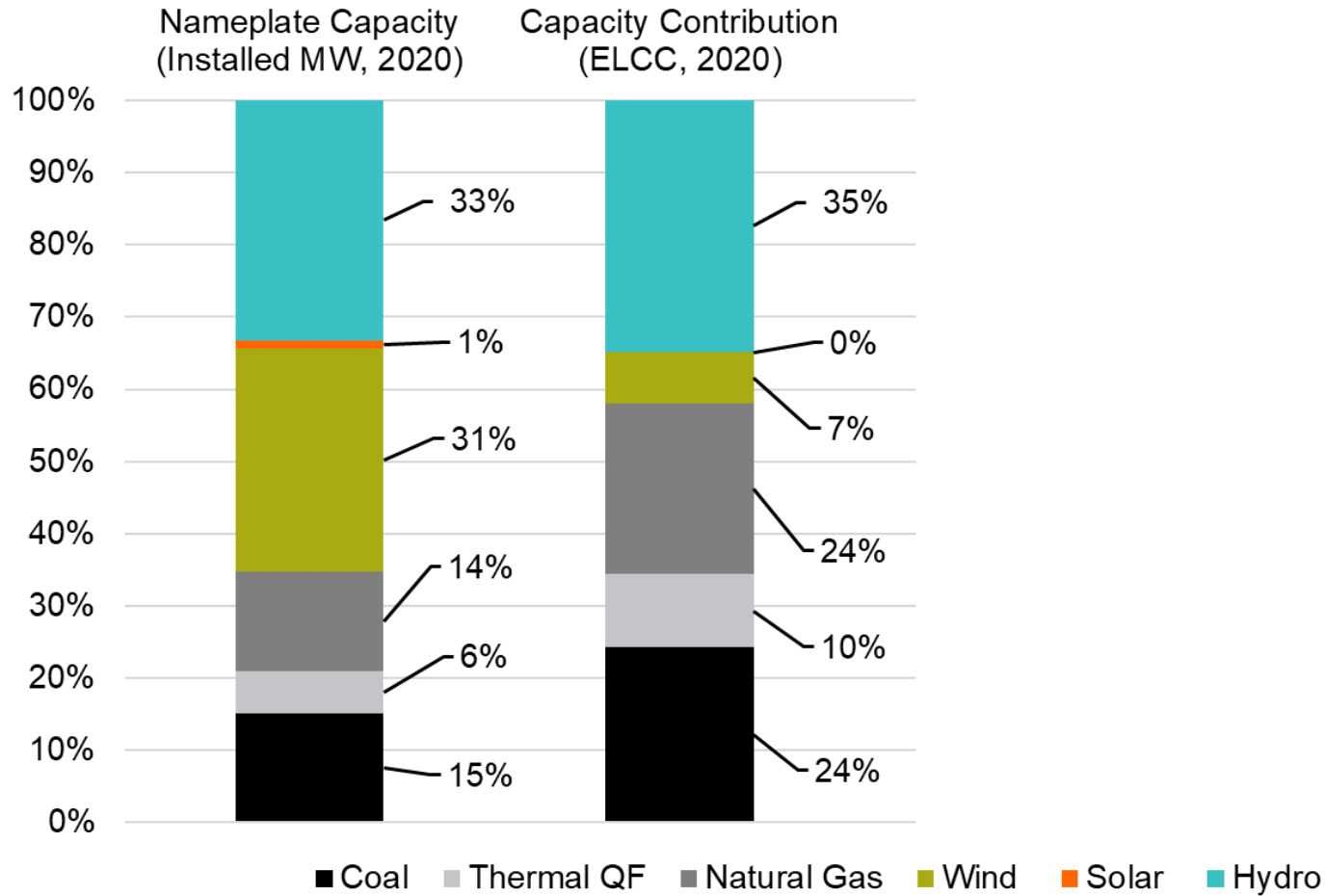
Black Eagle Solar



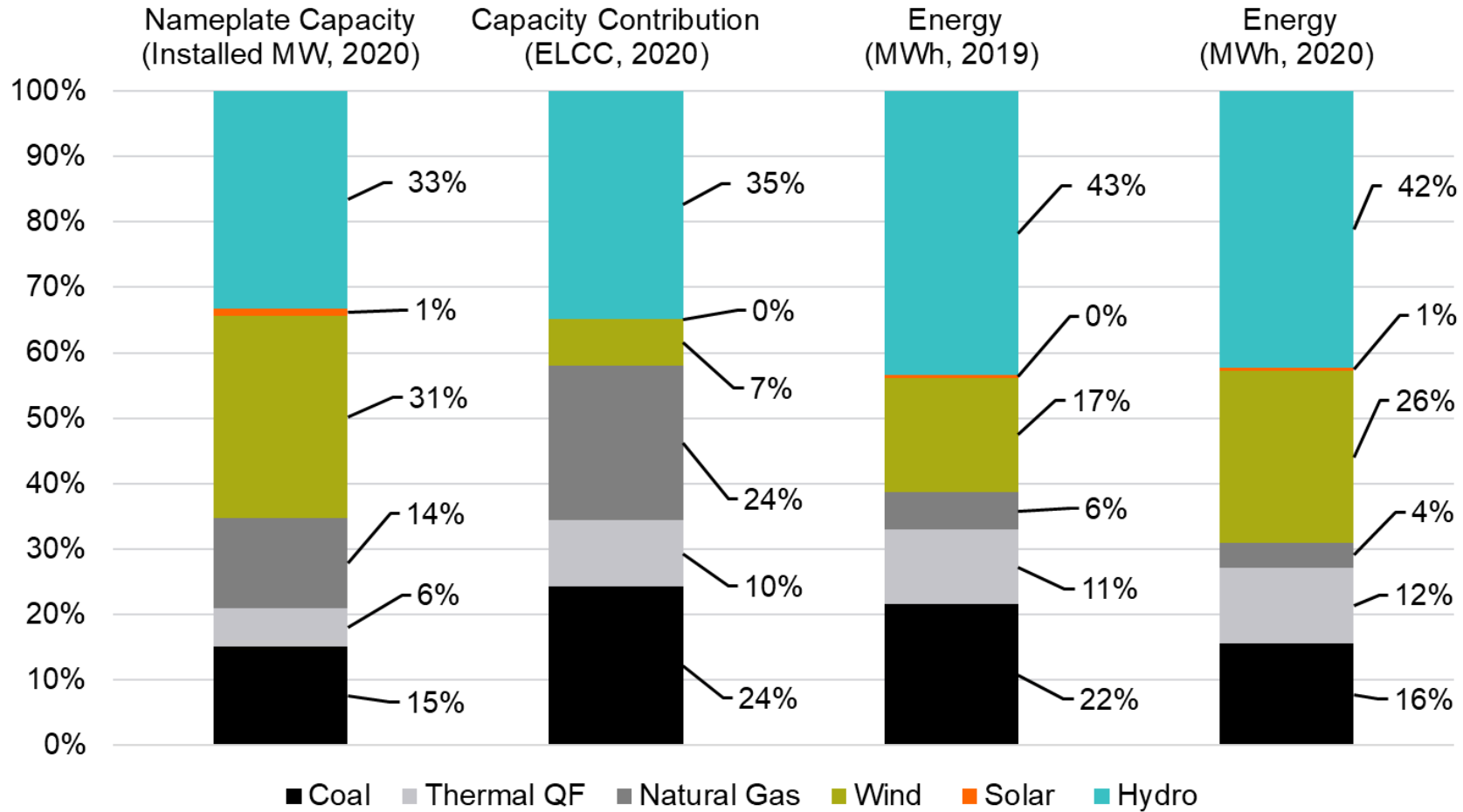
Current Generating Capacity



Current Generating Capacity

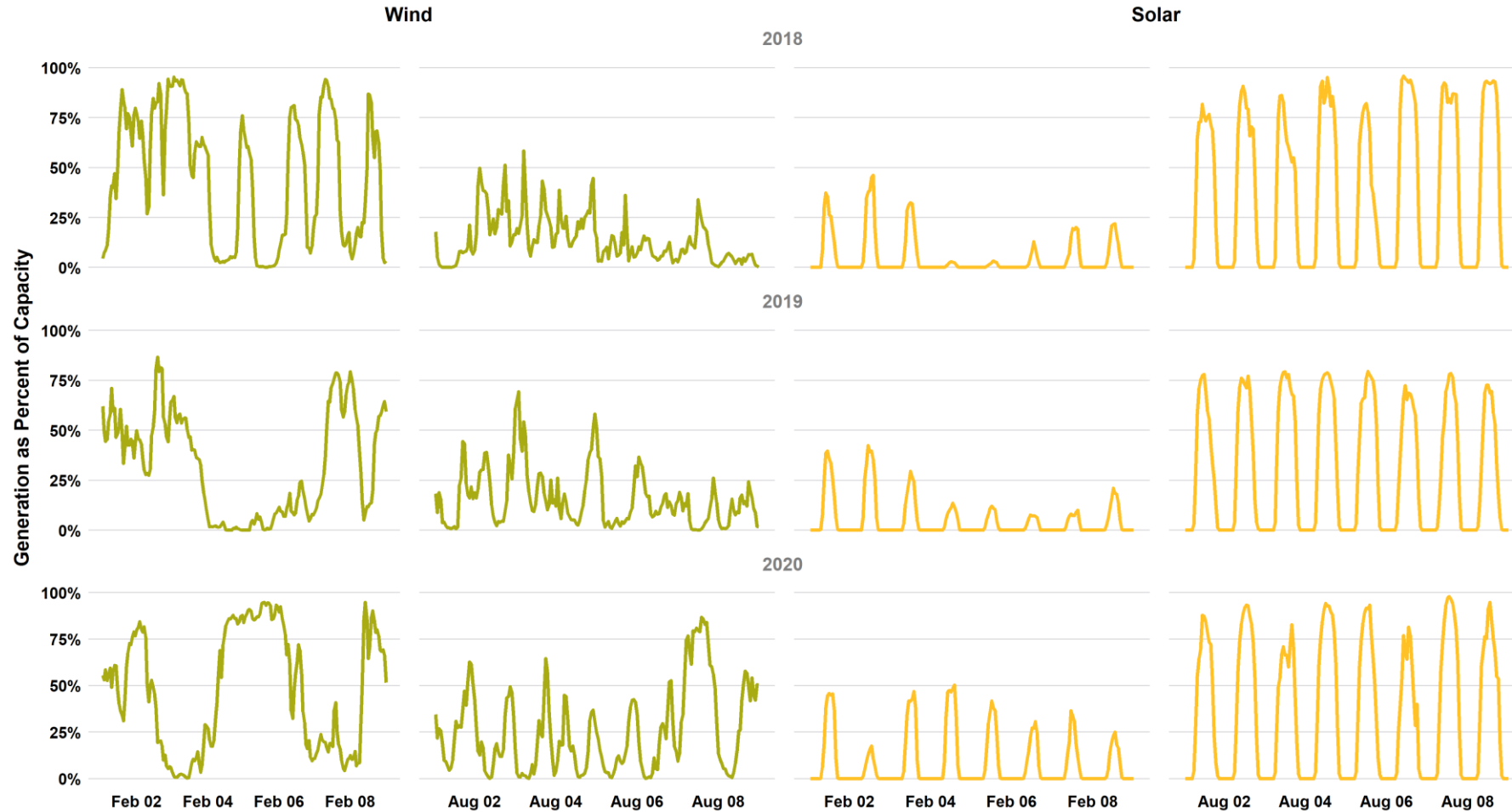


Current Generating Capacity

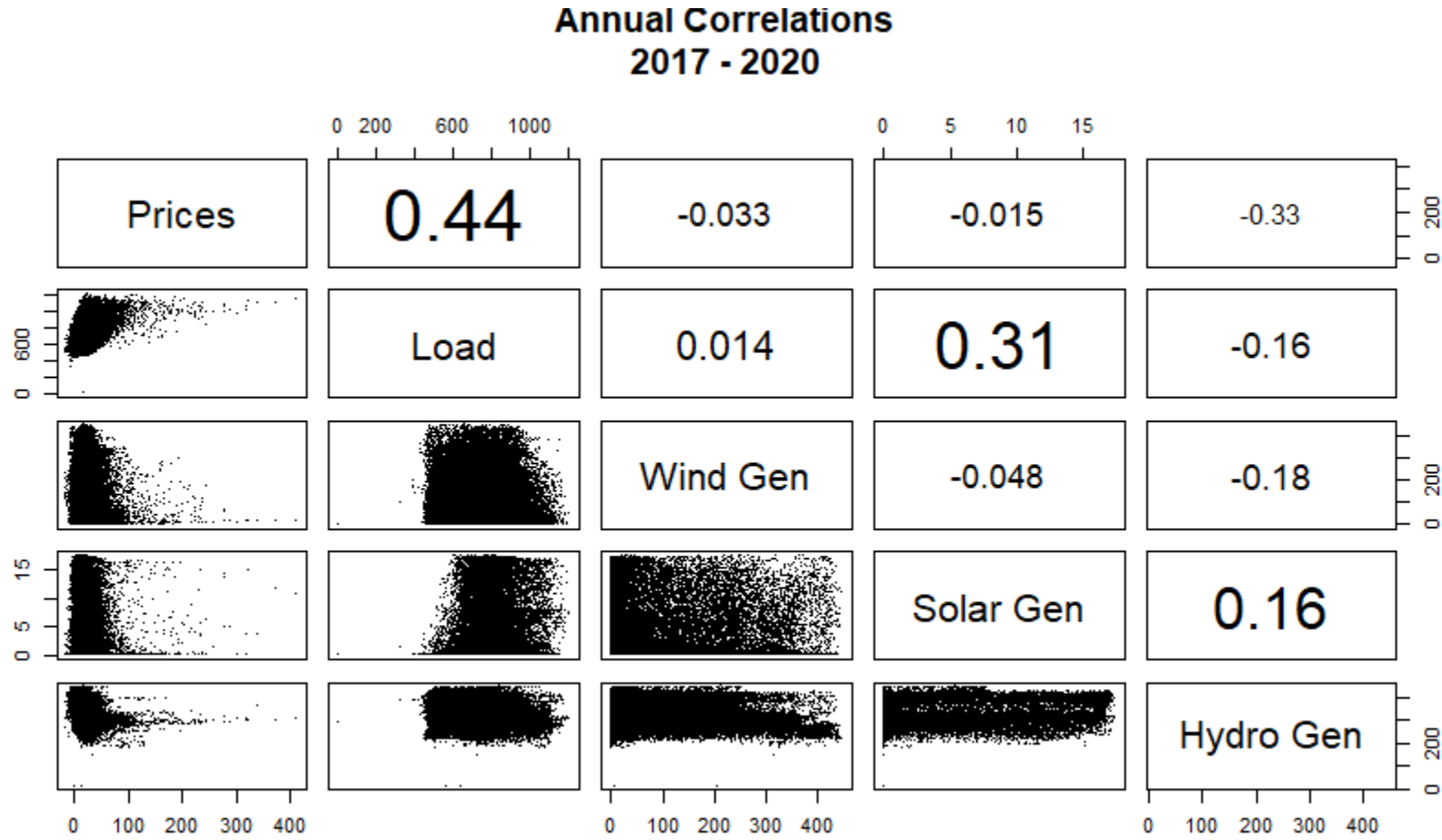




