

October 15, 2021

Will Seuffert
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
Saint Paul, Minnesota 55101-2147

RE: **Supplemental Comments of the Staff of the Minnesota Department of Commerce, Division of Energy Resources**
Docket No. E002/RP-19-368

Dear Mr. Seuffert:

Attached are the Supplemental Comments of the Staff of the Minnesota Department of Commerce, Division of Energy Resources (Department Staff), in the following matter:

2020-2034 Upper Midwest Integrated Resource Plan.

The Petition was filed on July 1, 2019 (as supplemented on June 30, 2020) by:

Christopher B. Clark
President
Xcel Energy
414 Nicollet Mall
Minneapolis, MN 55401

Department Staff recommends that the Minnesota Public Utilities Commission (Commission) **approve the petition with modifications**. Department Staff's team of Danielle Winner, Matthew Landi, Sachin Shah and myself are available to answer any questions that the Commission may have.

Sincerely,

/s/ STEVE RAKOW
Analyst Coordinator

SR/ar
Attachment



Before the Minnesota Public Utilities Commission

Supplemental Comments of the Staff of the Minnesota Department of Commerce Division of Energy Resources

Docket No. E002/RP-19-368

I. INTRODUCTION

A. DOCKET HISTORY—FIRST ROUND

On July 1, 2019 Northern States Power Company, doing business as Xcel Energy (Xcel or the Company) filed the Company's *2020-2034 Upper Midwest Integrated Resource Plan* (Petition). The Petition was filed in compliance with the Minnesota Public Utilities Commission's (Commission) January 30, 2019 *Order Extending Deadline for Filing Next Resource Plan* and January 11, 2017 *Order Approving Plan with Modifications and Establishing Requirements for Future Resource Plan Filings* in Docket No. E002/RP-15-21.

On July 3, 2019 the Commission issued its *Notice of Comment Period* which stated that comments on the Petition are due November 8, 2019 and January 8, 2020 and that comments on completeness were due August 1, 2019.

On July 18, 2019 the Commission issued its *Order Requiring Bill Insert and Referring Matter to OAH for Public Meeting* (Meeting Order). The Meeting Order established a process for holding public meetings to ensure that Xcel's customers have an opportunity to participate in the IRP process.

On July 25, 2019 the Minnesota Department of Commerce, Division of Energy Resources (Department) filed a letter recommending that the Commission not undertake a completeness review.

In response to the Meeting Order, on July 30, 2019 the Minnesota Office of Administrative Hearings (OAH) issued OAH's *Scheduling Order*, establishing October 21, 23, 28, and 30 as dates for public meetings.

On July 31, 2019 the city of Minneapolis filed a letter on completeness.

On October 8, 2019 Xcel filed a letter indicating that the Company could:

- provide updated Strategist modeling in a new filing by December 6, 2019;
- participate with other utilities in a planning meeting to cover the new capacity expansion modeling (CEM) tool (Encompass), along with a variety of topics; and
- provide a supplemental filing in the April 2020 timeframe using EnCompass.

On or about October 15, 2019 the following organizations and coalitions filed comments on modifying the comment deadlines:

- Sierra Club, Vote Solar, and the Institute for Local Self-Reliance;
- Clean Energy Organizations;¹
- Citizens Utility Board of Minnesota;
- Xcel Large Industrials (XLI);²

On November 12, 2019 the Commission issued its *Order Suspending Procedural Schedule and Requiring Additional Filings* (Supplemental Order). The Supplemental Order:

- suspended the procedural schedule;
- required Xcel to file certain supplemental information; and
- delegated to the Executive Secretary the establishment of a new procedural schedule—but stated that Xcel’s supplement could be filed no later than July 1, 2020.

On December 18, 2019 the OAH filed its *Report Summarizing Public Meetings* which summarized the public comments obtained at the October public meetings regarding the Petition.

B. DOCKET HISTORY—SECOND ROUND

On December 6, 2019 the Commission issued a notice indicating that:

- Xcel must file a supplement by April 1, 2020;
- comments are due August 3, 2020; and
- reply comments are due October 2, 2020.

On February 12, 2020 the Minnesota Sustainable Growth Coalition (MSG) filed comments on behalf of MSG’s non-utility members regarding Xcel’s proposed plan.³

On March 6, 2020 Xcel filed the Company’s *Extension Request*, requesting an extension for the supplemental filing to May 15, 2020 in light of the need to conduct a substantial update of the Strategist modeling, and to implement the EnCompass model, including development of more granular modeling inputs for hourly analysis.

On March 11, 2020 the Commission issued its *Notice Approving Extension Request and Extending Comment Periods* establishing a new deadline for Xcel’s supplement and for filing initial comments and reply comments.

¹ This coalition consists of Clean Grid Alliance, Fresh Energy, Minnesota Center for Environmental Advocacy, and the Union of Concerned Scientists.

² This coalition consists of Covia Holdings Corporation; Flint Hills Resources Pine Bend, LLC; Gerdau Ameristeel US Inc.; Marathon Petroleum Corporation; and USG Interiors, Inc.

³ MSG’s non-utility members come from the private, public, and non-profit sectors.

On March 13, 2020 International Brotherhood of Electrical Workers locals 23, 160, and 949 filed comments regarding Xcel's proposed plan.

On April 10, 2020 Xcel filed the Company's *Extension Request*, requesting a second extension for the supplemental filing to June 30, 2020 in light of the ongoing COVID-19 public health emergency.

On April 16, 2020 the Commission issued its *Second Notice Approving Extension Request and Extending Comment Periods* stating that:

- the deadline for Xcel's supplement is June 30, 2020;
- the deadline for filing initial comments is October 30, 2020; and
- the deadline for filing reply comments is January 15, 2021.

On June 30, 2020 Xcel filed the Company's *Supplement to the Petition* (Supplement).

On September 15, 2020, at the request of the Department, the Commission established January 15, 2021 as the due date for comments and March 15, 2021 as the due date for reply comments.

On December 23, 2020 the Department issued Global Energy & Water Consulting, LLC's (Global) *Independent Investigation of Cost Overruns and Cost Estimates for Xcel Energy's Monticello and Prairie Island Nuclear Power Plants* (Report). The Department retained Global to prepare the Report in compliance with the Commission's March 26, 2019 *Order Authorizing Commissioner of Commerce to Seek Funding for Specialized Technical Professional Services Under Minn. Stat. § 216B.62 Subd. 8* in Docket Nos. E002/RP-15-21 and E002/GR-15-826:

The Commission authorizes the Commissioner of the Department of Commerce to seek authority from the Commissioner of Management and Budget to incur costs for specialized technical professional investigative services under Minn. Stat. § 216B.62, Subd. 8, to continue investigating the causes of cost increases related to Xcel's Prairie Island and Monticello nuclear facilities and to assist the Department in Xcel's upcoming integrated resource plan and rate case proceedings.

On December 28, 2020, at the Department's request, the Commission established February 11, 2021 as the due date for comments and April 12, 2021 as the due date for reply comments.

In January and February, 2021, comments were filed by the Prairie Island Indian Community, a federally recognized Indian tribe; Goodhue County Board of Commissioners; Board of Wright County Commissioners; St. Paul Area Chamber; MSG on behalf of MSG's non-utility members; Northern Natural Gas; and other organizations.

On February 10 and 11, 2021 the following organizations filed comments:

1. Center of the American Experiment;
2. Citizens Utility Board of Minnesota;
3. City of Becker;
4. City of Minneapolis;
5. City of Monticello;
6. Clean Energy Economy Minnesota;
7. Coalition of Utility Cities;⁴
8. Deputy Commissioner of the Department (Department Deputy);
9. Staff of the Department (Department Staff);
10. CEO;
11. Fresh Energy, Community Stabilization Project, Green & Healthy Homes Initiative, Inquilinx Unidxs Por Justicia, Minnesota Housing Partnership, National Housing Trust, and Natural Resources Defense Council (collectively, EEFA Partners);
12. Laborers' International Union of North America Minnesota and North Dakota;
13. Monticello Industrial & Economic Development Committee;
14. Sierra Club;
15. St. Paul 350;
16. Vote Solar, Institute for Local Self Reliance, Cooperative Energy Futures, and the Environmental Law and Policy Center (collectively, DSP); and
17. XLI.

Xcel's reply comment proposed a revised 2020-2034 IRP, referred to as the "Alternate Plan." According to the Company, the main changes in the Alternate Plan as compared to its previously proposed IRP include:

- Elimination of a natural gas-fired combined cycle facility at the Sherco Generating Station (Sherco);
- Reutilization of interconnections at the retired Sherco and Allen S. King (King) coal sites to enable significant solar and wind additions, as well as hydrogen-capable combustion turbine (CT) resources; and
- Beginning a process to shift the Company's current emergency system restoration (black start) plans from the current centralized restoration approach to a zonal restoration approach

Numerous members of the public filed comments throughout this proceeding.

⁴ The Coalition of Utility Cities is an organization of eight member cities that host Minnesota's largest power plants.

C. *DOCKET HISTORY—THIRD ROUND*

On June 30, 2021 the Commission filed its *Notice of Supplemental Comment Period* (Notice). The Notice stated that the following topics are open for comment:

1. Should the Commission approve, modify, or reject Xcel Energy's Alternate Plan, as described in the Company's June 25, 2021 Reply Comments?
2. If the Commission modifies the Alternate Plan, what modifications should the Commission make?
3. Should the Commission adopt a proposed alternative plan under Minnesota Rules 7843.0300 subp. 11? If so, provide a narrative with quantitative analysis supporting how the proposed changes are in the public interest, considering the factors listed in Minnesota Rules 7843.0500, subp. 3.
4. What resource acquisition process(es) should Xcel use to implement the approved resource plan?
5. When should Xcel file its next IRP?
6. Are there other issues or concerns related to this matter?

Below are Department Staff's supplemental comments regarding Xcel's proposed alternate plan and the issues specified by the Notice.

D. *XCEL'S ALTERNATE PLAN*

Xcel's reply comments describe the Company's alternate plan as follows:

- Regarding the baseload unit retirement schedule:
 - retire King in 2028;
 - retire Sherco Unit 3 in 2030;
 - operate the Monticello Nuclear Generating Plant (Monticello) through 2040;
 - Action plan: "We plan to initiate a Certificate of Need (CN) proceeding in Minnesota in the next several months."⁵
 - Operate both Prairie Island Nuclear Generating Plant (Prairie Island) units at least through the end of their current licenses—Prairie Island unit 1 to 2033 and Prairie Island unit 2 to 2034.
 - Action plan: "If a decision is made to extend the Prairie Island license, we would file a petition seeking a Certificate of Need in Minnesota within the Five-Year Action Plan window."
- Regarding addition of new solar capacity:
 - add approximately 3,150 MW of utility-scale solar by 2034; and
 - accommodate 575 MW of distributed solar by 2034.

⁵ The petition has since been filed in Docket No. E002/CN-21-668.

- Action plan: “we have proposed significant amounts of solar additions through a gen-tie line reutilizing the interconnection at the retired Sherco and King coal sites ... These additions start in 2024 with the retirement of Sherco Unit 2 and thus our development activities and associated regulatory proceedings will proceed in the near-term.”
- Regarding addition of new wind capacity:
 - add approximately 2,650 MW of wind by 2034.
 - Action plan: “wind additions do not begin until 2028, procurement activities and potentially the regulatory proceedings for some additions could fall within the five-year plan.”
- Regarding existing additional infrastructure:
 - add a double-circuit 140-mile 345 kV gen-tie line from Sherco to Lyon County to connect solar, wind, and firm dispatchable resources to the Sherco interconnection; and
 - add a single-circuit 15-mile 345 kV gen-tie line from King into Wisconsin to connect solar to the King interconnection.
 - Action plan: “We would start these efforts, including the associated regulatory proceedings, within the five-year plan window.”
- Regarding new natural gas capacity:
 - do not add any new combined-cycle resources; and
 - add approximately 2,900 MW of firm, dispatchable capacity resources by 2034.
 - Action plan: “[the plan] includes 400 MW of CTs in Lyon County, Minnesota ... by 2026 ... We would also initiate a proceeding in Minnesota for the Lyon County CT.
 - Action plan: “we also propose initiating a new regulatory docket in the near-term to discuss broader blackstart issues that would include the consideration of other blackstart additions”
- Regarding demand response (DR) resources:
 - add more than 800 MW of additional⁶ demand savings by 2034.
 - Action plan: “The Alternate Plan continues to include the acquisition of 400 MW of incremental DR resources by 2023.”
- Regarding energy efficiency resources:
 - add more than 780 GWh in average annual energy savings.
- Regarding energy storage resources:
 - add 250 MW of storage.

Based upon the alternate plan, the Company requests the following items:

- approval of Company ownership of Sherco and King gen-tie lines plus renewable resources added on the lines;
- approval of 400 MW of CTs in Lyon County, Minnesota and 400 MW CTs in Fargo, North Dakota;
- approval to continue pursuing a 10-year extension for our Monticello Nuclear plant; and

⁶ When compared to the level approved in Xcel’s last IRP.

- approval for black start shift to zonal approach and need for black start resources in each zone which includes:
 - two specific black start additions in Minnesota and Wisconsin by 2026; and
 - new regulatory docket to discuss broader black start issues that would include the consideration of other black start additions in other zones in the out years of our plan to consider optimal technologies.
- use of the Modified Track 2 process for the following acquisition proceedings:
 - solar and wind resources that utilize the transmission interconnection at Sherco;
 - solar resource that utilize the transmission interconnection at King;
 - approximately 400 MWs of CTs in Lyon County to connect to the transmission interconnection at Sherco;
 - any wind or solar additions needed before the next resource plan.