Wind and Solar Generation

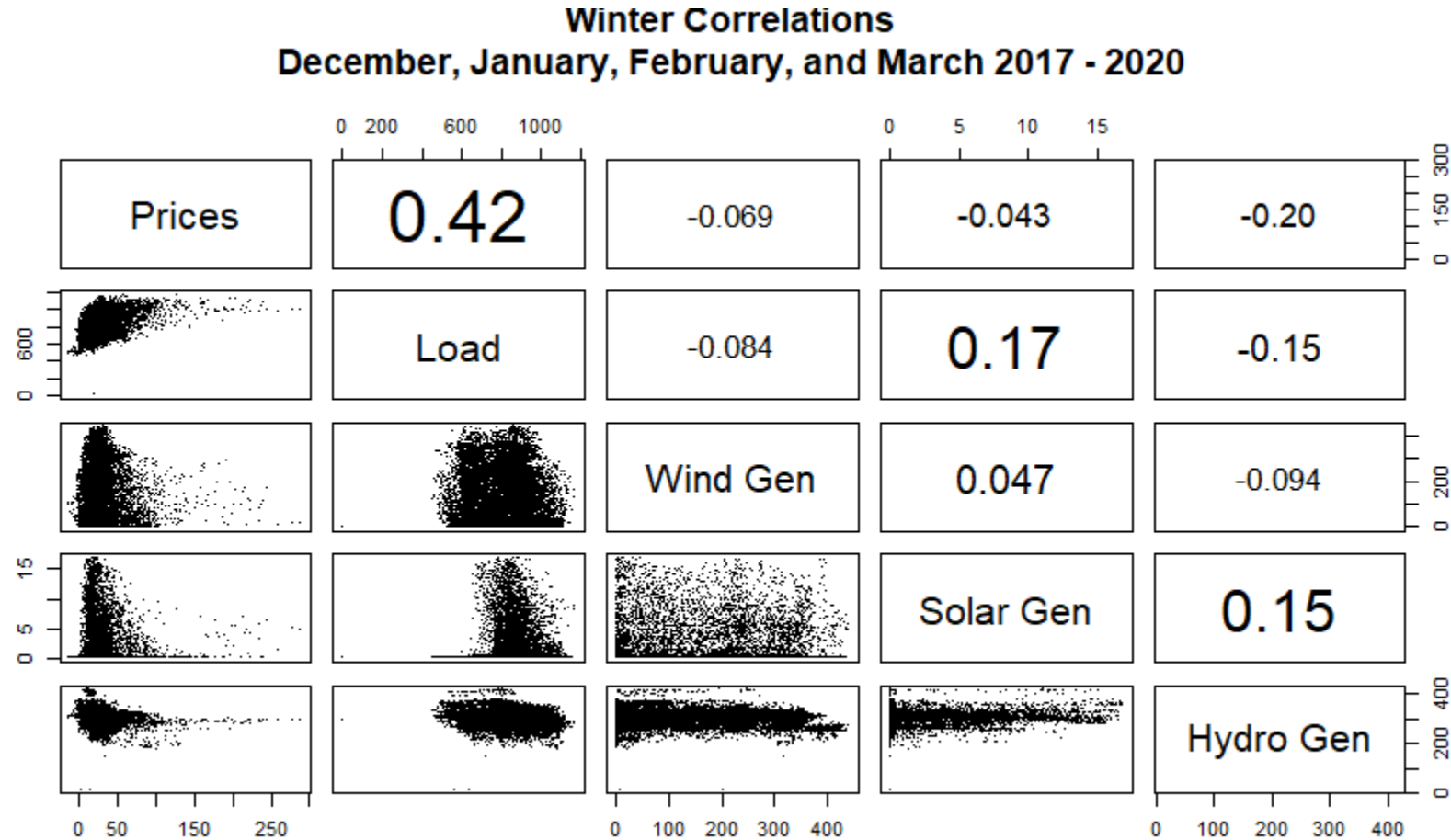


Annual Renewable Correlations

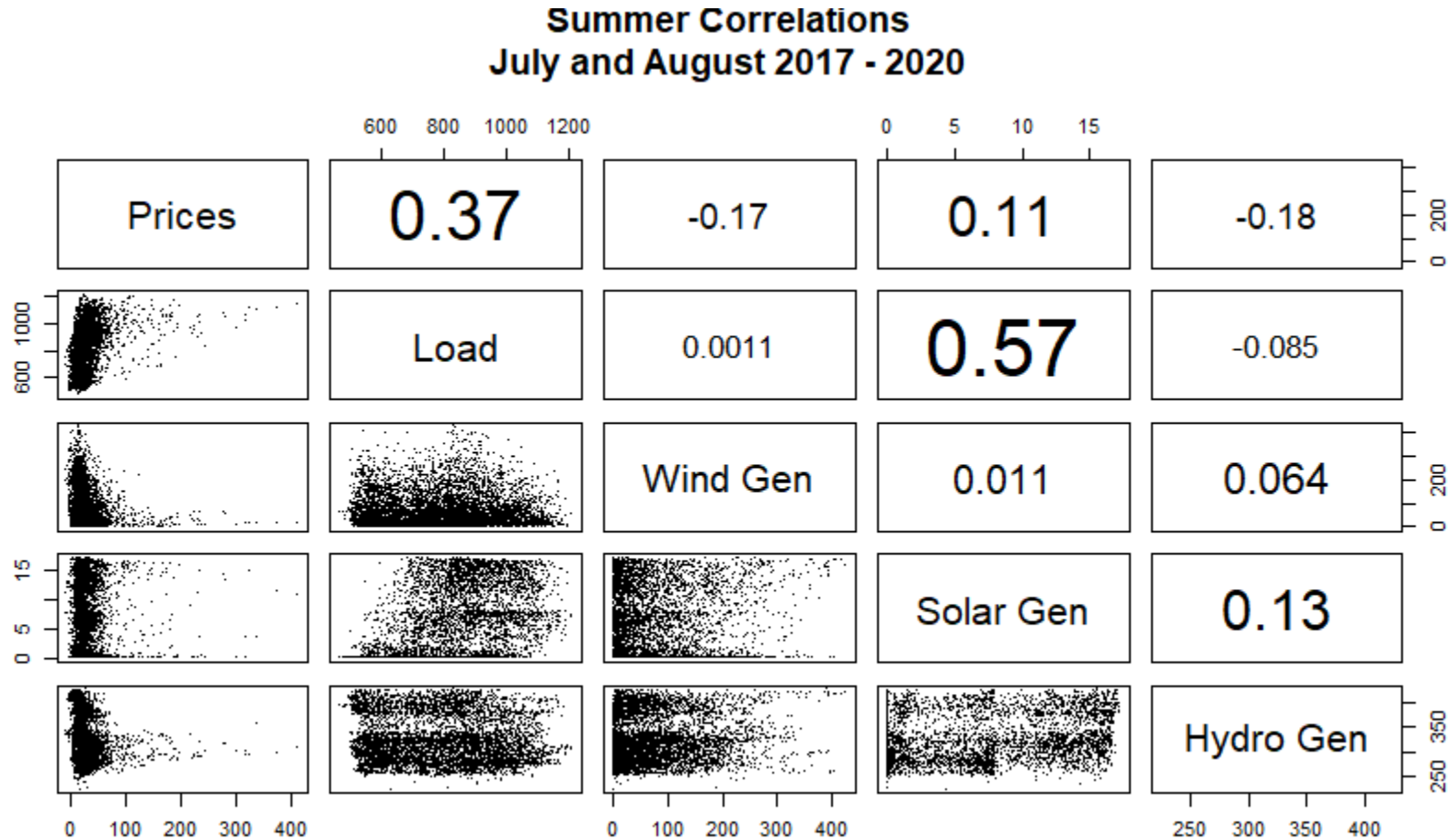




Winter Renewable Correlations



Summer Renewable Correlations





Equity and Supply Planning



Equity and Supply Planning

Why now?

- Proposed change in MT Planning Rules
- Regional emphasis on equitable energy outcomes / burden reduction
- Not a technical criteria, but an important qualitative consideration
- Is Equity part of the Process or Analysis?



HB 597 – Proposed Planning Rules

Planning rules

- Proposed 38.5.8203 (1)(c): **promote equity**, economic efficiency, and environmental responsibility through the pricing of electricity Services, operation of existing Resources, and procurement of new Resources;
- Contrast with CURRENT lowest cost, least risk planning requirements
- Limited guidance about what equity means in this context



Regional Activities

Setting the regional stage

- Avista, PSE: CETA 10-year implementation plan, formation of Equity Advisory Group
- CETA goal to ensure an equitable transition to clean energy
- NWPCC - setting groundwork to include equity considerations in future planning cycles
- Does Equity = subsidy?

Compared to the region



POPULATION
1,068,778



MEDIAN HOUSEHOLD INCOME
\$57,153



POVERTY RATE
12.6%



BACHELOR'S DEGREE OR HIGHER
33.6%

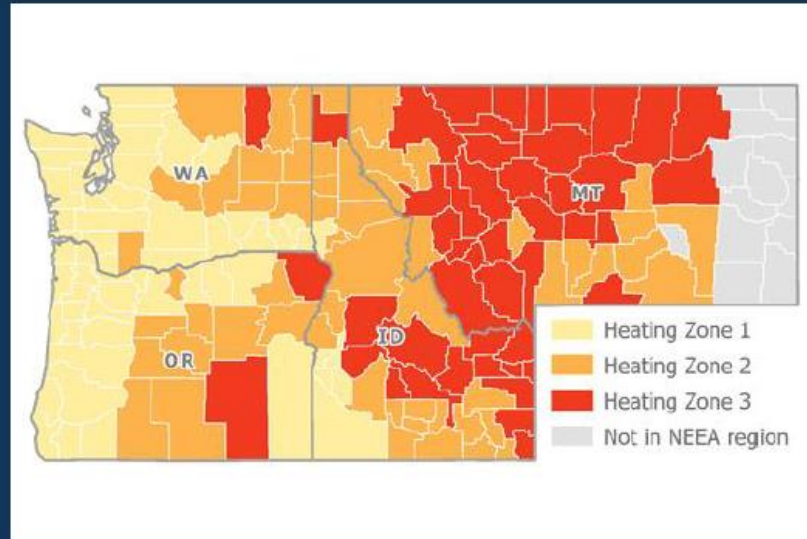


EMPLOYMENT RATE
59.8%



TOTAL HOUSING UNITS
519,938

Northwest Heating Zones





2020 Supplement Results

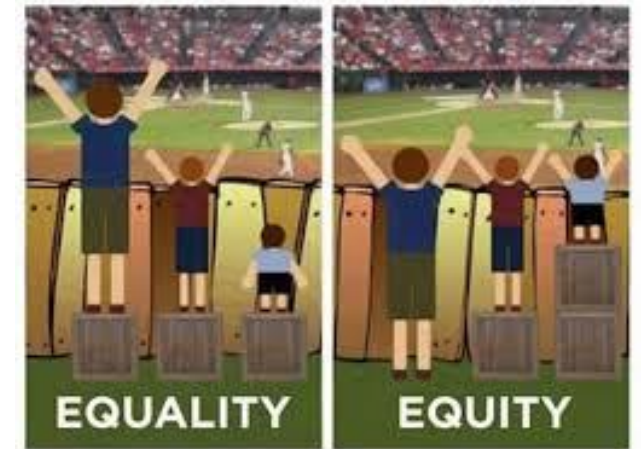
2020 Portfolio NPV

Portfolios Ranked by Cost - Base Case Prices													
Cost			New Capacity (Nameplate MW)										
Portfolio	NPVRR (Billion)	Rank	Natural Gas			Wind Hybrid		Solar Hybrid		Wind	Solar	Total Nameplate	ELCC
			Natural Gas	Battery Storage	Pumped Hydro	Wind	Storage	Solar	Storage				
6	\$5.29	1	315	700							1015	604	
10	\$5.39	2	207	250	200						657	598	
1	\$5.64	3	630								630	601	
7	\$5.79	4	315		375						690	607	
12	\$6.18	5	162	250	200					1000	1612	606	
13	\$6.23	6	261	700					500	500	1961	602	
14	\$6.28	7	315	450					500	500	1765	604	
18	\$6.34	8	207	250	150				500	500	1607	598	
11	\$6.57	9	162	250	200				1000		1612	606	
21	\$6.63	10	162	150	50	200	100	100	100	500	500	1862	605
20	\$6.77	11	162	50	150	200	100	100	100	500	500	1862	614
2	\$7.07	12		1700						1000	1000	3700	602
17	\$7.29	13	261	450						1000	1000	2711	602
15	\$7.30	14		450	250					1000	1000	2700	598
19	\$7.63	15		150	150	200	100	100	100	1000	1000	2800	600
16	\$7.64	16	261		250					1000	1000	2511	594
5	\$9.44	17		250				200	200	2000	2000	4650	587
4	\$9.78	18		250		400	200			2000	2000	4850	602
8	\$9.99	19	315							3000	3000	6315	601
9	\$11.33	20		700						3000	3000	6700	603
3	\$11.85	21			375					3000	3000	6375	606

What is equity?

What does it mean

- Fairness, impartiality, evenhanded dealing – Black's Law
- Cost and Externalities
- Energy burden >6% of annual income





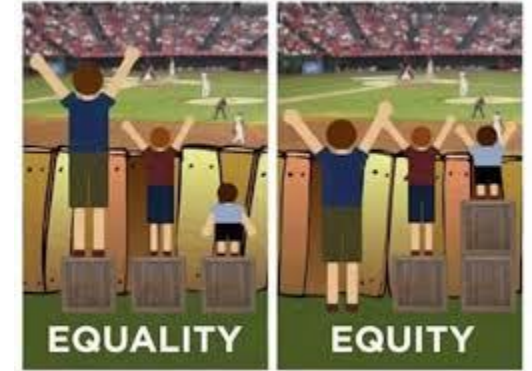
How does NorthWestern address equity now?

- NorthWestern's current actions to address equity issues
 - USB, Energy Share Participation
 - 50% of USB funds (\$4.9M) directed to low income support (bill discounts, weatherization), assisting over 11,000 customers
 - \$400k in COVID relief spending
 - Procurement criteria newly focused on supplier diversity



Barriers to equity

- Housing envelope
- Access
- Perception that DSM and EE is for homeowners
- TIME
- Siting decisions
- Difficulty accessing LIHEAP / Energy Share application process





Is more needed from supply planning?

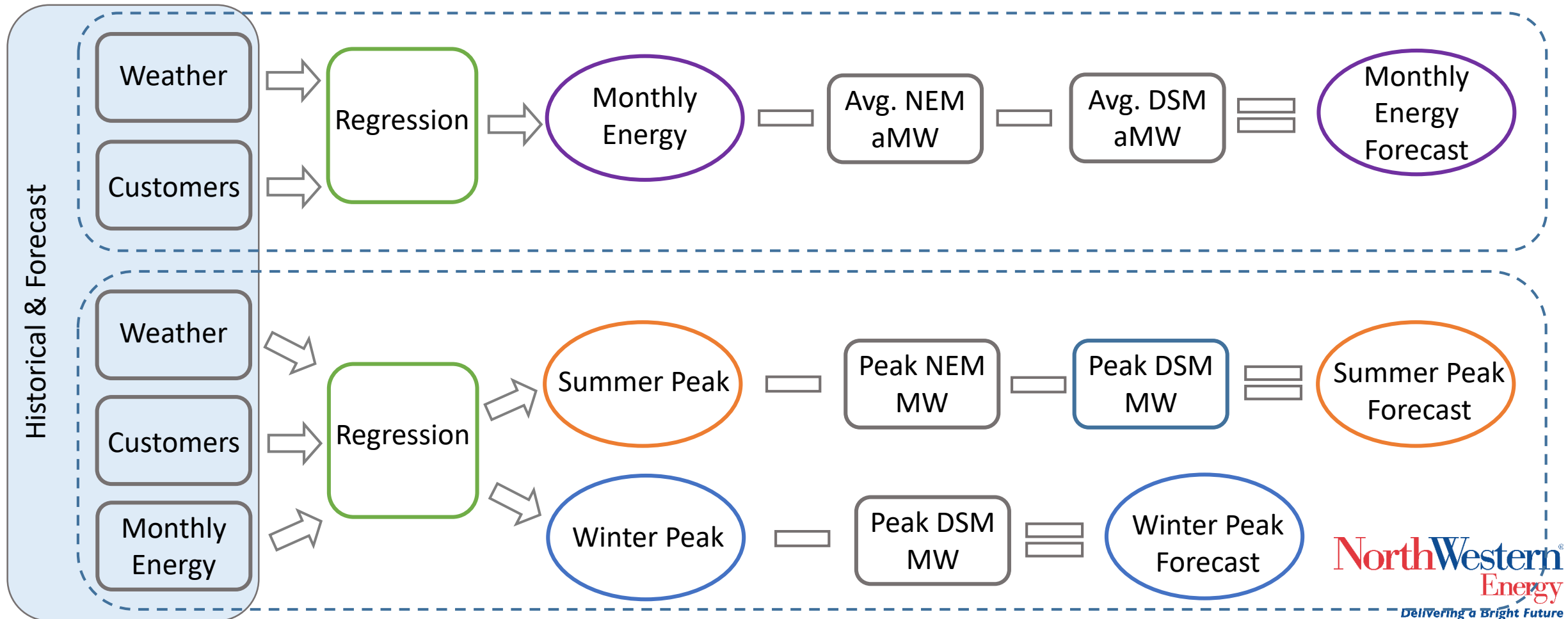
Is there appropriate emphasis on equity in technical planning work, absent any legal requirement to do so?