Finally, Xcel anticipates the following regulatory filings:

- a CN proceeding for the Monticello life extension;
- a CN and Route Permit for the Sherco gen-tie line;
- a CN and Route Permit for the King gen-tie line;
- site permits needed for any acquisitions of generation, including generation to utilize the Sherco and King interconnections; and
- a new regulatory docket to discuss broader black start issues that would include the consideration of other black start additions in other zones in the out years of our plan to consider optimal technologies.

II. DEPARTMENT STAFF SUPPLEMENTAL COMMENTS

A. BLACK START UNITS

The Company's reply comments describe the proposed changes to the black start process as planning to move from an approach that relies on a limited number of centrally located units to a process that utilizes an array of decentralized units. The Company also proposes to have a dedicated proceeding outside of this IRP to analyze the proposed black start plan. The Company's response to XLI Information Request (IR) No. 149 provides two basic reasons for this:

We believe a dedicated proceeding outside of this Integrated Resource Plan is the best venue for these issues for several reasons. First, although there are some exceptions, historically, the Commission has used resource planning as a tool to assess and determine the appropriate size, type, and timing of generation resources – and not the location of particular resources. Our planned zonal restoration approach, however, specifically requires the consideration of resource locations for reliability purposes. Second, the identity of black start resources and system restoration plans are highly confidential. A proceeding dedicated to a discussion of these resources, conducted with appropriate measures to protect sensitive

information, minimizes the risk of inadvertently disclosing information regarding our restoration plan that could be exploited by a bad actor.

Department Staff agrees with Xcel's rationale regarding a separate black start proceeding. Note that for purposes of modeling the Company required EnCompass to add certain units. See Table 4-9 of the Company's reply comments for details. Department Staff did not change the Company's inputs regarding the expansion units forced to be added by EnCompass as part of the proposed black start plan. First, Department Staff concluded that the forced units were reasonably reflective of what might be approved by the Commission. If the forced units are not reflective of the plan ultimately approved by the Commission, the actual black start plan would be revised in the Company's next IRP. Second, EnCompass added additional units of the same type as the black start units for economic reasons. This makes it unlikely that the forced units biased the overall expansion plan in a meaningful way.

B. DEMAND AND ENERGY FORECASTS

1. Xcel's Adjustments

The forecast review in this docket had two goals: first to be done quickly and second to establish an acceptable base forecast for long term planning purposes. Given these limits, the forecast review did not address some details that would normally be part of forecast analysis. Thus, as stated in Department Staff's February 11, 2021 Comments, for this IRP, Department Staff neither reviewed the technical details of Xcel's forecasts nor tested all the Company's previous or current statistical models. Instead, Department Staff examined the potential for bias in Xcel's forecasting over the past 15 years. Department Staff's review indicated that the Company's demand and energy forecasts have a systematic bias. Based upon this conclusion Department Staff made adjustments to the Company's demand and energy forecasts in the capacity expansion models used in Comments and Reply Comments. In addition, Department Staff recommended that the Commission:

require Xcel to file and use a forecast from an independent consultant in any future regulatory proceedings. This requirement will enable Xcel's proceedings to continue normally while the Company attempts to audit and identify the flaws in their current forecast process.

In reply comments Xcel identified five contributors to the historical forecast variance identified by Department Staff. Xcel stated that "[t]hese factors were not known at the time the forecasts were developed and can be analyzed and quantified without testing the Company's previous or current statistical models." The five factors are:

- Weather—Department Staff's variance compared actual peak demand to weather-normalized forecasts. During the 15-year period of 2004-2018, weather impacting the peak day was cooler than normal in eight years (contributing to the forecast being higher than actual) and hotter than normal in seven years (contributing to the forecast being lower than actual).

- Wholesale Load⁷—Between 2009 and 2013, all of the Company's contracts with firm wholesale customers expired; all forecasts prior to July 2012 were overstated by the amount of wholesale load that ultimately was not served by the Company.
- Large Customer Load Changes—In 2011 the Company experienced several reductions in large customer loads; all forecasts prior to the reductions assumed that the load would be served.
- Combined Heat and Power (CHP) Operations—In 2017 a customer began serving part of its load from CHP operations and Xcel began adjusting forecasts in 2014 for this event. Thus, all forecasts prior to August 2014 were overstated beginning in 2017 due to the loss of load.
- Energy Efficiency⁸—actual energy efficiency achievements have consistently been greater than forecasted, contributing to the forecast being higher than actual energy and demand.

Using the five factors discussed above the Company updated Department Staff's forecast variance analysis. The Company's updated analysis of demand forecasting was provided in the reply comments at Table 6-1. The Company's updated analysis of energy forecasting was provided in the reply comments at Table 6-3. Department IR Nos. 115 and 116 requested data supporting the Company's variance calculations as shown in Tables 6-1 and 6-3; however, the initial response contained errors. Xcel provided the correct data underlying Tables 6-1 and 6-3 in response to Department IR Nos. 117 and 118.

After briefly reviewing Xcel's explanation and the Company's additional forecasting data (while neither reviewing the technical details of Xcel's forecasts nor testing all the Company's previous or current statistical models), Department Staff's conclusions are as follows:

- First, regarding weather, Department Staff agrees that a forecast assuming normal weather should be compared to weather normalized actuals. To conserve resources Department Staff did not review the Company's weather normalization calculations. Instead, Department Staff simply accepts the Company's adjustment for IRP purposes only.
- Second, regarding wholesale load, large customer load changes, and CHP operations Department Staff agrees with the Company's adjustments. Again, Department Staff did not review any detailed supporting documents to conserve resources. Instead, Department Staff assumed that the adjustments were reasonably measurable. Again, Department Staff accepts the Company's adjustments for IRP purposes only.

⁷ Until notified by the wholesale customer that its contract would not be extended, the Company concluded it was reasonable and necessary for the Company to include the customer's forecasted energy and demand in its long-term forecasts.

⁸ Beginning with the October 2008 forecast, the Company incorporated an adjustment to the demand and energy forecast to account for future energy efficiency amounts.

- Third, regarding energy efficiency, Department Staff notes that the Company's calculations added first-year savings over several years rather than assuming some of the savings expires in future years. The Company's response to Department IR No. 119 states that first-year savings were added based on the method used for forecasting DSM achievements used in the 2008-2018 load forecasts, all of which included a 14-year lifetime assumption for all DSM achievements. Department Staff also notes that incorporating forecast adjustments based upon the difference between what did happen (forecast data with energy efficiency achievements) and what would have happened in an alternate reality (forecast data with assumed energy efficiency achievements removed) is speculative. As with weather normalization, to conserve resources, Department Staff did not review the Company's energy efficiency calculations. Instead, Department Staff simply accepts the Company's adjustment for IRP purposes only.

2. Demand Forecast

Having decided to accept the Company's adjustments for IRP purposes only, Department Staff next reviewed Table 6-1 and the Company's response to Department IR Nos. 115 and 117. This revised data clearly shows that the Company's adjustments did not remove the bias in the demand forecast. Even accepting the Company's adjustments about 90 percent of the demand forecast variances are still too high. However, the degree of bias has been reduced by the adjustments.

The Company observed that the remaining variances are within the bands typically used in IRPs. Department Staff agrees with this observation. However, it is not relevant. The difference between forecast error and forecast bias must be kept in mind. Here, a forecast error is the difference between the forecast value and the actual or experienced value. This difference is expected to be randomly distributed—sometimes too high and sometimes too low. Over a long duration the errors should be too high about half the time and too low about half the time. A forecast bias occurs when the forecast errors are too high most of the time (or vice versa).

The purpose of the forecast band is to account for forecast error not forecast bias.⁹ Forecast bias is addressed by changing the model inputs themselves. Perceived bias is the reason other modeling inputs have been adjusted by parties in this proceeding. To account for the demand forecast bias remaining after incorporating Xcel's revisions for IRP purposes only, Department Staff recalculated the demand forecast adjustments as shown in Table 1 below. Similar to the original adjustment, Department Staff constructed the forecast adjustments using two criteria: maintaining any adjustment for two years and adjusting Xcel's forecast using two percentage point increments. The adjustments were applied to the variances calculated by Xcel in Department IR Nos. 115 and 117.

⁹ This also applies to the band applied to any other model input such as natural gas prices.

Table 1: Demand Forecast Variance and Adjustment

Forecast Year	Remaining Average Forecast Error	Department Forecast Adjustment	Difference
1	1.1%	0.0%	1.1%
2	1.6%	0.0%	1.6%
3	1.7%	-2.0%	-0.3%
4	2.3%	-2.0%	0.3%
5	3.0%	-2.0%	1.0%
6	3.6%	-4.0%	-0.4%
7	4.6%	-4.0%	0.6%
8	5.9%	-6.0%	-0.1%
9	7.7%	-6.0%	1.7%
10	8.9%	-10.0%	-1.1%
11	12.0%	-10.0%	2.0%
12		-10.0%	
13		-10.0%	
14		-10.0%	
15		-10.0%	

Note that the oldest forecast is from 2008, so there is no forecast error data for years 12 to 15.

3. Energy Forecast

Department Staff next reviewed Table 6-3 and Xcel's reply to Department IR Nos. 116 and 118. As with the demand forecasts, the revised data clearly shows that the Company's adjustments did not remove the bias in the energy forecasts. Accepting the Company's adjustments, for IRP purposes only, about 65 percent of the energy forecast variances are still too high.

As before, to account for the remaining energy forecast bias Department Staff recalculated the energy forecast adjustments as shown in Table 2 below. As with the demand forecast adjustment, Department Staff used a minimum two-year interval and two percentage point increments to calculate the energy forecast adjustment from the post-adjustment variances calculated by Xcel in Department IR Nos. 116 and 118.

Table 2: Energy Forecast Variance and Adjustment

Forecast Year	Remaining Average Forecast Error	Department Forecast Adjustment	Difference
1	0.0%	0.0%	0.0%
2	0.0%	0.0%	0.0%
3	0.6%	0.0%	0.6%
4	1.0%	0.0%	1.0%
5	1.4%	-2.0%	-0.6%
6	1.9%	-2.0%	-0.1%
7	3.2%	-4.0%	-0.8%
8	4.5%	-4.0%	0.5%
9	5.7%	-4.0%	1.7%
10	6.6%	-6.0%	0.6%
11	5.5%	-6.0%	-0.5%
12		-6.0%	
13		-6.0%	
14		-6.0%	
15		-6.0%	

Again, the oldest forecast is from 2008, so there is no forecast error data for years 12 to 15.

B. ENCOMPASS AND CONVERGENCE TOLERANCE

1. Background

In this proceeding Xcel used EnCompass both as a CEM and as a production cost model. First, Xcel runs a scenario using EnCompass as a CEM. The purpose of this step is to determine a least cost expansion plan. During this step Xcel's inputs simplify EnCompass' operations, for example, using one off-peak day and one on-peak day each month. Second, Xcel locks-in the expansion plan (from the first step) and re-runs the scenario using EnCompass as a production cost model. The results reported by the Company are from the production cost model run. This is discussed further in the next section.

When used as a CEM, EnCompass uses a mathematical method called mixed integer programming (MIP) to determine the least cost expansion plan. At a high level, EnCompass' MIP process involves two basic steps. In the first step EnCompass determines the potential ideal (or lowest possible cost) expansion plan by adding fractions of units. For example, the potential ideal plan may involve adding 30 percent of a wind unit in 2023, 70 percent of a solar unit in 2025, and 20 percent of a combustion

turbine unit in 2027. The assumption in this proceeding is that fractions of units are not possible in the real world, and thus a second step is necessary.

In the second step EnCompass experiments by adding whole units and not fractions of units in order to create feasible plans. For example, a feasible plan may involve adding one wind unit in 2023 and one combustion turbine unit in 2027. EnCompass continues to experiment until it finds a feasible plan (using whole units) that falls within an acceptable cost range. EnCompass then ceases experimenting and reports the results of the feasible plan.

The range of acceptable costs is defined by the modeler and is referred to as the “MIP Stop Basis.” EnCompass’ MIP Stop Basis input is a fraction of the cost of the potential ideal plan. The potential ideal plan still includes fractional units, so that the ideal (using whole units) plan cost must be higher than the potential ideal plan. During the MIP process, the costs of this potential ideal plan will increase as potential feasible plans are evaluated and eliminated from consideration. For example, if the cost of the potential ideal plan is \$6.527 billion¹⁰ and the MIP Stop basis input is 80 (which is 0.0080) then the maximum allowed cost would be \$6.579 billion.¹¹ The first feasible plan that EnCompass finds that has a cost between \$6.527 billion and \$6.579 billion would be reported by EnCompass as the expansion plan.¹²

Note that any changes to EnCompass inputs that change the costs considered in creating the ideal plan (such as fuel costs or the demand and energy forecasts) will change the range of acceptable costs even if the MIP Stop Basis input was not changed. Thus, use of a higher MIP Stop Basis does not necessarily mean a wider range of acceptable costs if other inputs were changed as well. For example, in a first run EnCompass might calculate a potential ideal plan cost of \$1.000 billion. If the MIP Stop Basis input is 80, then the range of acceptable costs is from \$1.000 billion to \$1.008 billion. This creates a gap of \$8 million for feasible plans. Second, assume that the modeler runs a contingency with a lower energy and demand forecast, resulting in a potential ideal plan cost of \$0.500 billion. If the MIP Stop Basis input remains at 80, then the range of acceptable costs narrows to between \$0.500 billion and \$0.504 billion. This leaves a gap of only \$4 million for feasible plans. Since the cost of expansion units has not changed, the resulting \$4 million gap might be too small for EnCompass to fit in whole expansion units (rather than fractions).¹³ However, if the MIP Stop Basis input is increased from 80 to 160, then the range of acceptable costs broadens to between \$0.500 billion and \$0.508 billion (a gap of \$8 million again). Thus, the use of a higher MIP Stop Basis in the second (low forecast) EnCompass run creates the same \$8 million range of acceptable costs as in the first EnCompass run.