- Increasing public participation may help address equity issues
- Other ideas?

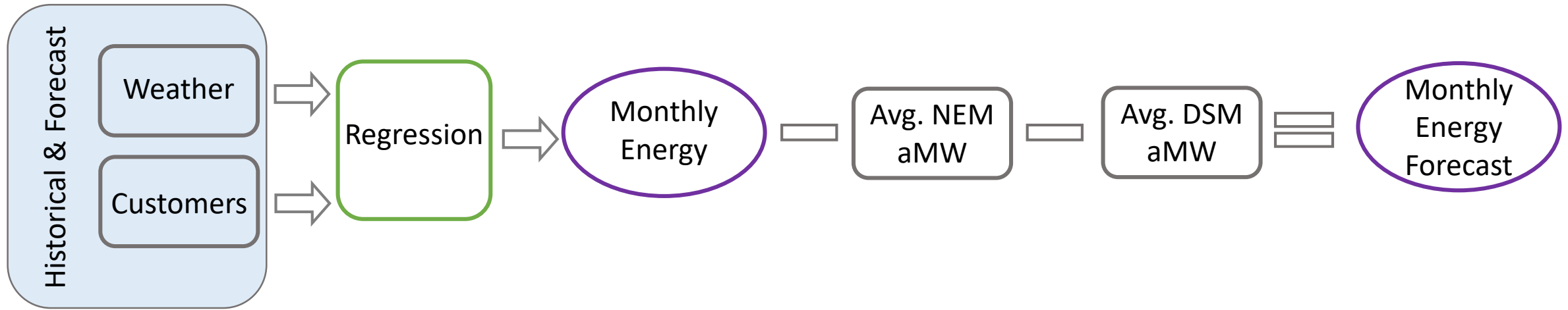


Load Forecast

Load Forecast

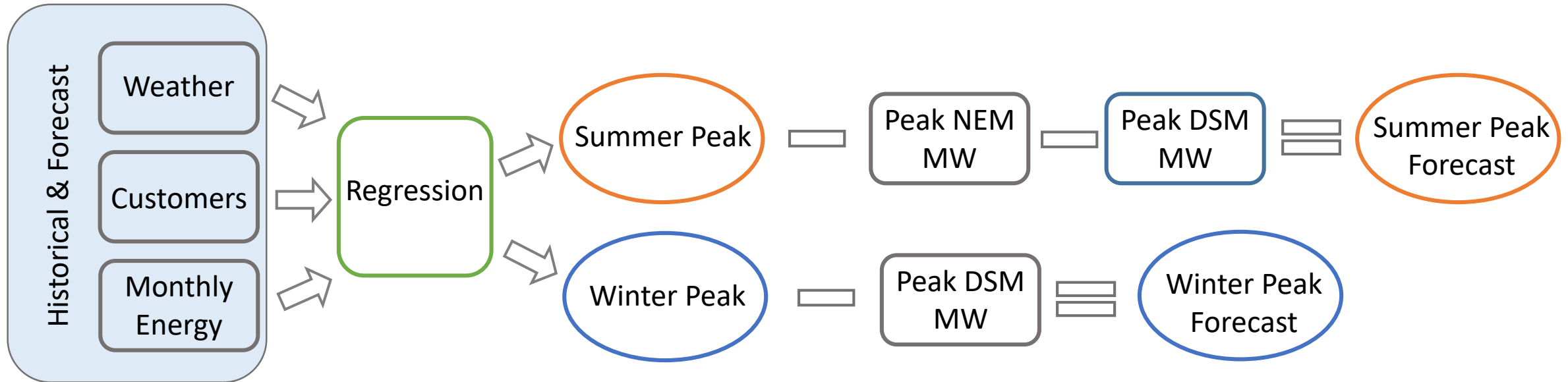


Energy Forecast



- Monthly Energy (MWh) = $f(\text{TDD}, \text{Customers}) - \text{DSM} - \text{NEM}$
 - Residential & Commercial
- All other customer classes = recent actuals or averages

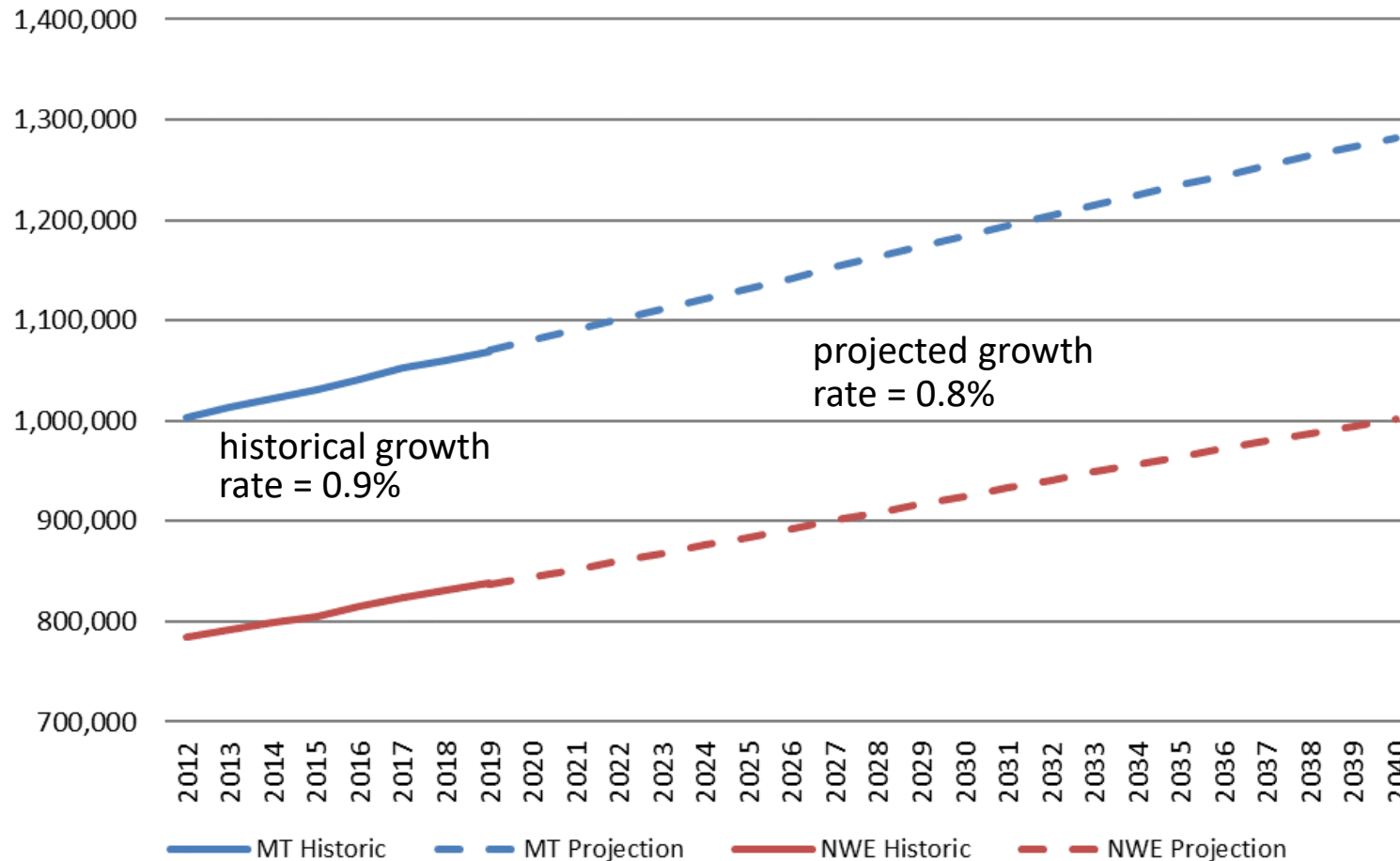
Peak Demand Forecast



- Summer Peak MW = $f(\text{Monthly Energy, Customers, Peak Day Max Temp})$
- Winter Peak MW = $f(\text{Monthly Energy, Customers, Peak Day Heating Degree Days})$

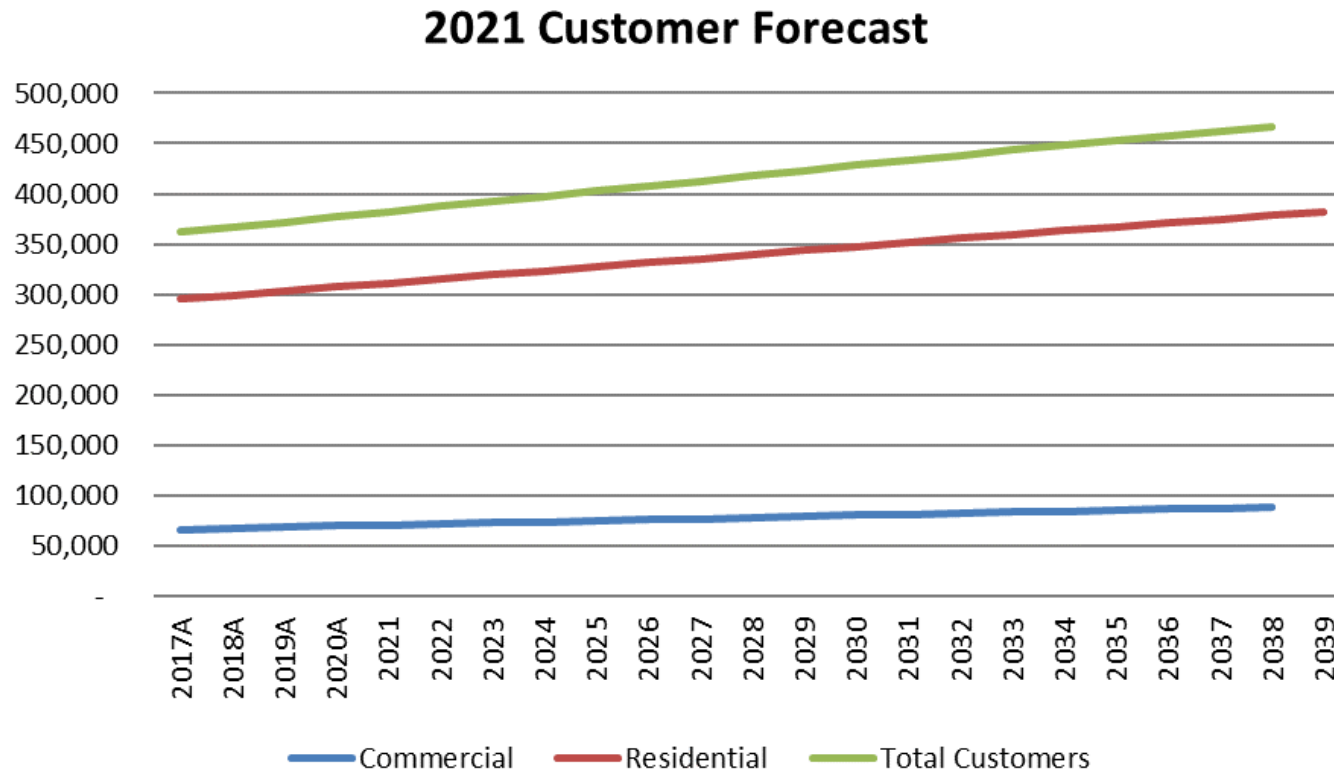


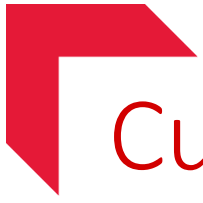
Population Forecast



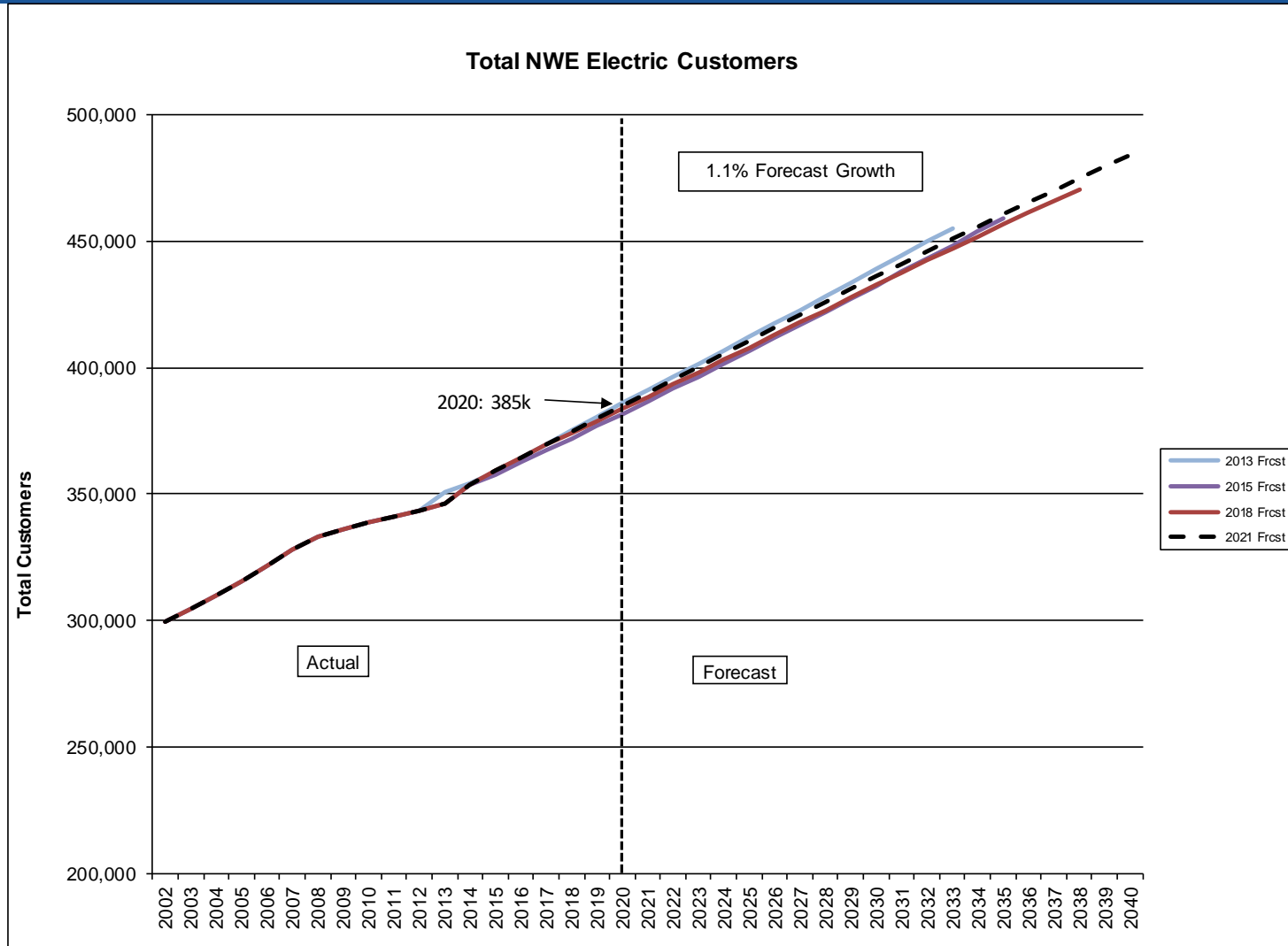
Customer Forecast

- Residential Customers = $f(\text{Service Territory Pop.})$
- Commercial Customers = $f(\text{Service Territory Pop.}, \text{Service Territory Employment})$