As shown above, everything else held constant, the smaller the MIP Stop Basis input the narrower the range of acceptable costs becomes. However, EnCompass, on average, will require a longer duration to find a feasible plan and may not be able to find a plan at all if computing resources are limiting.

¹⁰ The ideal cost includes only variable costs of existing units and all costs (fixed and variable) for new units. So, the ideal cost excludes fixed costs of existing units.

¹¹ The equation is $\$6.527 \text{ billion} * [1 + (80/10,000)] = \6.579 billion .

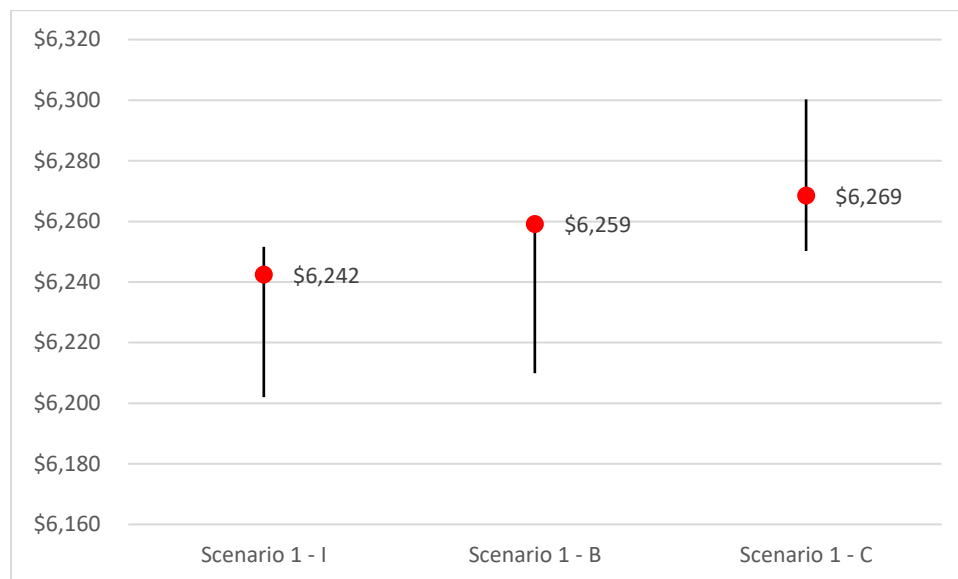
¹² It is possible to require EnCompass to find and report on multiple plans but that and other complications are not discussed here.

¹³ While the numbers are hypothetical, this situation was encountered by Department Staff in this proceeding.

2. Understanding EnCompass Cost Results

When comparing the costs of various plans to each other it is important to keep the convergence tolerance of the EnCompass modeling process in mind. For example, in Chart 1 below the lines represents the range of acceptable costs (from the potential ideal plan's cost to the maximum allowed cost) for three scenarios. The dots represent the cost reported by EnCompass for the feasible plan for the three scenarios. For simplicity, assume the only difference among the three scenarios is that they have different expansion units available to be added. Of the three plans, at first glance "Scenario 1 – I" is clearly reported as least cost, "Scenario 1 – B" has a cost higher by \$17 million, and "Scenario 1 – C" has a cost higher than Scenario 1 – I by \$27 million.

Chart 1: MIP Convergence Example (\$ million)



However, when examining the bars in Chart 1, which show the range of acceptable costs, it is possible for both Scenarios 1 – I and 1 – B to have feasible plans with costs lower than the \$6,242 million reported for Scenario 1 – I because the bars for both extend below \$6,242 million. Likewise, it is not possible for Scenario 1 – C to have a feasible plan with a cost lower than the \$6,242 million because the bar (the range of acceptable costs) does not extend far enough. In this example, given the information available in Chart 1 Department Staff would conclude two things. First, Scenario 1 – C clearly cannot be least cost because Scenario 1 – I has a reported cost lower than the potential ideal (or lowest possible) cost of Scenario 1 – C. Second, the reported costs of Scenarios 1 – I and 1 – B are within the tolerance inherent in the model; meaning one plan cannot be said to be cheaper than the other.¹⁴

¹⁴ The existence of a margin of error for a modeling result is not unique to EnCompass and has been discussed by the Department in past resource plan comments regarding Strategist results. For an example, see the Department's July 8, 2016 comments in Docket No. E002/RP-15-21.

3. Understanding EnCompass Expansion Unit Results

The convergence tolerance inherent in EnCompass' cost minimization routine also impacts how to understand the number of expansion units added. Table 3 below shows the solar unit capacity added in four contingencies for 12 different scenarios. These results were taken from an early test run of EnCompass and do not represent Department Staff's final analysis. Instead, the results are merely used to illustrate the matter at hand.

For ease of understanding, in Table 3 the capacity added is shown as the change in capacity added from the base case of that scenario. For example, in Scenario 1, changing to low wind prices resulted in EnCompass adding an additional 100 MW of solar capacity.

Table 3: MIP Convergence and Expansion Units (Solar MW)

	Low Wind Prices	High Wind Prices	Low Solar Prices	High Solar Prices
Scenario 1	100	300	750	50
Scenario 2	50	300	(50)	(100)
Scenario 3	(200)	(150)	750	(150)
Scenario 4	(250)	50	850	(250)
Scenario 5	-	250	650	(50)
Scenario 6	(150)	100	700	-
Scenario 7	650	650	750	(50)
Scenario 8	(450)	-	50	(550)
Scenario 9	100	100	50	(100)
Scenario 10	150	350	450	400
Scenario 11	100	250	450	(50)
Scenario 12	(250)	150	200	(600)
Increase	6	10	11	2
Decrease	5	1	1	9
Increase > 100 MW	2	7	9	1
Decrease <= 100 MW	5	1	-	4

When reviewing the data in Table 3 Department Staff expected the following results:

- increase in wind prices—results in more solar capacity added;
- decrease in wind prices—results in less solar capacity added;
- increase in solar prices—results in less solar capacity added; and
- decrease in solar prices—results in more solar capacity added.

Department Staff understood that this would not always be the result because complex system effects may lead to unexpected results. However, the expectation was that the expected results should appear in the vast majority of the cases. The actual result, in the contingency where wind prices are decreased, was that the most common result is that more solar capacity is added rather than less.

To understand why an unexpected result was occurring so frequently, Department Staff considered several potential explanations. One explanation of importance is that the net cost increase/decrease of adding/subtracting 50 MW or 100 MW of solar capacity might be so low, that the cost increase leaves several plans within the acceptable range of costs determined by the MIP process.

The hypothetical cost range discussed above was \$6.527 billion to \$6.579 billion.¹⁵ In contrast, a 50 MW solar unit added in 2027 might impose a cost increase of about \$14 million¹⁶ in net present value. If the actual least cost plan is \$6.550 billion the net cost increase of adding another 50 MW of solar results in a plan with a total cost of \$6.564 billion, still within the acceptable range. From this it can be seen that the existence of a range of acceptable costs implies that cost changes that are small in magnitude may be within the convergence tolerance of the model. In this example, there are at least two plans (with and without the hypothetical solar unit added in 2027) within the acceptable range and either might be reported by EnCompass.

In summary, at 50 MW each Xcel's wind and solar expansion units are too small for EnCompass to truly determine if the addition or subtraction of one or two units is cost effective. In future resource plans, if Xcel determines to use discrete unit sizes, Department Staff recommends Xcel consider MIP convergence tolerance as a factor in determining the sizes to use. For the current resource plan, Department Staff recommends that the Commission consider differences in expansion units of 100 MW or less to be meaningless.

4. Using EnCompass' Potential Ideal Plan

Another way to run EnCompass is to skip the step where the model determines the best combination of whole units to add and have the model simply report the potential ideal plan. For example, in a given year EnCompass might show 0.4 wind units, which is equivalent to using 40% of the cost and capacity values of a full wind unit. The next year EnCompass might show 0.6 wind units. This is the same as adding another wind unit with 20% of the cost and capacity values of a full unit. This option has the advantage of keeping all costs and constraints intact but bypassing the step in which EnCompass searches for the best way to round the units up or down, and thus reducing runtime. In addition, this approach avoids the variability that is inherent in the MIP acceptable cost range process.

¹⁵ While not drawn from the results of any one actual scenario, this range is reflective of the ranges actually found in portions of the Department's analysis.

¹⁶ Calculated assuming a 50 MW unit, added in 2027, priced at \$45 per MWh (escalated at two percent annually), with a 22 percent capacity factor, the ability to recover from the market (or avoid generation from existing units) only 75 percent of its costs—so that 25 percent of its costs represent a net cost increase to Xcel's ratepayers, all discounted to the starting year of the model run.

However, use of the potential ideal plan raises the question “does adding a fraction of a unit actually provide meaningful resource planning information?” One response would be that, since the expansion plan is based on long-term forecasts, the IRP process can only determine the approximate size, type, and timing of new units. Thus, the specific values must be interpreted as including a degree of uncertainty and acquiring approximately the capacity selected would be reasonable.

A second response would be that wind turbines and solar panels actually come in very small sizes, less than 10 MW per wind turbine and smaller still for solar panels. Therefore, wind and solar projects could be developed in nearly any size. This means that adding fractions of wind and solar units is reasonable.¹⁷ A more difficult question is how to consider the capacity units (here modeled as CT units). Department Staff has consistently assumed that the CT units are merely generic capacity. This means that anything that can perform essentially the same function would be acceptable. Since load management can serve many of the same functions as a CT it would be acceptable. Capacity (in the form of load management) can be acquired in nearly any size as well. In summary, the units being selected in Xcel’s resource plan do not have to be acquired in any one size increment.

Overall, Department Staff concludes that reporting the potential ideal plan costs is a reasonable way to use EnCompass. Department Staff recommends Xcel consider the benefits and costs of reporting fractions of units when running EnCompass for the Company’s next IRP.

D. MODELING BACKGROUND

For these supplemental comments, Department Staff used EnCompass to review Xcel’s modeling efforts. This is the first IRP where Department Staff relied solely on EnCompass. The general process followed by Department Staff when reviewing CEM data is as follows:

1. obtain from the applicant a base case file and the commands necessary to recreate the various scenarios explored by the Company;
2. re-run the applicant’s base case file to make sure the outputs match and that Department Staff is working with the correct files (matching analysis);
3. review the base case’s inputs and outputs for reasonableness;
4. create a new base case, which includes any changes deemed necessary to the Company’s base case;
5. run scenarios of interest on the new base case to explore various risks and alternative futures;
6. assess the results of the scenarios and establish a new preferred case; and
7. run scenarios of interest on the new preferred case to test the robustness of the preferred case.

¹⁷ One limiting factor is that, to actually be acquired, generation projects above a certain size must go through the MISO generation interconnection queue. Projects in MISO’s queue tend to come in sizes rounded to 50 MW. But, that is not required. Of course, there are ways around the need to go through the MISO generation interconnection queue—such as connecting to the distribution grid.

For these supplemental comments Department Staff did not perform steps 3 and 4 in detail. Instead, Department Staff relied upon the review and the new base case from prior rounds of analysis; see Department Staff's February 11, 2021 comments at pages 55-58 for details. Note that Department Staff altered the forecast adjustment in Department Staff base case file as discussed above.

Department Staff's overall goal in reviewing a utility's modeling efforts is to determine if the Company's proposed plan results in a reliable, low cost, low impact system that manages risk, and to recommend modifications if needed. Figure 1 below illustrates how the four overall goals are implemented in EnCompass analysis.

Figure 1: Minnesota Decision Criteria and Modeling

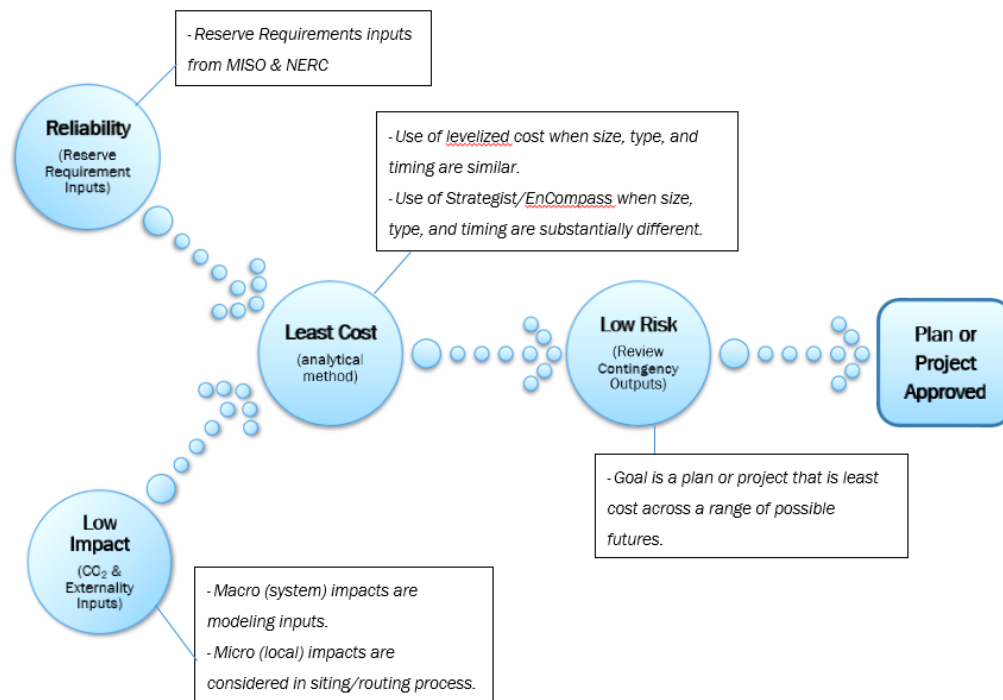


Figure 1 shows that, when evaluating modeling results, the present value of societal costs (PVSC) outputs already include the Commission's reliability and environmental impact criteria. Since EnCompass' function is to minimize cost, that is also included in the modeling results. Thus, when evaluating modeling outputs Department Staff's focus is on understanding why the model is producing the results, the risks inherent in the results, and how the plan contributes to other State goals not reflected in the modeling inputs, such as greenhouse gas reduction goals.