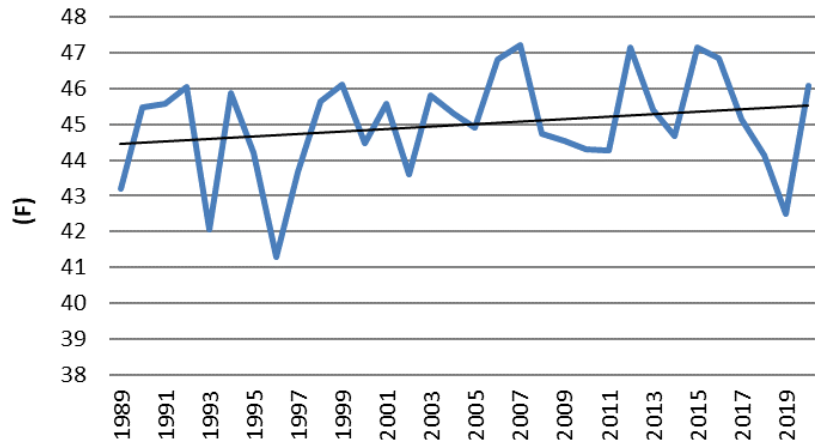
Customer Forecast



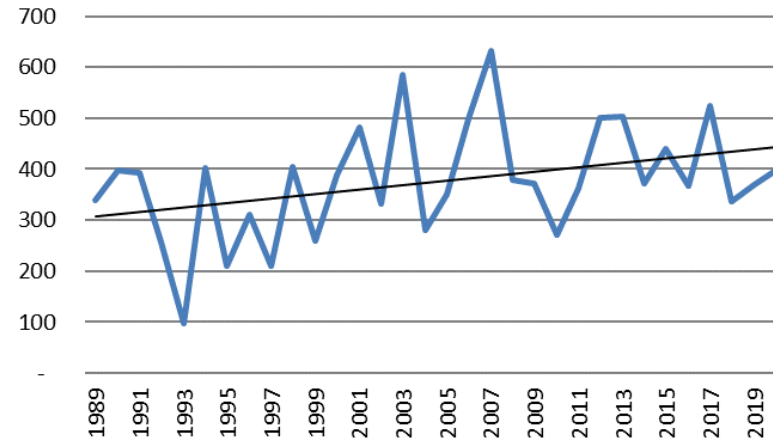


Weather Forecast

Average Temperature

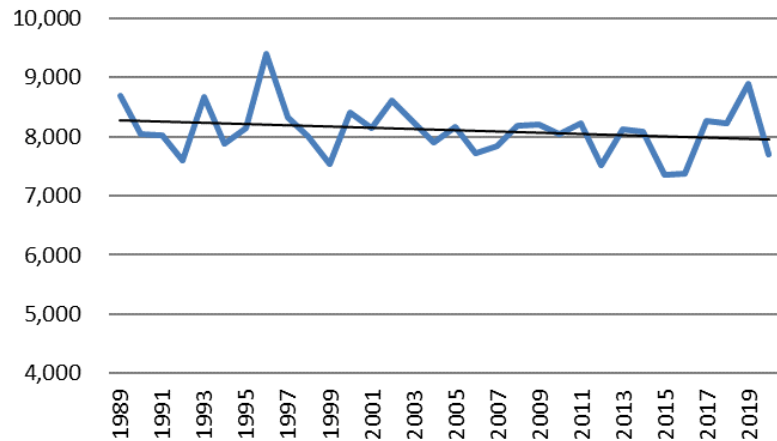


Cooling Degree Days

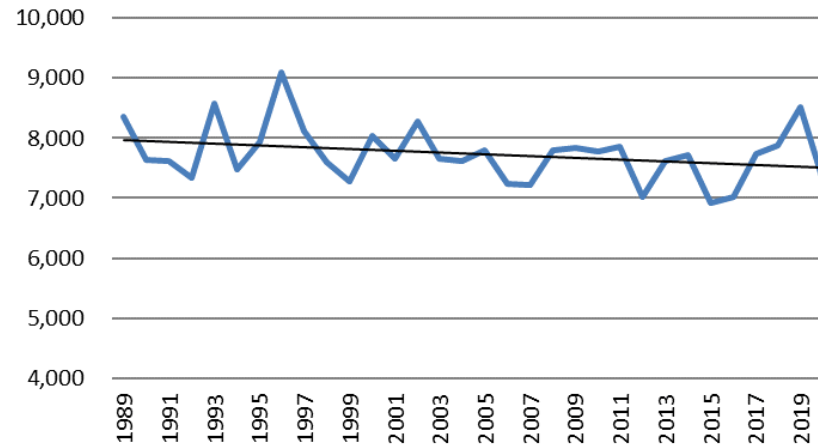


Cooling degree day (CDD) = daily average temp - 65°

Total Degree Days



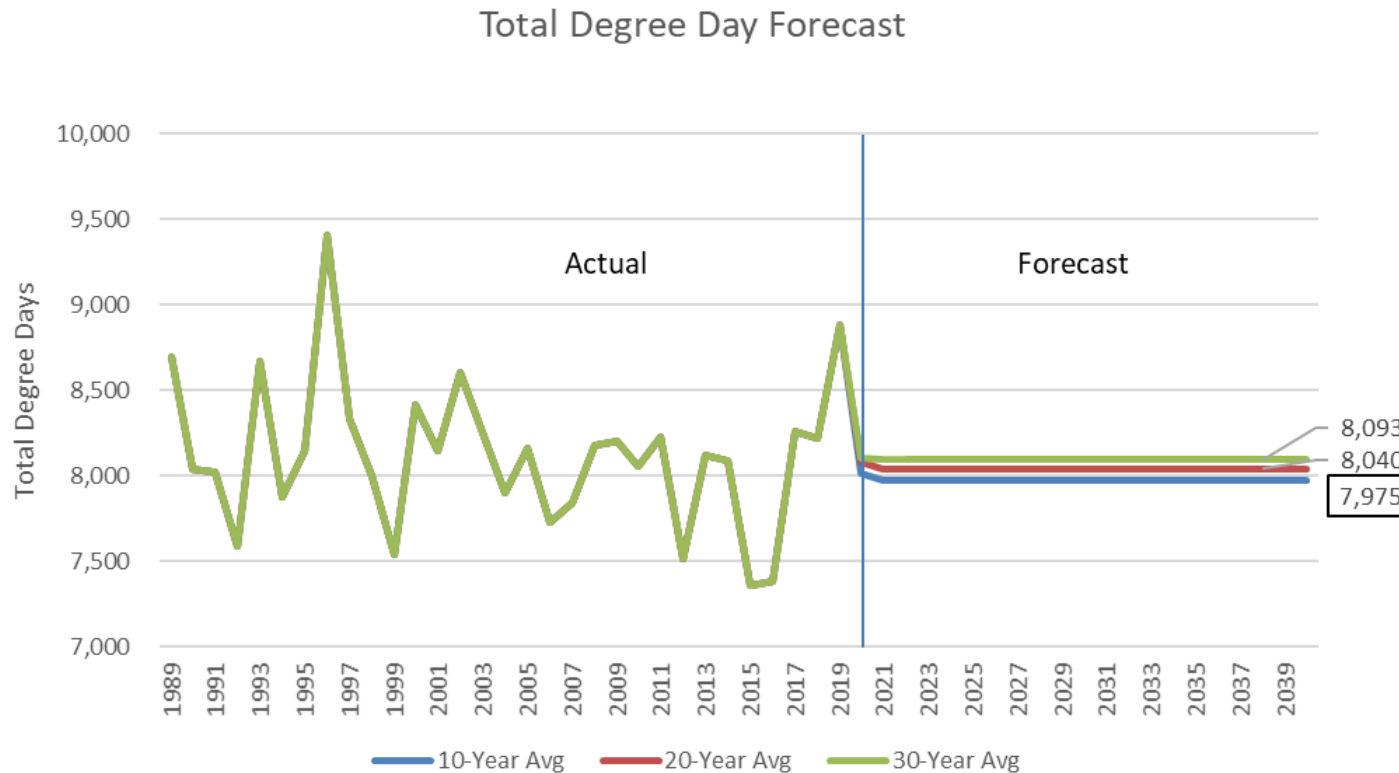
Heating Degree Days



Heating degree day (HDD) = 65° - daily average temp

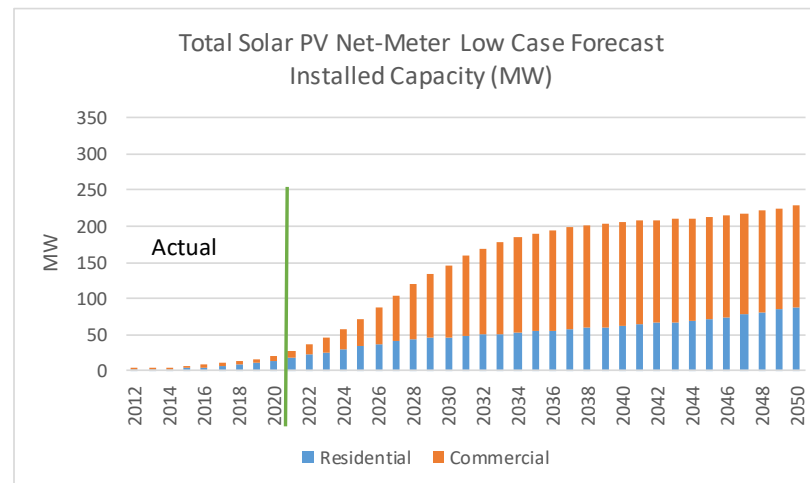
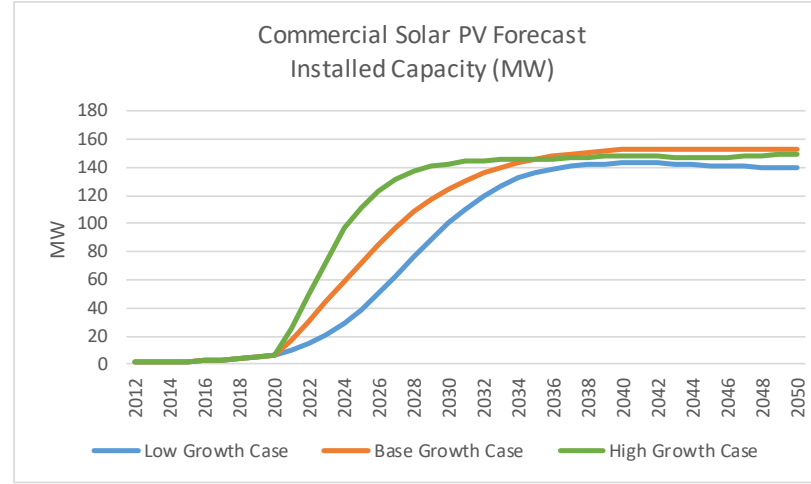
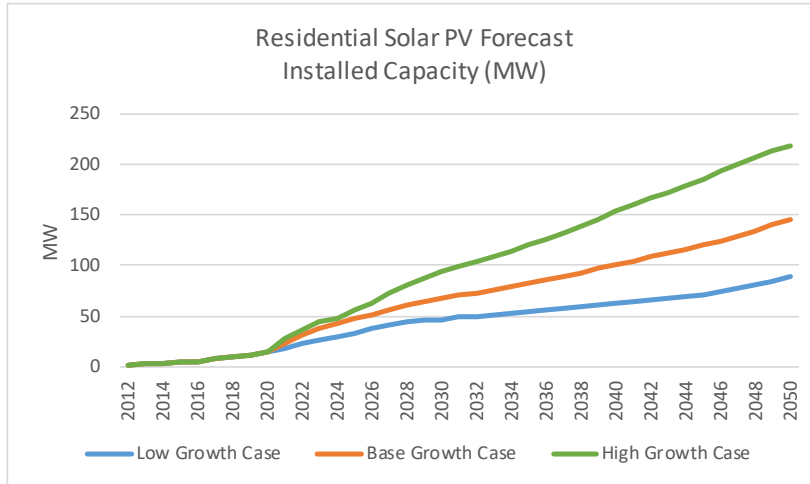
Total Degree Days

- Switch from 30 to 10 years of weather data lowers TDD forecast





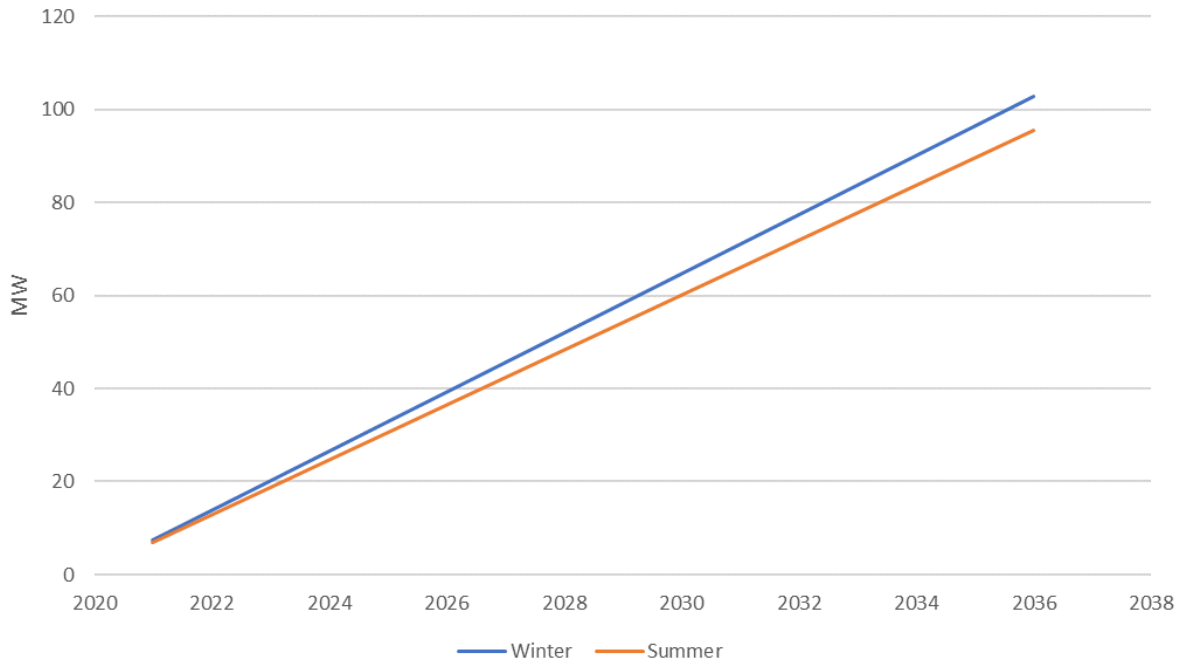
Net Energy Metering (NEM) Forecast



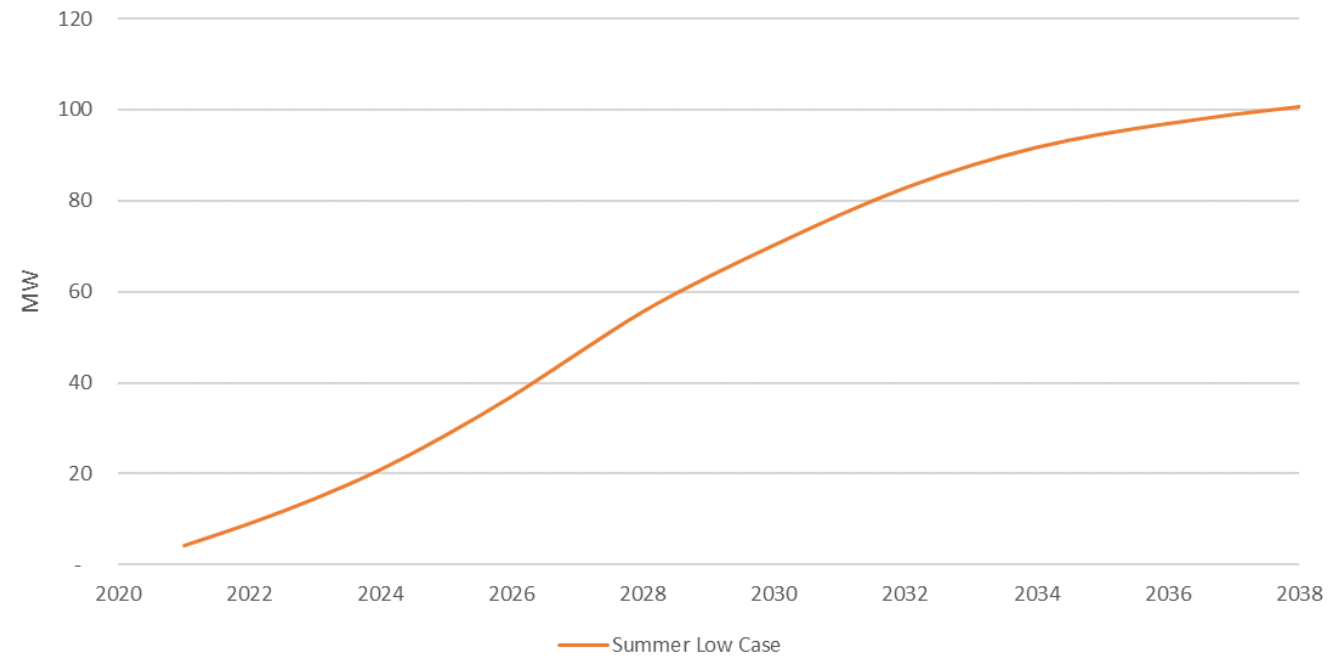


NEM and DSM Impact on Peak Forecast

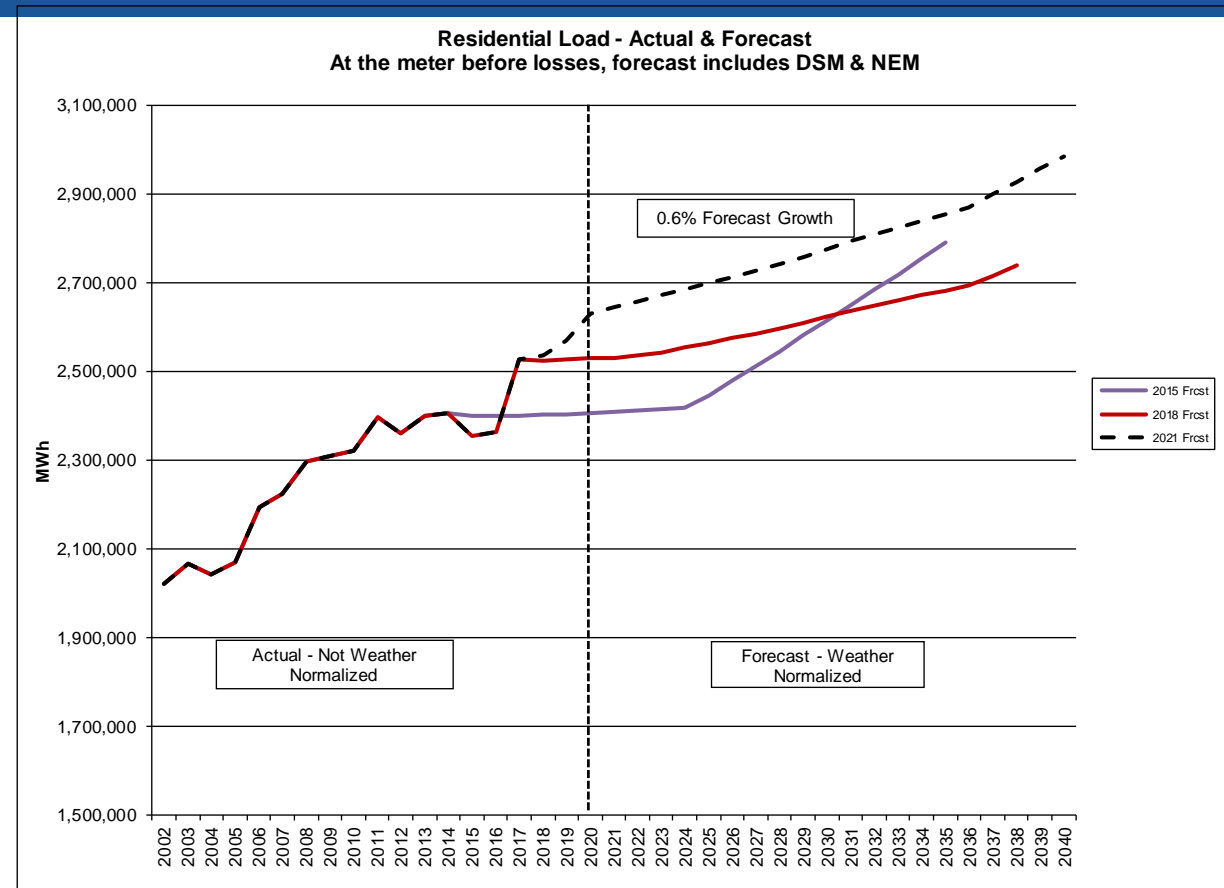
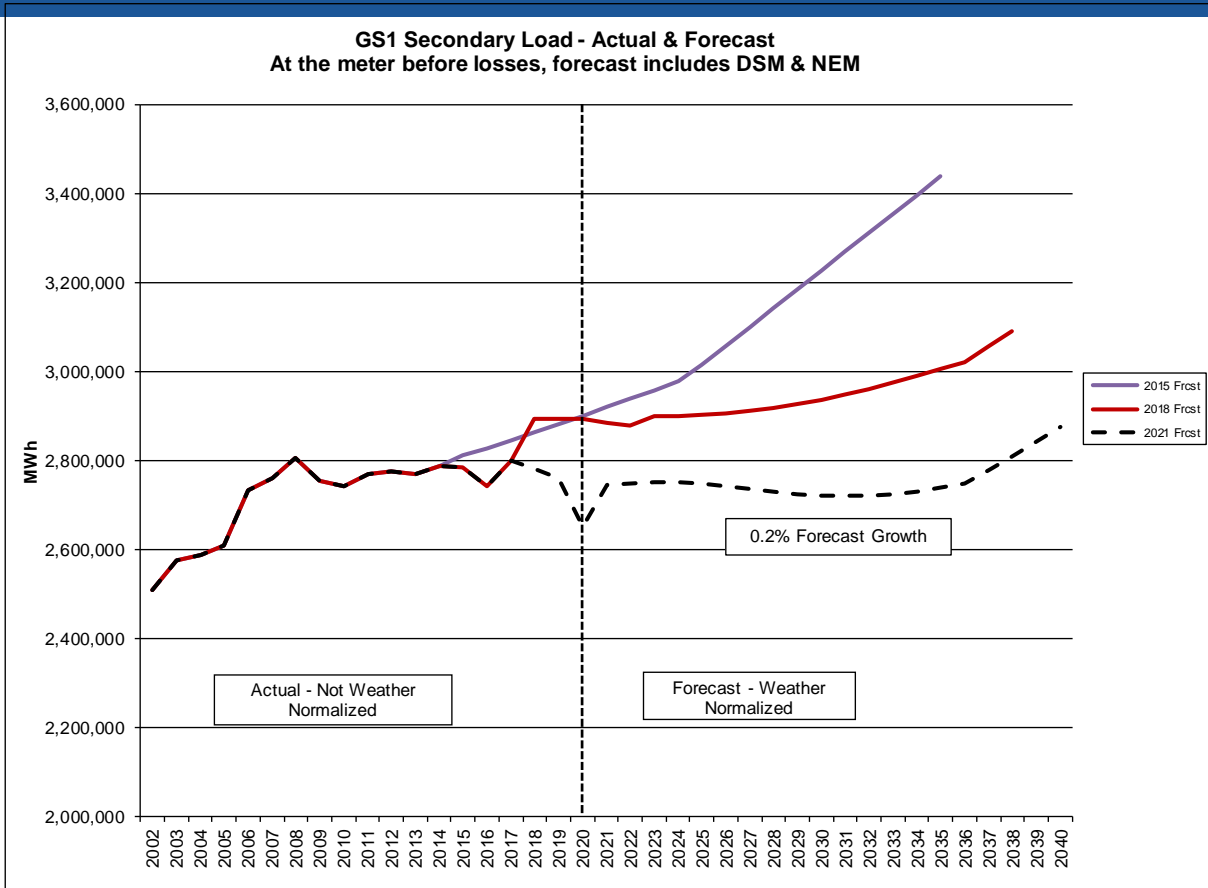
DSM Reduction in Peak Load



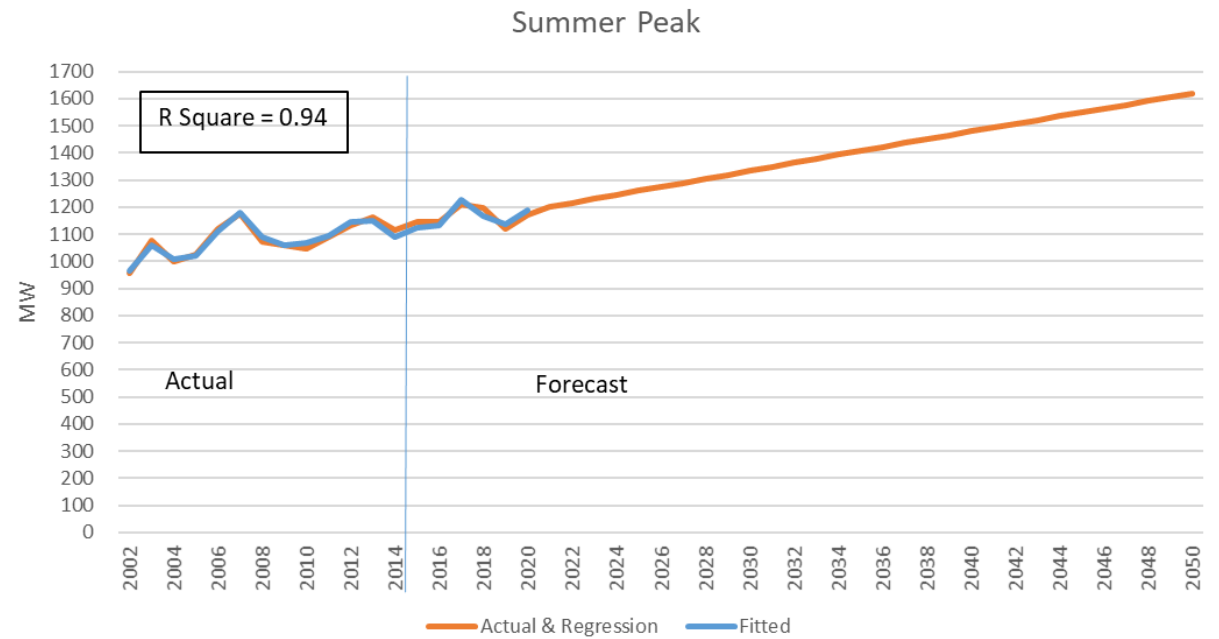
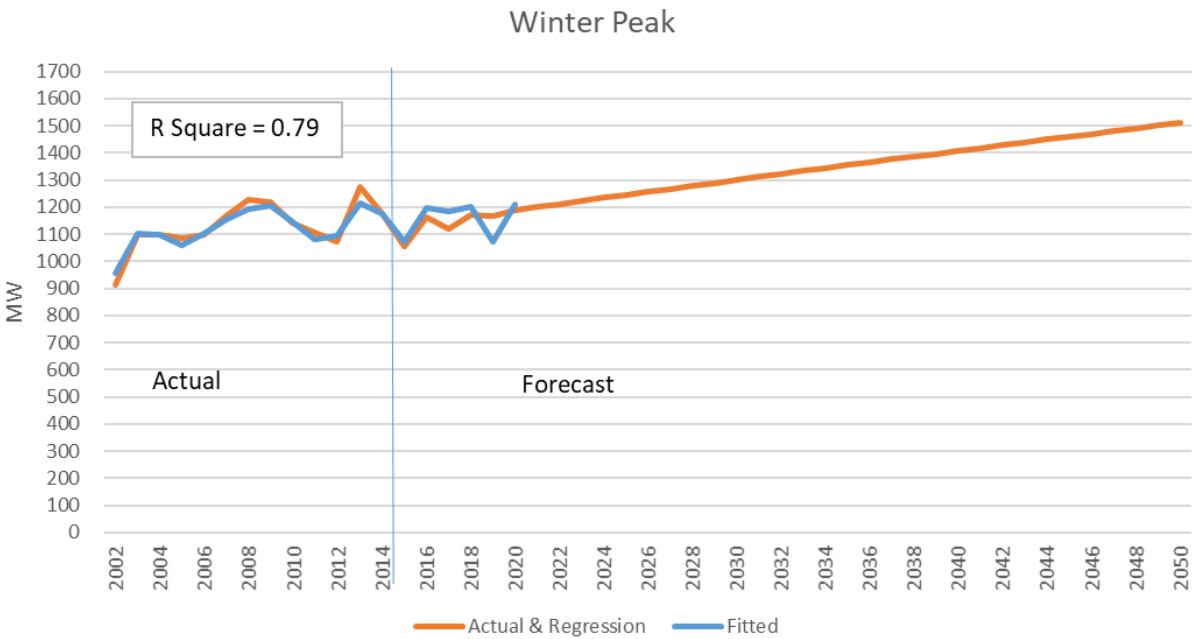
NEM Reduction in Peak Load