E. *ENCOMPASS ANALYSIS—PART 1*

1. *Matching Analysis*

As described by Department Staff in prior rounds of Comments in this docket, the point of Department Staff's matching analysis is to verify that the data received by Department Staff is the same data used by the utility. Given the complexity of utility databases and the repetitive nature of downloading and saving modeling spreadsheets, it is relatively easy for modelers to have mismatched inputs and outputs.¹⁸ However, if parties use different data than the utility, all subsequent party analysis has the potential to be meaningless. Therefore, the matching process is a critical component of analyzing the utility's CEM.

i. *Xcel's Updated Database*

Department Staff's February 11, 2021 Comments in this docket attempt to provide an outline of the structure of Xcel's original database.¹⁹ Department Staff describes how Xcel's original database contained fifteen "baseload" scenarios (numbered 1 through 15) and approximately twenty "contingencies" or "sensitivities" for each baseload scenario (lettered A through V).²⁰ Further, Department Staff noted in its June 25, 2021 Comments that Xcel's database also contained a number of additional contingencies specific to Scenario 9, Xcel's preferred plan. Finally, Department Staff described how Xcel did not produce a unique expansion plan for each scenario/contingency combination; instead, many of the contingencies were evaluated solely as production cost runs, which run a new dispatch routine on an existing expansion plan. A visual summary of the Company's original database is provided in Attachment 1A to these Comments.

In its updated filing, Xcel provided a much smaller database. Xcel's updated database contains only four of the original fifteen baseload scenarios examined in its original database: Scenarios 1-Reply (Updated Base Case), 4-Reply, 9-Reply, and 12-Reply. In addition, the Company introduced three "Black Start" scenarios: Scenarios 4-Black Start, 9-Black Start, and 12-Black Start. Xcel ran one expansion plan, one PVSC run, a production cost run with externality values, and one Present Value Revenue Requirement (PVRR) run, and a production cost run without externality values for each of the four baseload and three black start scenarios. For Scenarios 1-Reply, 9-Reply, and 9-Black Start only, the Company looked at sixteen additional contingencies. Again, Xcel did not produce a unique expansion plan for each

¹⁸ For example, a modeler might upload an input spreadsheet into EnCompass (Input 1), run the model and download and save the outputs (Output 1), change the input data within EnCompass without downloading the new input spreadsheet (Input 2), and run the model and download and save the new outputs by overwriting the original outputs (Output 2). In this example, the modeler would have saved the mismatched Input 1 spreadsheets and Output 2 spreadsheets but may believe those datasets correspond to each other.

¹⁹ See Attachment 6 to the February 11, 2021 Comments.

²⁰ As described in Attachment 6 to its February 11, 2021 Comments, Department Staff examined an additional 21 scenarios beyond the 15 submitted by Xcel, for a total of 36 scenarios. Department Staff examined all contingencies submitted by Xcel, running each scenario/contingency combination as both an expansion plan run and a production cost run.

scenario/contingency combination.²¹ A visual summary of the Company's updated database is provided in Attachment 1B to these Comments.²²

ii. Department's Updated Matching Analysis Methodology

Department Staff's February 11, 2021 Comments and June 25, 2021 Comments both detailed Department Staff's matching analysis process. While many datasets and assumptions used in Xcel's updated database appeared to be the same as those used in the original database, Department Staff nonetheless performed a new matching analysis to verify the integrity of the new data provided. Additionally, Department Staff refined and updated its matching analysis methodology, and provides an updated explanation of the process in these Comments.

As in its original matching analysis, Department Staff did not match every scenario/contingency combination provided by Xcel. As noted in Department Staff's February 11, 2021 Comments:²³

This is because the goal is to validate datasets used by Xcel; if a dataset can be validated through a single expansion plan run⁸⁷ and a single production cost plan run, no further analysis is needed. The Department reasons that since each scenario or contingency corresponds with a particular input file, if the input file can be validated for a given expansion plan run and production cost run, it is unnecessary to keep validating the same file in other runs.

⁸⁷ If applicable; as submitted by Xcel, not all contingencies are associated with expansion plan runs.

To this point, Department Staff offers a further refinement: it's likely that a single dataset need only be validated through a single expansion plan run *or* a single production cost run. However, performing both types of runs on the same dataset (where applicable) helps validate the data associated with the scenario settings, rather than simply the data contained in the dataset.²⁴ In the instant Comments, Department Staff attempted to match the minimum number of runs required to match all provided datasets, along with one additional run (Scenario 1 – Reply – PVSC) that helped validate scenario settings. Attachment 1C shows a list of runs identified for matching by Department Staff that meet these parameters, along with the corresponding datasets and output files. Attachment 1D shows the Company's updated database with runs identified for matching; the runs highlighted in Attachments 1C and 1D correspond. In its updated matching analysis, Department Staff also looked at slightly different output figures to validate the Company's inputs.

²¹ For an updated description of which scenarios and contingencies were examined by Department Staff for these Comments, see the next section below.

²² Xcel provided to Department Staff both "optimized" and "locked" databases; the purpose of the latter is discussed in the matching methodology section. The table provided in Attachment 1B depicts the optimized database only.

²³ See page 79 of Department Staff's February 11, 2021 Comments.

²⁴ Note that each scenario will have unique scenario settings data; therefore, unlike datasets, which may get used across multiple scenarios, the only way to validate all scenario settings data would be to match each scenario submitted by a utility. Therefore, while it is likely appropriate to attempt to match every dataset submitted, in the interest of time it's likely also appropriate to match simply a "sample" of scenario settings data by matching both expansion plan and production cost runs associated with a single dataset.

In its February 11, 2021 Comments, Department Staff matched the sum of the net present value of the total operating costs and carrying charges from the EnCompass Company Capital Report (“Operating Costs”).²⁵

Department Staff continued to use the Operating Costs for matching Xcel’s production cost runs. However, for expansion plan runs, Department Staff instead used the PV Cost (\$000) value (which is the objective function used by EnCompass when optimizing) to validate the Company’s data. From Department Staff’s perspective, it is logical to include fixed costs when matching an expansion plan run, since incorrect fixed cost data could completely change an expansion plan. However, production cost runs are based on an existing expansion plan; as such, fixed cost data is already validated in the parent expansion plan and doesn’t need to be validated again.²⁶ As in Department Staff’s original matching analysis, Xcel’s manual calculation of externality costs were not included in this process; therefore, the matching analysis process outputs—including the PV Cost (\$000) values—are representative of final plan costs.

Regarding use of Xcel’s “locked” expansion plans to validate the production cost run data, as described in Department Staff’s February 11, 2021 Comments:²⁷

For the MIP stop basis to determine whether two plans fall into an acceptable range, the inputs of those two plans must match exactly. In the case of Scenario 1, Xcel’s and the Department’s inputs matched because both parties used the same datasets and the same run assumptions. Scenario 1-PVSC (*author note: a production cost run*), however, uses the expansion plan of Scenario 1 (*author note: an expansion plan run*) as an input; since the Department and the Company produced slightly different expansion plans from Scenario 1, the Scenario 1-PVSC results could not be compared. [Footnotes Omitted]

iii. Department Staff’s Updated Matching Analysis Results

Department Staff’s expansion plan and production cost matching analysis results can be found in Attachments 1E and 1F to these Comments, respectively. Department Staff was able to match a majority of datasets used by Xcel but was unable to validate the Company’s Sensitivity E (high forecast) dataset. Department Staff’s result is shown below:

²⁵ Net present value is shown in year 0 of the EnCompass Company Capital Report.

²⁶ Moreover, production cost runs do not generate a Plan Cost Report in EnCompass, making the objective function harder to determine.

²⁷ See pages 71-72 of Department Staff’s February 11, 2021 Comments.

**Table 4. Xcel's Versus Department Staff's Scenario 1 – Reply – E
(Present Value Cost Results, Actual and Percent Difference, and MIP Stop Bases Used)**

Expansion Plan Scenarios (Optimized Database)	MIP Stop Basis	PV Costs (\$000), Actual and Percent Difference
Xcel's Scenario 1 - Reply - E	40	\$14,705,455
Dept Scenario 1 - Reply - E	40	\$14,359,386
Delta		\$(346,069)
Percent Difference		-2.35%

Table 4 shows that when Department Staff ran Scenario 1 – Reply – E exactly as Xcel had submitted it, Department Staff's output was unacceptably different from the Company's output. Since the MIP stop basis of each run was set at 40, Department Staff's output would need to be less than 0.40 percent different from the Company's output for the results to be within an acceptable of each other. As a result of this difference, Department Staff is unable to validate Xcel's Sensitivity E dataset and concludes that any of the Company's results that use this dataset may be incorrect.²⁸ This includes the following runs:²⁹

- Scenario 1 – Reply – E
- Scenario 9 – Reply – E
- Scenario 9 – Black start Sherco King – E
- Scenario 1 – Reply – Q
- Scenario 9 – Reply – Q
- Scenario 9 – Black start Sherco King – Q

Typically, Department Staff would prefer to obtain a new Sensitivity E dataset or a new set of outputs from the Company. However, as in its previous comments, Department Staff used its own sales forecast in creating Department Staff's original base case. Additionally, Department Staff planned to use its own high and low sales forecasts for Sensitivity E and Sensitivity D runs, respectively. Given that this was the case, and that Department Staff would not be using the Sensitivity E dataset throughout the remainder of its analysis, Department Staff did not request a new dataset or outputs from the Company, considering the matter resolved from Department Staff's end. However, other parties should be aware that Xcel's Sensitivity E dataset does not produce the results claimed in the corresponding output data.

²⁸ Note that in Xcel's original database, Department Staff was able to match the high forecast sensitivity, indicating that different Sensitivity E datasets were used in the original versus the updated filings.

²⁹ Note that each of these runs is an expansion plan run. Department Staff was able to verify corresponding production cost runs. However, because Xcel's production cost runs are built upon "locked in" expansion plan datasets, the datasets validated in the high forecast production cost runs do not include the Sensitivity E dataset. To see this distinction, see Attachment 1G to these Comments.

2. Department Staff's Preferred Base Case

The next step in Department Staff's process is to create a new preferred base case using the Department's preferred inputs and assumptions; all further analysis is then performed on Department Staff's preferred base case. In these comments, Department Staff refers to its June 25, 2021 preferred base case as its "original base case" and its preferred case in the instant Comments as its "updated base case."

i. Department Staff's Original Base Case

In its June 25, 2021 Comments, Department Staff detailed the assumptions made in Department Staff's original base case and contrasted these with the corresponding assumptions made by Xcel in the Company's original base case. Table 5 is copied from those Comments for ease of reference:

Table 5. Assumptions in Department Staff's Original Base Case (6/25/2021) versus Xcel's Original Base Case filed 6/30/2020³⁰

Xcel Original Base Case Assumption	Department Staff Original Base Case Assumption
Did not include Commission-approved resources	Added Commission-approved resources Deuel Harvest Wind, Elk Creek Solar, Mower County Wind, Borders Repower, Ewington Repower, Grand Meadows Repower 2023, Nobles Repower 60Pct, Pleasant Valley Repower (used Xcel datasets or created by Department Staff) ³¹
Used high externalities/regulatory costs	Used Xcel's mid externalities/regulatory costs (used Xcel dataset)
Used NSP Energy and Demand Forecasts	Used Department's monthly energy and demand load forecasts instead of Xcel's forecasts. For End Effects repeated 2035 monthly data from beginning of 2036 through end of 2045
Used Historic Energy Efficiency Demand Forecast, No End Effects	Used Department's monthly demand forecast instead of Xcel's for impacts of pre-2020 energy efficiency. For End Effects repeated 2035 monthly data from beginning of 2036 through end of 2045. Post-2020 energy efficiency unchanged
No End Effects for: Distributed Solar Capacity, Electric Vehicle Energy and Demand, Energy Efficiency Demand, Demand Response Capacity	Repeated Xcel's 2035 monthly data from beginning of 2036 through end of 2045 for: Distributed Solar Capacity, Electric Vehicle Energy and Demand, Energy Efficiency Demand, Demand Response Capacity

³⁰ A full list of inputs and times series changes incorporated into Department Staff's original base case can be found in Attachment 2 to these Comments.

³¹ Department Staff also noted that the Heartland Divide PPA, which was approved by the Commission on April 28, 2021 in Docket No. E002/M-20-806, was not included in either Xcel's original base case or Department Staff's original base case.