Energy Forecast

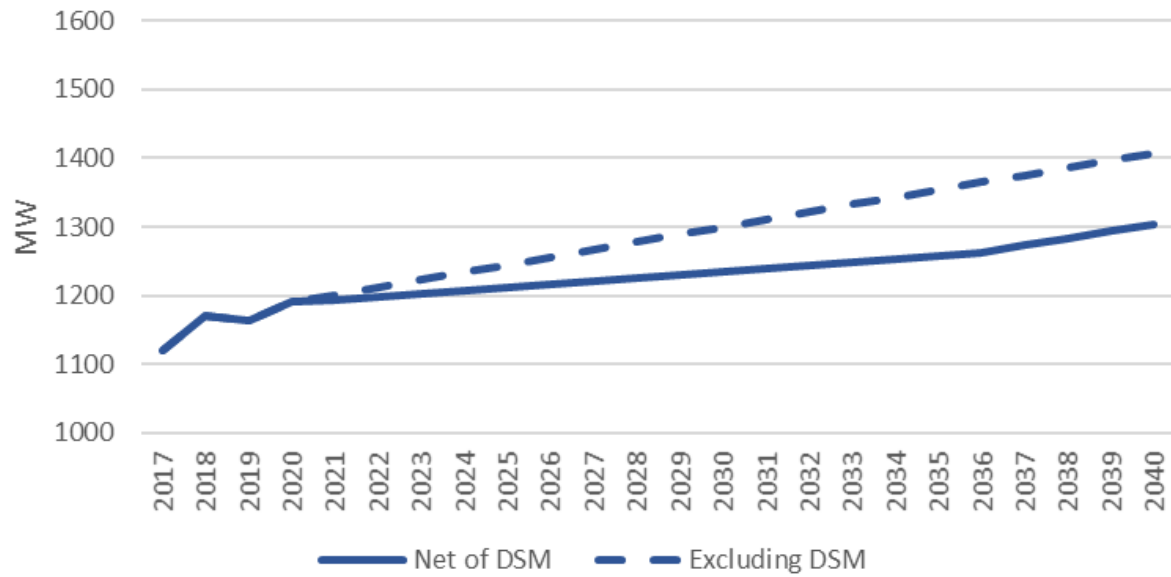


Peak Demand Forecast

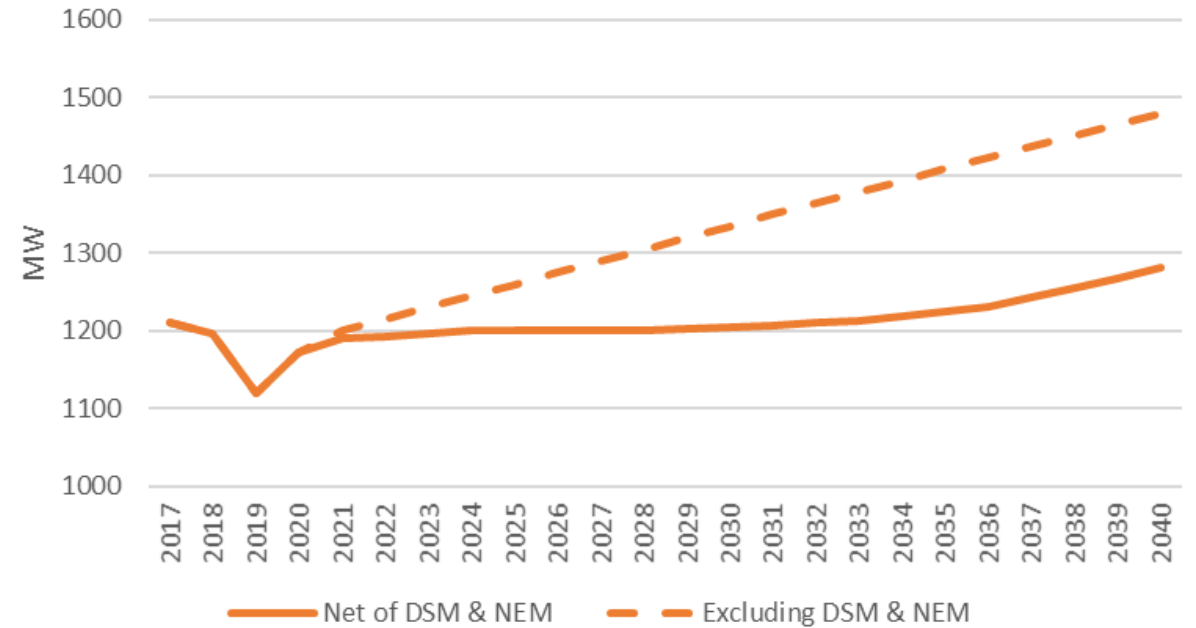


Peak Demand Forecast

2021 Winter Peak Forecast

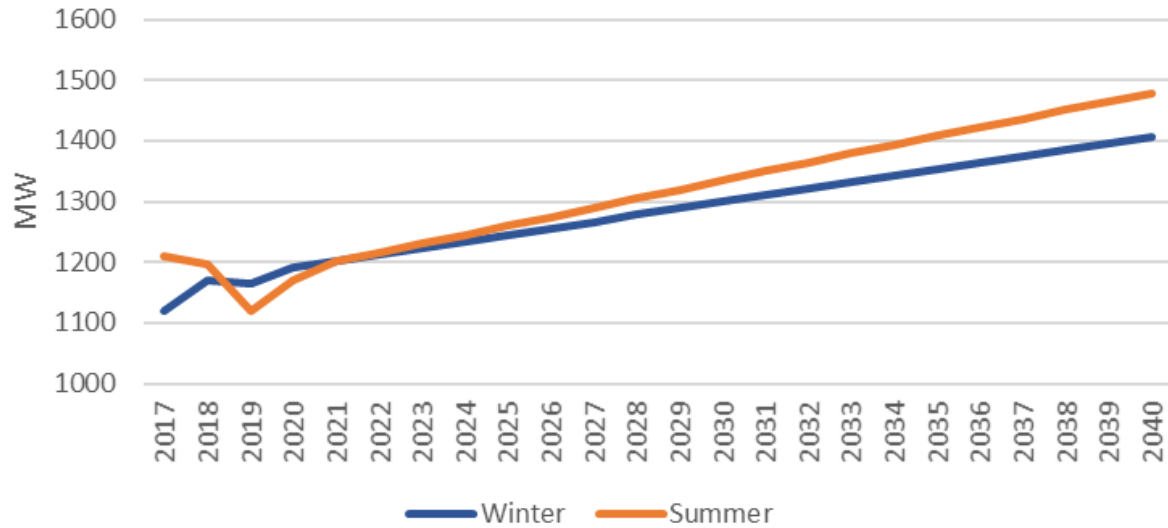


2021 Summer Peak Forecast

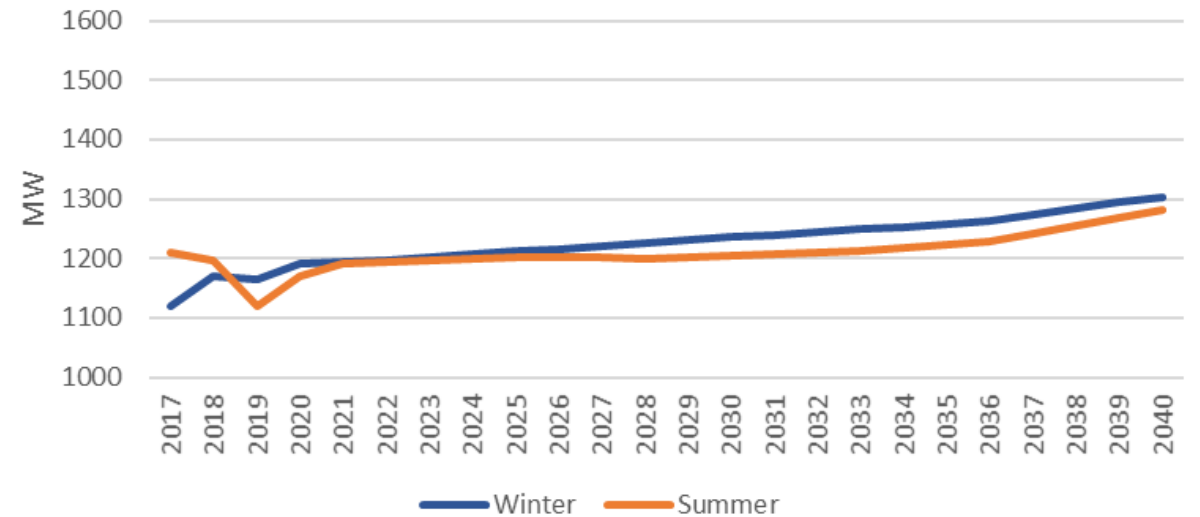


Peak Demand Forecast

2021 Winter vs Summer Peak Forecast
Excluding DSM & NEM



2021 Winter vs Summer Peak Forecast
Including DSM & NEM





Resource Adequacy



Resource Adequacy

See RA slide deck.



NorthWestern Energy – ETAC Meeting

August 4, 2021

Thank you.