No End Effects for: Non-Baseload Retirements	Extended all non-baseload resources set to retire between the beginning of 2035 and the end of 2045 to retire on December 31, 2045.
Used aggressive capital and O&M costs for nuclear units	Increased Construction Cost inputs and Fixed cost escalation factor for nuclear units
Used Generic Resource Fuel Prices for Generic CT and Generic CC units	Changed Xcel's Generic CT fuel price to Xcel's Invenergy Cannon Falls price; changed Xcel's Generic CC fuel price to Xcel's Black Dog price
Set MISO Capacity Market Prices at maximum Cost of New Entry (CONE) price	Changed Xcel's value Cost of New Entry (CONE) from the maximum price to the average price
Included a MISO spinning reserves requirement	Eliminated Xcel's spinning reserve requirement
Included an input attributing CO ₂ emissions to MISO spot market energy transactions	Removed an input attributing CO ₂ emissions to MISO spot market energy transactions
Used CO ₂ emissions for Blue Lake 1 and Wheaton 1-4 and 6 that were dissimilar to comparable units	Changed CO ₂ emissions for Blue Lake 1 and Wheaton 1-4 and 6 to be more similar to comparable units

In those Comments, Department Staff also noted that its original base case used an updated version of EnCompass, whereas Xcel's original base case used an older version. While not typically a concern, this particular difference in versions had the potential to impact the resulting expansion plans.³²

ii. Department Staff's Updated Base Case

Some of the changes incorporated into Department Staff's updated base case were dependent upon the changes made to Xcel's updated base case filed June 25, 2021. In its updated filing, Xcel incorporated the Commission-approved resources that Department Staff had included in its original base case: Deuel Harvest Wind, Elk Creek Solar, Mower County Wind, Borders Repower, Ewington Repower, Grand Meadows Repower 2023, Nobles Repower 60Pct, Pleasant Valley Repower.³³ As a result of these additions, Department Staff did not need to include them in its updated base case. The Company also included in its updated base case a non-baseload resource set to retire during the end effects period; as a result, Department Staff extended the retirement date of this resource to 12/31/2045.³⁴ Xcel also used an updated version of EnCompass, which meant that Department Staff could be assured that any differences in expansion plans between Department Staff and the Company would not be due to the version of EnCompass used.

³² See page 20 of Department's June 25, 2021 Comments for a discussion.

³³ Xcel also incorporated some additional datasets, including the Heartland Divide PPA, into its updated base case that had not been incorporated into either Xcel's original base case or Department Staff's original base case.

³⁴ This resource was St. Cloud hydroelectric, which Xcel assumed was retiring 5/31/2041.

There were two additional assumptions in Department Staff's updated base case that warrant further discussion: the treatment of hourly shape files during the end effects period and the treatment of externality costs in both the model and in Xcel's post-processing calculations.

a. Hourly Shape Files and End Effects

An important component of Department Staff's original base case was the incorporation of Department Staff's preferred forecasts. As noted in the above table, Department Staff used its own monthly demand and energy forecasts for Northern States Power Company's (NSP) whole service territory, and also used its own monthly *demand* forecast for pre-2020 demand side management and energy efficiency load (DSM/EE).³⁵ In its February 11, 2021 Comments, Department Staff noted that it was unable to adjust any DSM/EE *energy* forecasts in EnCompass. This was because Department Staff's preferred forecasts were constructed from Strategist data, which was entirely based around monthly projections. In contrast, the corresponding DSM/EE forecasts used in EnCompass were based upon hourly rather than monthly data.³⁶

In addition to using its own forecasts, Department Staff also incorporated "end effects" into its original base case. Including end effects in a CEM is a way to counteract the model's bias against adding energy-intensive units towards the end of the planning period. Department Staff's end effects treatment typically involves "repeating" the last year of the model several times. In this case, the last year of Xcel's planning period is 2034. But a major event happens that year, Prairie Island unit 2 retires. Therefore, Department Staff repeated the 2035 year for each year between 2036 and 2045.³⁷ To do this, Department Staff changed the retirement date of any non-baseload resource set to retire during the end effects period to a new retirement date of 12/31/2045.³⁸ Department Staff then repeated 2035 data from the "load group" time series. This impacted the following data streams:

- NSP: Monthly Energy and Demand Forecasts
- Electric Vehicles (EVs): Monthly Energy and Demand Forecasts
- Demand-Side Management: Monthly Demand Forecasts
- Energy Efficiency: Monthly Demand Forecasts
- DR: Monthly Demand Forecasts
- Direct Load Control (DLC): Monthly Demand Forecasts
- Distributed Solar ("DG Solar"): Monthly Demand Forecasts
- Community Solar Gardens (CSG): Monthly Demand Forecasts

³⁵ Department Staff did not adjust the forecasts of any other resources besides NSP demand, NSP energy, and pre-2020 DSM/EE demand in the original base case.

³⁶ As noted in Department Staff's February 11, 2021 Comments, these hourly load shapes were constructed at least in part from the Strategist monthly data.

³⁷ Thus, while the "planning period" spans 2020 through 2034, the "study period" spans 2020 through 2045.

³⁸ Note that because one of the main issues at stake in these proceedings is the retirement of the four baseload plants (King, Sherco unit 3, Monticello, and Prairie Island); therefore, Department Staff did not perform an end effects treatment on these resources.

While Xcel's original database contained monthly energy time series data for both EVs and for the whole NSP service area, the database did not have monthly energy data for any of the other load groups listed above (DSM, EE, DR, DLC, DG Solar, and CSG). Rather, Xcel used hourly load shape forecast data for these other load groups. As a result, end effects were incorporated into both the monthly energy and demand forecasts for NSP and EVs, but only to the demand forecasts for the remaining load groups.

In its updated base case, Department Staff expanded its end effects treatment by repeating the 2035 hourly shape data of those remaining load groups for each year of the end effects period (2036-2045).³⁹

Department Staff also learned that in EnCompass, anytime a modeler enters a new peak or energy forecast, the load shape will automatically adjust to meet the new criteria. Therefore, while Department Staff had previously been concerned that it was unable to incorporate Department Staff's preferred monthly DSM/EE energy forecasts into EnCompass, this was not actually a problem. Xcel's DSM/EE time series in EnCompass are either monthly peak or hourly load shape data; therefore, since Department Staff incorporated its preferred monthly peak data for pre-2020 energy efficiency, the hourly shape would have automatically adjusted to the new peak criteria. However, Department Staff also learned that simply adjusting the monthly peak forecasts to account for end effects will not fully incorporate end effects into the hourly load shape data. For end effects to be fully accounted for in the load group data, both the monthly peak and hourly load shape data needed to repeat the 2035 year.

b. Externality Costs

As Department Staff explained in its June 25, 2021 Comments, Xcel calculates the net present value (NPV) of its base case using three cost streams: the EnCompass-generated revenue requirement, the EnCompass-generated externality cost, and the Xcel-calculated externality cost. The Xcel-calculated externality cost values are not generated directly from EnCompass; instead, these values are the product of a manual calculation using both outputs from EnCompass modeling and other data sources.⁴⁰ The goal of this post-processing analysis is to avoid the double-counting of carbon dioxide (CO₂) emissions and externality costs associated with spot market purchases and sales in the Mid-Continent Independent System Operator (MISO) energy market, adding emissions and costs to each scenario when purchasing from MISO and deducting emissions and costs to each scenario when selling to MISO.

Regarding these calculations Department Staff noted the following:⁴¹

Xcel's spreadsheet contains six methodological approaches to calculating CO₂ emissions and externality costs associated with MISO spot market purchases and sales. Xcel relied on a methodology referred to as

³⁹ Not all load shapes required changes to fully implement end effects, as some shape files already had data repeated each year during the end effects period. A list of changed shape files can be found in Attachment 2 to these Comments.

⁴⁰ See page 14 of Department Staff's June 25, 2021 Comments.

⁴¹ See page 15 of Department Staff's June 25, 2021 Comments.

Alternative #4 to determine the Xcel-calculated externality cost in reporting the costs of its resource plans. The other five methodological approaches treat market sales and purchases differently. However, after meeting with the Department, Xcel agreed to use Alternative #5. The Department's review of Xcel's calculation of the externality cost stream is limited to reviewing the methodological approach for Alternative #5.

Xcel's Alternative #4, which was used in Xcel's original calculations, adjusts the total NPV of each scenario in 2023 dollars by adding CO₂ externality costs associated with MISO purchases and deducting CO₂ externality costs associated with MISO sales for the years prior to 2025. Beginning in 2025, the adjustment to the total NPV of each scenario (in 2023 dollars) only deducts CO₂ externality costs associated with MISO sales and does not add CO₂ externality costs associated with MISO purchases.

In contrast, Xcel's Alternative #5 adjusts the total NPV of each scenario (in 2023 dollars) by adding and subtracting CO₂ externality costs associated with MISO purchases and sales (respectively) in the years before 2025. Beginning in 2025, Alternative #5 assumes that CO₂ externality costs become internalized as "regulatory" costs, and since these regulatory costs will be captured within MISO's Locational Marginal Prices (LMPs), it is unnecessary to continue to capture externality costs beyond 2025 for either sales or purchases.

When Xcel used Alternative #4 in its post-processing analysis, it appeared to Department Staff that Xcel was attempting to remove the effect of MISO purchases on the Xcel-calculated externality costs but maintain the deduction of MISO sales on the Xcel-calculated externality costs, which would artificially reduce the total NPV of the scenario (in 2023 dollars). Department Staff disagreed with this approach, as Xcel should account for emissions associated with MISO purchases if it is going to account for emissions associated with MISO sales in its post-processing analysis of externality costs.

In order to address this deficiency with Alternative #4, Department Staff initially altered an EnCompass input called the "MISO emissions release rate" and set it to zero. The MISO emissions release rate contains values that Xcel described in response to XLI IR No. 104, which is a forecasted system average CO₂ emissions rate for MISO.⁴² This rate is used to quantify emissions associated with Xcel's market purchases. Zeroing out this value in EnCompass would have the effect of zeroing out emissions that result from MISO purchases and ultimately avoid the double-counting of the EnCompass-generated revenue requirement attributable to MISO purchases and Xcel's post-processing adjustment of those same purchases.

However, this modeling adjustment provided little value, as it only affected modeling years 2023 and 2024; beginning in 2025, Xcel stopped adding CO₂ externality costs associated with market purchases to the total NPV of each scenario (in 2023 dollars). It also did not address Xcel's deduction of MISO sales from the total NPV of each scenario, which remained in place through 2045.

⁴² See page 16 of Department Staff's June 25, 2021 Comments.

The complexity of this modeling task and the unequal treatment of MISO purchases and sales in Xcel's post-processing analysis of Alternative #4 led Department Staff to suggest that Xcel should adopt Alternative #5 instead. This was due to the simplifying assumption that the Commission's regulatory costs for CO₂ would be reflected in the LMPs beginning in 2025 in most contingencies, obviating the need for Xcel to calculate externality costs in post-processing analysis: the costs of MISO purchases and sales would be reflected in the EnCompass-generated revenue requirement, one of the components of the calculation of the total NPV of each scenario in 2023 dollars. This effectively "zeroed" out Xcel's post-processing adjustment to the total NPV of each scenario (in 2023 dollars) beginning in 2025 in most runs. This also allowed Department Staff to maintain the "MISO emissions release rate" input in its EnCompass modeling; thus, in its updated base case, Department Staff removed the zero input from the MISO emissions release rate that had been used in Department Staff's previous new base.

Xcel agreed to use Alternative #5 moving forward. Department Staff concluded that adjusting the costs of the resource plan by accounting for the externality costs of CO₂ emissions associated with market sales and purchases until 2025 is reasonable.

iii. Xcel's vs. Department Staff's Updated Base Case

Table 6 shows the final components of Department Staff's updated base case, compared to Xcel's corresponding assumptions in its updated base case.

Table 6. Assumptions in Department Staff's Updated Base Case (10/15/2021) versus Xcel's Updated Base Case filed 6/25/2021⁴³

Xcel Updated Base Case Assumption	Department Staff Updated Base Case Assumption
Used Xcel's high externalities/regulatory costs	Used Xcel's mid externalities/regulatory costs (used Xcel dataset)
Used Xcel's NSP Energy and Demand Forecasts	Used Department's monthly energy and demand load forecasts instead of Xcel's forecasts. For End Effects repeated 2035 monthly data from beginning of 2036 through end of 2045
Used Xcel's Energy Efficiency Demand Forecast, No End Effects	Used Department's monthly demand forecast instead of Xcel's for impacts of pre-2020 energy efficiency. For End Effects repeated 2035 monthly and hourly shape data from beginning of 2036 through end of 2045. Post-2020 energy efficiency unchanged.
No End Effects for: Distributed Solar Capacity, Electric Vehicle Energy and Demand, Energy Efficiency Demand, Demand Response Capacity	Repeated Xcel's 2035 monthly and hourly shape data from beginning of 2036 through end of 2045 for: Distributed Solar Capacity, Electric Vehicle Energy and Demand, Energy Efficiency Demand, Demand Response Capacity

⁴³ A full list of inputs and time series changed in Department Staff's updated base case can be found in Attachment 2 to these Comments.

No End Effects for: Non-Baseload Retirements	Extended all non-baseload resources set to retire between the beginning of 2035 and the end of 2045 to retire on December 31, 2045.
Used aggressive capital and O&M costs for nuclear units	Increased Construction Cost inputs and Fixed cost escalation factor for nuclear units
Used Generic Resource Fuel Prices for Generic CT and Generic CC units	Changed Xcel's Generic CT fuel price to Xcel's Invenergy Cannon Falls price; changed Xcel's Generic CC fuel price to Xcel's Black Dog price
Set MISO Capacity Market Prices at maximum Cost of New Entry (CONE) price	Changed Xcel's value Cost of New Entry (CONE) from the maximum price to the average price
Included a MISO spinning reserves requirement	Eliminated Xcel's spinning reserve requirement
Used CO ₂ emissions for Blue Lake 1 and Wheaton 1-4 and 6 that were dissimilar to comparable units	Changed CO ₂ emissions for Blue Lake 1 and Wheaton 1-4 and 6 to be more similar to comparable units

Finally, Department Staff tested the impacts of two different components of its updated base case: the preferred forecast and the updated nuclear charges. First, Department Staff ran all scenarios using the above new base assumptions. Second, Department Staff ran all scenarios without Department Staff's preferred forecasts, although end effects were still incorporated into Xcel's forecasts. Third, all scenarios were run with Department Staff's preferred forecasts but without Department Staff's incorporation of "increased construction cost inputs and fixed cost escalation factor for nuclear units" as was done for Department Updated Base Case Assumptions as indicated in Table 6 above.

As a result, Department Staff essentially has three updated base cases:⁴⁴

- Department Staff Updated Base Case 1: All changes incorporated
- Department Staff Updated Base Case 2: No forecast changes incorporated
- Department Staff Updated Base Case 3: No nuclear cost changes incorporated

F. ENCOMPASS ANALYSIS—PART 2

1. Scenarios and Contingencies

As before, Department Staff ran scenarios covering all possible combinations of shutdowns:

- King—early and normal;
- Sherco unit 3—early and normal;
- Monticello—early, normal, and extended; and
- Prairie Island—early, normal, and extended.

⁴⁴ See Attachment 2 to these Comments for a comparison of all inputs and time series assumptions between these different new bases.

This results in 36 scenarios ($2 \times 2 \times 3 \times 3 = 36$). In addition to the base case, each scenario was run through 14 contingencies, each varying a single input:

- high, middle, low, and no externalities/ CO_2 internal costs (per Commission Order, six contingencies);
- high and low solar prices ($\pm \$5$ per MWh);
- high and low wind prices ($\pm \$5$ per MWh);
- high and low natural gas/spot market prices (per Xcel); and
- high and low energy/demand forecast (per discussion above).

The scenarios and contingencies were analyzed with Xcel's generic 50 MW wind and solar units along with a 374 MW CT unit available to determine the approximate size, type, and timing of resource needs. Normally Department Staff designs wind and solar contingencies with price changes greater than \$5 per MWh. However, due to time limits, Department Staff was unable to design contingencies exploring much lower and higher wind and solar pricing.

2. Modeling Results—Base Conditions

A summary of Department Staff's EnCompass modeling outputs is provided in Attachment 3. Additional annual capacity and energy data is provided in Attachment 4 and Attachment 5. Note that this section refers to "Department Staff Updated Base Case 1" discussed above.

In reviewing the CEM outputs, Department Staff began by reviewing the MIP convergence tolerance calculations to gain an understanding of which plans were clearly different and which were clearly not different. These calculations were significantly complicated by Xcel's method of running EnCompass. Department Staff calculated the MIP convergence tolerance as follows. First, Department Staff calculated the cost of the potential ideal plan and the maximum allowed cost to obtain the range of acceptable costs (the black bars on the MIP Convergence charts). Second, Department Staff also obtained the cost of the feasible plan from the outputs reported by EnCompass at the end of each run (the red dots on the MIP Convergence charts).

At this point it must be understood that, during the MIP convergence tolerance process, EnCompass ignores fixed costs of existing units since such costs cannot impact the model's decision. However, the different scenarios developed here have differing levels of fixed costs for existing units due to the different retirement dates for the coal and nuclear units. Therefore, the results of the calculations at this stage are not comparable across the scenarios. In addition, Xcel made an externalities adjustment to the costs calculated by EnCompass which also must be considered (the Xcel-calculated externality cost adjustment described above). Finally, Xcel ran EnCompass in a different manner during the production cost runs that are actually presented in comments than in the expansion plan runs. In the expansion plan runs the MIP convergence process is reported only once, covering the entire 25-year duration of the run. In the production cost runs the MIP convergence process is reported every 28 days, making it impossible to calculate the MIP convergence values.⁴⁵

⁴⁵ EnCompass reports a different MIP value for each 28-day interval.

To obtain a reasonable estimate of the MIP convergence tolerance, Department Staff calculated the cost of every run using Xcel's method, then substituted the cost calculated under Xcel's formulas for the cost reported by EnCompass for the feasible plan. The range of acceptable costs (from the potential ideal plan's cost to the maximum allowed cost) was then transferred to the newly calculated feasible plan cost.⁴⁶ The results of the calculations are shown in Chart 2 below. In Chart 2 the range of acceptable costs is represented by the black bar and the feasible plan that was selected is represented by the red dot. The purpose of Chart 2 is to illustrate scenarios where the costs are clearly different and scenarios where the costs are essentially the same to EnCompass.

Chart 2: MIP Convergence Results (million dollars PVSC)

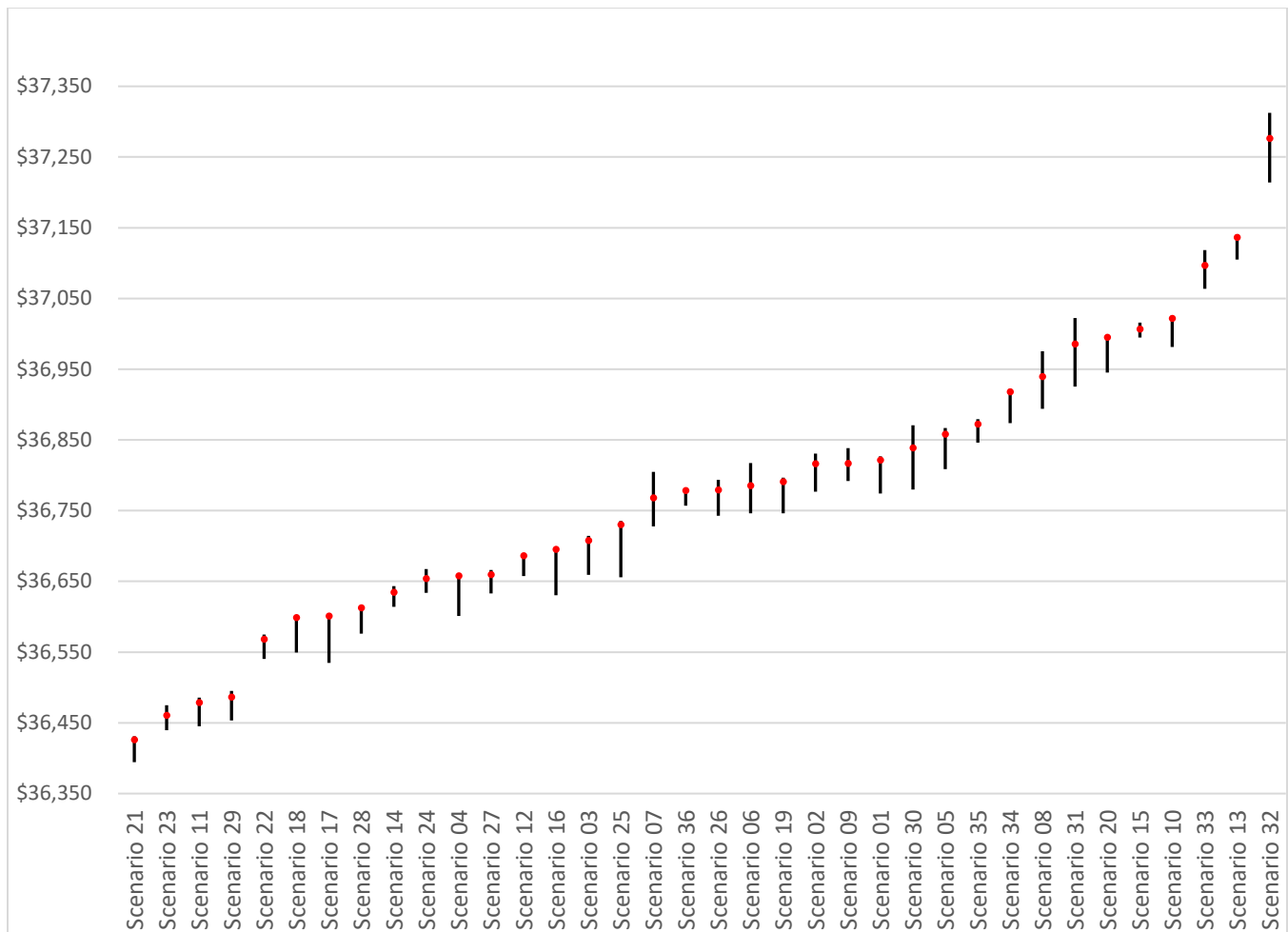


Chart 2 shows that Scenario 21 is clearly the least cost scenario under the MIP convergence tolerance calculations because the maximum allowed cost for Scenario 21 (the top end of the black bar) is below the range of costs of the potential ideal plan for Scenario 23 (the bottom end of the black bar). However, Scenarios 23, 11 and 29 all have black bars that overlap, indicating to Department Staff that

⁴⁶ For example, assume in the expansion plan run the feasible plan cost was \$5 and the range of acceptable costs was from \$1 (\$4 below feasible) to \$7 (\$2 above feasible). If the re-calculated cost was \$10, the range of acceptable costs becomes \$6 (again \$4 below feasible) to \$12 (again \$2 above feasible).

the plans are indistinguishable. Then there is a \$82 million PVSC gap between the maximum allowed cost for Scenario 29 (ranked fourth) and the ideal plan cost of scenario 22 (ranked fifth). Scenario 22 then overlaps with two more scenarios, and so on.

Second, Department Staff reviewed the modeling outputs by sorting the 36 scenarios by PVSC under base case conditions. This sorting is shown in Table 7 below. The goal of this review was to determine if some retirement options performed very well or very poorly, to reduce the number of plans that had to be reviewed to a manageable number.

Table 7a: Retirement Scenarios Ranked (top half)

Plan Rank	King Retirement	Sherco Retirement	Monti Retirement	Prairie Isl. Retirement	Scenario Number
1	Early	Early	Early	Extend	21
2	Norm	Early	Early	Extend	23
3	Early	Early	Norm	Extend	11
4	Norm	Early	Norm	Extend	29
5	Early	Norm	Early	Extend	22
6	Early	Early	Early	Norm	18
7	Norm	Early	Early	Early	17
8	Early	Norm	Norm	Extend	28
9	Norm	Norm	Norm	Extend	14
10	Norm	Norm	Early	Extend	24
11	Early	Early	Norm	Norm	4
12	Norm	Early	Norm	Early	27
13	Early	Early	Extend	Extend	12
14	Early	Norm	Early	Early	16
15	Norm	Early	Norm	Norm	3
16	Early	Early	Norm	Early	25
17	Norm	Norm	Early	Early	7
18	Norm	Early	Extend	Extend	36

Amongst the top half of the scenarios, extending the life of Prairie Island is the best performing retirement option; being included in the top five scenarios and in eight of the top 10 scenarios. Early retirement of Sherco unit 3 also performs strongly, being included in the top four plans and six of the top 10 scenarios. The top four plans, discussed above, all include extending Prairie Island and early retirement for Sherco unit 3. Retirement dates for King and Monticello are less clear, with the top plans alternating between normal and early retirement.

As pointed out by Xcel, and agreed to by Global, the Commission does not have to make a final determination regarding Prairie Island in this proceeding. There is time for another round of resource planning before a final decision is necessary. Therefore, assuming an extended life at Prairie Island is not an option at this time or a different decision is made in the future (e.g., either the normal or early retirement dates are ordered), Scenario 18 does not include an extended life at Prairie Island and is ranked number six. Scenario 18 still involves early retirement of both coal units and Monticello.

Table 7b: Retirement Scenarios Ranked (bottom half)

Plan Rank	King Retirement	Sherco Retirement	Monti Retirement	Prairie Isl. Retirement	Scenario Number
19	Early	Norm	Norm	Early	26
20	Norm	Norm	Norm	Early	6
21	Early	Norm	Early	Norm	19
22	Early	Norm	Norm	Norm	2
23	Early	Early	Extend	Norm	9
24	Norm	Norm	Norm	Norm	1
25	Early	Early	Extend	Early	30
26	Norm	Norm	Early	Norm	5
27	Early	Norm	Extend	Extend	35
28	Norm	Early	Extend	Norm	34
29	Early	Early	Early	Early	8
30	Early	Norm	Extend	Early	31
31	Norm	Early	Early	Norm	20
32	Norm	Norm	Extend	Extend	15
33	Early	Norm	Extend	Norm	10
34	Norm	Norm	Extend	Early	33
35	Norm	Norm	Extend	Norm	13
36	Norm	Early	Extend	Early	32

Among the bottom half of the scenarios, extending the life of Monticello is clearly the worst performing retirement option, being included in the bottom five scenarios and in eight of the bottom 10 scenarios. Normal retirement of the coal units also performed poorly, four of the lowest five ranked scenarios involved the normal retirement date for King; the same was true for Sherco unit 3.

In summary, the result of this step was that early retirement of Sherco unit 3, and a life extension for Prairie Island clearly stood out among the best performing (least cost) scenarios. The second step was to evaluate the risks associated with the top four ranked scenarios (scenario 21, 23, 11, and 29).

Third, Department Staff evaluated the risks associated with the top four ranked Scenarios (scenarios 21, 23, 11 and 29). To do this Department Staff reviewed how each scenario performed in the various contingencies. The result were as follows:

- Scenario 21—ranked among top 6 scenarios 13 times, in all but:
 - low gas prices and no externalities.
- Scenario 23—ranked among top 6 scenarios 10 times, in all but:
 - low gas prices, low externalities, low externalities with low regulatory cost, mid externalities, and no externalities.
- Scenario 11—ranked among top 6 scenarios 12 times, in all but:
 - low gas prices, low externalities with low regulatory cost, and no externalities.
- Scenario 29—ranked among top 6 scenarios 10 times, in all but:
 - low gas prices, low externalities, low externalities with low regulatory cost, mid externalities, and no externalities.

Overall, each of the top 4 scenarios performed reasonably well across the contingencies studied. The contingencies where the plans did not land in the top 6 generally were considered to be of lesser importance. Therefore, this analysis did not result in any one plan being favored over another.

3. Modeling Results—No Nuclear Adjustment

Department Staff's next step was to review the modeling outputs of a second set of runs. This time, the runs included all of Department Staff's adjustments except the increase in fixed costs at the nuclear units. Note that this section refers to "Department Staff Updated Base Case 3" discussed above.

As before, Department Staff sorted the 36 scenarios by PVSC under base case conditions. This sorting is shown in Table 8 below. Also, as before, the goal of this review was to determine if some retirement options performed very well or very poorly, to reduce the number of plans that had to be reviewed to a manageable number.

Table 8a: Retirement Scenarios Ranked, No Nuclear Adjustment (top half)

Plan Rank	King Retirement	Sherco Retirement	Monti Retirement	Prairie Isl. Retirement	Scenario Number
1	Early	Early	Early	Extend	21
2	Early	Early	Norm	Extend	11
3	Norm	Early	Norm	Extend	29
4	Norm	Early	Early	Extend	23
5	Early	Early	Extend	Extend	12
6	Early	Norm	Norm	Extend	28
7	Early	Norm	Early	Extend	22
8	Norm	Norm	Norm	Extend	14
9	Norm	Early	Extend	Extend	36
10	Norm	Norm	Early	Extend	24
11	Early	Norm	Extend	Extend	35
12	Early	Early	Early	Norm	18
13	Early	Early	Norm	Norm	4
14	Early	Early	Extend	Norm	9
15	Norm	Early	Norm	Norm	3
16	Norm	Norm	Extend	Extend	15
17	Norm	Early	Extend	Norm	34
18	Early	Norm	Norm	Norm	2

Removing the nuclear fixed cost increases clearly leaves extending the life of Prairie Island as the best performing retirement option; now being included in the top eleven scenarios. Monticello also performs better; four of the top six scenarios all involve either a normal or extended retirement date. Finally, early retirement of Sherco unit 3 also performs slightly better than before, now being included in the top five scenarios. Overall, the same four plans appear at the top of the list, with Scenarios 21 and 11 now ranked as the top two plans. While not shown in the table, the cost difference between Scenarios 21 and 11 is only \$7 million. The MIP convergence tolerance calculations for this set of runs

(without the nuclear cost adjustment) show that the top three scenarios, numbers 21, 11, and 29 are indistinguishable from each other.

Table 8b: Retirement Scenarios Ranked, No Nuclear Adjustment (bottom half)

Plan Rank	King Retirement	Sherco Retirement	Monti Retirement	Prairie Isl. Retirement	Scenario Number
19	Norm	Norm	Norm	Norm	1
20	Early	Norm	Early	Norm	19
21	Early	Early	Extend	Early	30
22	Norm	Early	Norm	Early	27
23	Norm	Early	Early	Early	17
24	Early	Norm	Extend	Norm	10
25	Norm	Norm	Early	Norm	5
26	Early	Early	Norm	Early	25
27	Early	Norm	Early	Early	16
28	Early	Norm	Norm	Early	26
29	Norm	Norm	Norm	Early	6
30	Early	Norm	Extend	Early	31
31	Norm	Norm	Extend	Norm	13
32	Norm	Norm	Early	Early	7
33	Norm	Early	Early	Norm	20
34	Norm	Norm	Extend	Early	33
35	Early	Early	Early	Early	8
36	Norm	Early	Extend	Early	32

Removing the nuclear fixed cost increases leaves early retirement of Prairie Island, and normal retirement of the two coal units as clearly the poorest performing options.

4. Modeling Results—No Forecast Adjustment

Department Staff's final step was to review the modeling outputs of a third set of runs. This time, the runs included all of Department Staff's adjustments except the decrease in the energy and demand forecasts. Note that this section refers to "Department Staff Updated Base Case 2" discussed above.

As before, Department Staff sorted the 36 scenarios by PVSC under base case conditions. This sorting is shown in Table 9 below. As before, the goal of this review was to determine if some retirement options performed very well or very poorly, to reduce the number of plans that had to be reviewed to a manageable number.

Table 9a: Retirement Scenarios Ranked, No Forecast Adjustment (top half)

Plan Rank	King Retirement	Sherco Retirement	Monti Retirement	Prairie Isl. Retirement	Scenario Number
1	Early	Early	Early	Extend	21
2	Early	Early	Norm	Extend	11
3	Norm	Early	Early	Extend	23
4	Early	Norm	Early	Extend	22
5	Norm	Early	Norm	Extend	29
6	Early	Norm	Norm	Extend	28
7	Norm	Norm	Early	Extend	24
8	Early	Early	Early	Norm	18
9	Norm	Norm	Norm	Extend	14
10	Early	Early	Extend	Extend	12
11	Norm	Early	Extend	Extend	36
12	Early	Early	Norm	Norm	4
13	Norm	Early	Early	Early	17
14	Early	Early	Norm	Early	25
15	Early	Norm	Early	Norm	19
16	Norm	Early	Norm	Norm	3
17	Early	Norm	Early	Early	16
18	Norm	Early	Norm	Early	27

Removing the forecast decrease leaves extending the life of Prairie Island as clearly the best performing retirement option; now being included in the top seven scenarios and in ten of the top 11 scenarios. Monticello also performs better; three of the top six scenarios all involve a normal retirement date and an extended date appears in the top 10 scenarios. Finally, early retirement of Sherco unit 3 also performs well, still being included in four of the top five scenarios. Overall, the same four plans appear at the top of the list, with plans 21 and 11 again ranked as the top two plans. While not shown in the table, the cost difference between Scenarios 21 and 11 is \$55 million. However, the MIP convergence tolerance calculations for this set of runs (without the forecast adjustment) show that the top two scenarios, numbers 21 and 11 are indistinguishable from each other.

Table 9b: Retirement Scenarios Ranked, No Forecast Adjustment (bottom half)

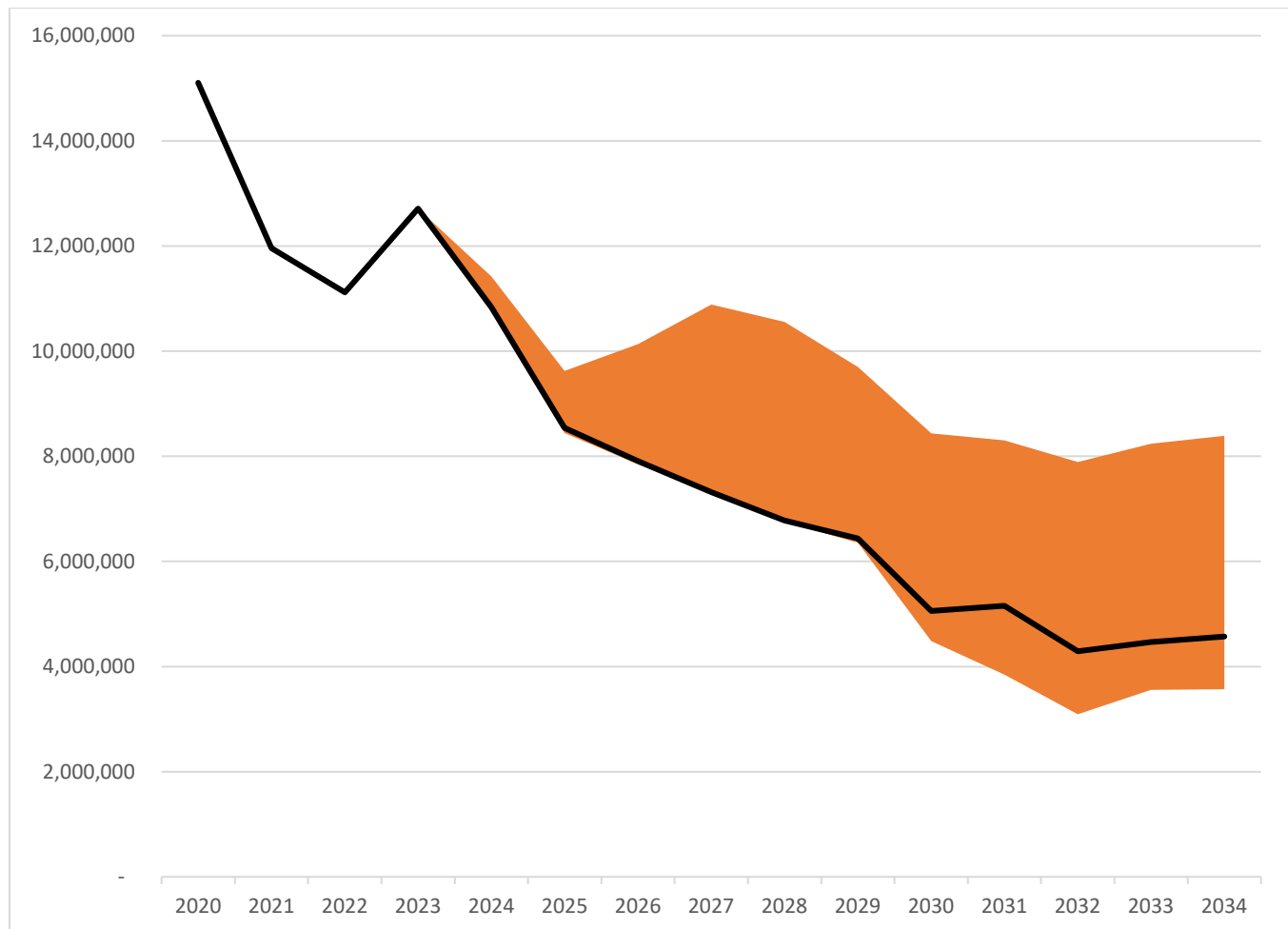
Plan Rank	King Retirement	Sherco Retirement	Monti Retirement	Prairie Isl. Retirement	Scenario Number
19	Early	Norm	Extend	Extend	35
20	Early	Norm	Norm	Early	26
21	Early	Norm	Norm	Norm	2
22	Early	Early	Extend	Norm	9
23	Norm	Norm	Early	Early	7
24	Norm	Norm	Norm	Norm	1
25	Norm	Norm	Early	Norm	5
26	Norm	Norm	Extend	Extend	15
27	Norm	Norm	Norm	Early	6
28	Norm	Early	Extend	Norm	34
29	Early	Early	Extend	Early	30
30	Early	Early	Early	Early	8
31	Early	Norm	Extend	Norm	10
32	Early	Norm	Extend	Early	31
33	Norm	Early	Early	Norm	20
34	Norm	Norm	Extend	Norm	13
35	Norm	Norm	Extend	Early	33
36	Norm	Early	Extend	Early	32

Removing the forecast decrease leaves extended life of Monticello and a normal retirement for King as the poorest performing options.

5. Other Factors

In determining the Scenario to recommend, Department Staff also considered several other factors, starting with CO₂ emissions. Under base case conditions, Scenario 11 emits about 4.5 million tons less CO₂ between 2020 and 2034 than Scenario 21. While the cost of CO₂ emissions is considered in the modeling, Scenario 11 has an advantage in terms of better enabling the state to meet its CO₂ emissions reduction goals. Chart 3 below shows how Scenario 11 compares to the range of CO₂ emissions from the 36 scenarios under base case conditions.

Chart 3: Range of Annual CO₂ Emissions in 36 Baseload Scenarios, with Scenario 11 Demarcated (tons)



Department Staff also considered the feasibility of actually acquiring the required size, type, and timing modeled. Under base case conditions, Scenarios 11 and 21 both add 1,870 MW of capacity units and 2,050 MW of wind units between 2020 and 2034. The difference is that Scenario 11 adds 2,400 MW of solar while Scenario 21 adds 2,550 MW. For the five-year action plan (2020 to 2024), both plans add 700 MW of solar and no wind or capacity units. From this data Department Staff concluded that the two scenarios were essentially the same in terms of expansion units added and their feasibility.

When reviewing the modeling data Department Staff noted that there would be socioeconomic benefits gained, in terms of employment and economic activity in the area around Monticello, if the plant ran to the end of the current license life (Scenario 11) rather than retired early (Scenario 21). In addition, there would be additional time for the region to adjust to the loss of the Monticello generating unit.

Finally, when considering overall exposure to spot market pricing, Scenarios 11 and 21 have essentially the same degree of exposure (the same net sales) for the years 2020 to 2025 and again from 2031 to the end of the model run. The years 2026 to 2031 Scenario 11 has more price risk due to much larger net sales, triggered by the presence of Monticello in place of retiring Monticello early and acquiring

replacement generation.⁴⁷ Overall, if prices are lower than forecast by Xcel in EnCompass, ratepayers would be relatively worse off under Scenario 11 than Scenario 21; if prices are higher than forecast by Xcel in EnCompass, ratepayers would be better off.

6. Overall Recommendation

Considering modeling results discussed above, Department Staff concludes that in terms of cost Scenarios 11 and 21 are essentially the same. Considering the non-cost factors, Department Staff concludes that Scenario 11 is slightly preferred to Scenario 21. Therefore, Department Staff recommends the Commission approve retirement dates assumed by Scenario 11:

- retirement of King early, in 2028;
- retirement of Sherco Unit 3 early, in 2030;
- retirement of Monticello at the end of the current life, in 2030;⁴⁸ and
- retirement of Prairie Island at the end of a life extended by ten years (Prairie Island unit 1 in 2043 and Prairie Island unit 2 in 2044).

G. FURTHER ANALYSIS OF WIND AND SOLAR

The amounts of wind and solar added by EnCompass in the base case of Scenario 11 are shown in Table 10. Note that for the purposes of this discussion Table 10 reflects only the solar being in added as expansion units by EnCompass and does not include Xcel's forecasted growth in distributed solar.

Table 10: Renewable Expansion Unit Capacity (MW)

Year	Solar	Wind
2020	-	-
2021	-	-
2022	-	-
2023	-	-
2024	700	-
2025	100	-
2026	-	-
2027	700	-
2028	200	-
2029	-	-
2030	350	350
2031	-	800
2032	-	900
2033	250	-
2034	100	-

⁴⁷ Net sales in Scenario 11 are larger by between about 800 and 2,700 GWh annually during 2026 to 2031.

⁴⁸ Department Staff will revisit this conclusion in Docket No. E002/CN-21-668, Xcel's certificate of need petition for additional dry cask storage at Monticello.

1. *Transmission Availability and the Expansion Plan*

One of the Company's requests in this proceeding is that the Commission approve Company ownership of Sherco and King gen-tie lines plus renewable resources added on the lines. Xcel states that this is required by the Federal Energy Regulatory Commission (FERC) if the Company is to re-use the interconnection capability at the Sherco and King sites. Department Staff has the same understanding of FERC's ownership requirements. Note that Minnesota Statutes § 216B.246 subd. 2 potentially also requires Xcel have the right to own the Sherco and King gen-tie lines if they would have to be "approved for construction in a federally registered planning authority transmission plan."

To obtain a quick update on the potential for Xcel to acquire 700 to 800 MW of new solar projects in the near future, Department Staff reviewed the latest data in the MISO generation interconnection queue (GIQ) in the region.⁴⁹ The projects are classified by MISO as either Done, Active, or Withdrawn. The data is summarized in Table 12:

Table 12: Status of Solar Projects (MW)⁵⁰

DPP Group	Done	Active	Withdrawn	Percent Withdrawn
DPP-2015-FEB	162.5	-	-	0.0%
DPP-2015-AUG	-	-	24.4	100.0%
DPP-2016-FEB	50.0	-	50.0	50.0%
DPP-2016-AUG	-	-	-	0.0%
DPP-2017-FEB	50.0	-	173.0	77.6%
DPP-2017-AUG	182.5	-	575.0	75.9%
DPP-2018-APR	250.0	130.0	2,617.5	87.3%
DPP-2019-Cycle	-	1,050.0	930.0	47.0%
DPP-2020-Cycle	-	1,824.0	1,156.0	38.8%
DPP-2021-Cycle	-	2,440.0	129.5	5.0%

Table 12 shows that in the three most recent Definitive Planning Phase (DPP) groups that have Done projects, at least 75 percent of the solar projects in the upper Midwest withdrew. If the 75+ percent withdrawal rate continues, Xcel would have to acquire a large fraction of all of the solar projects in the region that make it through the MISO GIQ to obtain the solar capacity EnCompass selects in 2024. Xcel acquiring most of the solar projects in the region is not a realistic planning objective.

⁴⁹ The data covers Minnesota, North Dakota, and South Dakota and was pulled from the MISO website on October 4, 2021.

⁵⁰ According to MISO's DPP schedule, as of October 1, 2021:

- DPP-2018-APR was in the Generation Interconnection Agreement (GIA) negotiation phase;
- DPP-2019-Cycle 1 was in the second of three DPP study phases, scheduled to finish in September 2022;
- DPP-2020-Cycle 1 was in the first of three DPP study phases, scheduled to finish in November 2022; and
- DPP-2021-Cycle 1 had not started the DPP studies, scheduled to finish in March 2023.

Based upon this analysis, Department Staff agrees with the Company that acquiring projects outside of the MISO GIQ is necessary. Considering the cost of distributed solar as shown in the Company's solar garden program and the fact that some expansion in distributed solar is already built into EnCompass, Department Staff agrees with the Company that re-use of the Company's existing generation interconnection rights at the Sherco and King sites is reasonable. Department Staff recommends the Commission approve the Company ownership of Sherco and King gen-tie lines plus renewable resources added on the lines.

2. Modeled Costs and the Expansion Plan

The solar added data in Attachment 1 for Scenario 11 is summarized in Table 13 below. Contingency Y (Low Solar Prices) decreased Xcel's solar prices by \$5 per MWh. Contingency Z (High Solar Prices) increased Xcel's solar prices by \$5 per MWh.

Table 13: Scenario 11 Solar Expansion Unit Additions (MW)

Time Frame	Base Case	Y-Low Solar	Change from Base	Z-High Solar	Change from Base
2020-'24	700	750	50	-	(700)
2025-'29	1,000	1,050	50	900	(100)
2030-'34	700	900	200	600	(100)

Table 13 shows that, small decreases in solar prices through 2029 are meaningless—remember that a change of 100 MW or less is meaningless in EnCompass as designed by Xcel. In contrast, small increases in solar prices have a large impact, eliminating near term (through 2024) solar acquisitions. For the near-term decisions, which are all that matter since additions in later years will be reviewed in future resource plans, Department Staff concludes that small decreases in solar prices do not have a significant impact. However, small increases are significant and should be taken into account in the subsequent resource acquisition proceeding.

3. Distributed Solar Forecast

The Company modeled distributed solar as a locked-in, forecast amount. Table 14 below shows Xcel's forecasted distributed solar additions.

Table 14: Xcel's Distributed Solar Forecast (MW)

Year	Solar Rewards	Community Gardens	TOTAL	Incremental Additions
2019	61	504	565	
2020	80	658	738	173
2021	95	714	809	71
2022	109	787	897	88
2023	123	841	964	67
2024	138	852	989	25
2025	152	853	1,005	16
2026	166	854	1,020	15
2027	180	855	1,035	15
2028	194	857	1,050	15
2029	208	858	1,066	16
2030	222	859	1,080	14
2031	236	860	1,095	15
2032	249	861	1,110	15
2033	263	862	1,125	15
2034	276	863	1,140	15

The incremental additions shown in Table 14 above need to be added to any solar additions from expansion units selected by EnCompass to arrive at the actual amount of solar capacity that must be acquired by Xcel.

4. Recommendation Regarding New Wind and Solar Capacity

Based upon the above analysis, Department Staff recommends the Commission approve an action plan to acquire approximately 1,125 MW of solar capacity by 2024, contingent upon prices being reasonable. This includes both solar acquired as a least cost resource through bidding processes and solar acquired via the Company's distributed solar programs. Note that units in years beyond the action plan will be re-analyzed in the next IRP.

Based upon the modeling results for Scenario 11, Department Staff recommends the Commission approve an action plan that does not include any wind additions.

H. FURTHER ANALYSIS OF CAPACITY RESOURCES

No capacity units (modeled both as CT units and as battery units) were added in any run during the 5-year action plan. Therefore, Department Staff recommends the Commission approve an action plan that does not include any capacity resource additions. Department Staff notes that any capacity resource can fill the need should be allowed to compete to fill a capacity need.

The Company has proposed a separate black start proceeding. Units needed for the black start plan can be determined in the black start docket and need not be addressed at this time. Since Department Staff recommended the Commission approve Xcel's proposal for a separate black start plan, Department Staff recommends the Commission take no action at this time regarding any units claimed to be needed as part of the black start plan. Commission approval can be limited to units selected as part of the 5-year action plan, which contains no capacity. Capacity units beyond the action plan will be re-analyzed in the next IRP.

I. ADDRESSING THE COMMISSION NOTICE

The Commission's Notice stated that the following topics are open for comment:

1. Should the Commission approve, modify, or reject Xcel Energy's Alternate Plan, as described in the Company's June 25, 2021 Reply Comments?
2. If the Commission modifies the Alternate Plan, what modifications should the Commission make?
3. Should the Commission adopt a proposed alternative plan under Minnesota Rules 7843.0300 subp. 11? If so, provide a narrative with quantitative analysis supporting how the proposed changes are in the public interest, considering the factors listed in Minnesota Rules 7843.0500, subp. 3.
4. What resource acquisition process(es) should Xcel use to implement the approved resource plan?
5. When should Xcel file its next IRP?
6. Are there other issues or concerns related to this matter?

Below Department Staff addresses the issues in the Notice.

1. Action on Xcel's Alternate Plan

The first issue listed in the Notice is "Should the Commission approve, modify, or reject Xcel Energy's Alternate Plan, as described in the Company's June 25, 2021 Reply Comments?" As discussed above, Department Staff recommends the Commission approve Xcel's Alternate Plan with modifications.

2. Modifying Xcel's Alternate Plan

The second issue listed in the Notice is "If the Commission modifies the Alternate Plan, what modifications should the Commission make?" The specific modifications to the Alternate Plan recommended by Department Staff are provided in the recommendations section below.

3. Narrative with Quantitative Discussion of Public Interest

The third issue listed in the Notice is "Should the Commission adopt a proposed alternative plan under Minnesota Rules 7843.0300 subp. 11? If so, provide a narrative with quantitative analysis supporting how the proposed changes are in the public interest, considering the factors listed in Minnesota Rules 7843.0500, subp. 3."

Minnesota Rules 7843.0500, subp. 3 states that resource plans must be evaluated on their ability to:

- A. maintain or improve the adequacy and reliability of utility service;
- B. keep the customers' bills and the utility's rates as low as practicable, given regulatory and other constraints;
- C. minimize adverse socioeconomic effects and adverse effects upon the environment;
- D. enhance the utility's ability to respond to changes in the financial, social, and technological factors affecting its operations; and
- E. limit the risk of adverse effects on the utility and its customers from financial, social, and technological factors that the utility cannot control.

The first criterion under Minnesota Rules is the ability to maintain or improve the adequacy and reliability of utility service. First, all of the scenarios modeled by Department Staff had, as inputs, the current MISO reliability construct. Therefore, each scenario provides the same level of reliability at a minimum. At points in time some scenarios will have some surplus capacity. The existence of surplus capacity implies a slightly higher level of reliability. However, the economics of the model will generally result in surplus capacity being small.

Second, Department Staff explored high and low load contingencies. These contingencies vary the forecasted demand and energy requirements. Increasing the demand requirement is the same as increasing the reserve ratio required by MISO. In a simple way, via the contingency analysis Department Staff explored variations in the capacity required for reliability purposes.

The second criterion under Minnesota Rules is the ability to keep the customers' bills and the utility's rates as low as practicable. Department Staff's recommended scenario consistently ranked among the least cost scenarios across various contingencies (high/low forecast, high/low gas prices, etc.). See Attachment 3 for the costs of various scenarios. The recommended scenario also ranked among the least cost scenarios when the fundamental modeling changes (nuclear cost and forecast) were removed. The only contingency where Department Staff's preferred scenario performed poorly and is relevant here is the no externalities or CO₂ regulatory cost contingency (contingency M) and the low regulatory cost contingency (contingency J). Thus, as long as the assumption that CO₂ regulatory cost will be imposed around 2025 is valid, Department Staff's scenario will keep customers' bills and Xcel's rates as low as practicable.

The third criterion under Minnesota Rules is the ability to minimize adverse socioeconomic effects and adverse effects upon the environment. Adverse effects on the environment are taken into account via the Commission's CO₂ regulatory cost and various externality cost values. Since these are basic inputs to the model, all scenarios directly consider adverse effects upon the environment. Department Staff's preferred scenario minimizes adverse socioeconomic effects by selecting the normal retirement date, providing time for the Monticello area to adapt to the closure of the plant while not burdening other areas served by Xcel with an uneconomic asset for an extended duration. Also, Department Staff's recommended re-study of the preferred retirement date for Prairie Island provides time for additional facts to develop before a final decision is made on Prairie Island. Last, adverse socioeconomic effects and adverse effects upon the environment are typically considered as part of the environmental review

phase of site and route permit proceedings associated with certificate of need proceedings. Department Staff recommends that the Commission consider these effects in those proceedings.

The fourth criterion under Minnesota Rules is the ability to enhance the utility's ability to respond to changes in the financial, social, and technological factors affecting its operations. The only near-term actions on supply-side resources required by Department Staff's modeling results are additions of substantial solar resources by 2024. Delaying most additions until after the 5-year action plan enables the utility to adapt to changes in financial, social, and technological factors by providing time for these factors develop before irreversible decisions are made.

The fifth criterion under Minnesota Rules is the ability to limit the risk of adverse effects on the utility and its customers from financial, social, and technological factors that the utility cannot control. The Department's recommended scenario maintains a wide variety of resource types on Xcel's system for at least the next decade while deferring most major additions. Maintaining a variety of resource types mitigates risks by allowing Xcel to use a variety of existing resources if events beyond the Company's control make any one resource unusable. Deferring most additions also mitigates risk because it prevents the Company from locking-in substantial resources that might later be regretted.

In summary, Department Staff's proposed plan meets all of the decision criteria contained in Minnesota Rules.

4. Resource Acquisition Processes

The fourth issue listed in the Notice is "What resource acquisition process(es) should Xcel use to implement the approved resource plan?" Department Staff's February 11, 2021 discussed in detail the bidding process Xcel should use. That discussion is not impacted by Xcel's Alternate Plan. Department Staff's final recommendations regarding bidding are repeated below.

5. Date of Next IRP

The fifth issue listed in the Notice is "When should Xcel file its next IRP?" Considering the need to provide updated analysis regarding Prairie Island, Department Staff recommend a two-year interval between resource plans be maintained, using Xcel's reply comments as the filing date for the current resource plan places the filing date for the next resource plan on July 1, 2023.

6. Other Issues

The sixth issue listed in the Notice is "Are there other issues or concerns related to this matter?" Department Staff have no other concerns or issues not discussed in these reply comments or in prior comments in this proceeding.

III. DEPARTMENT RECOMMENDATIONS

A. XCEL'S REQUESTS

Based upon the alternate plan, the Company requests the following items:

- approval of Company ownership of Sherco and King gen-tie lines plus renewable resources added on the lines;
- approval of 400 MW of CTs in Lyon County, Minnesota and 400 MW CTs in Fargo, North Dakota;
- approval to continue pursuing a 10-year extension for our Monticello Nuclear plant; and
- approval for black start shift to zonal approach and need for black start resources in each zone which includes:
 - two specific black start additions in Minnesota and Wisconsin by 2026; and
 - new regulatory docket to discuss broader black start issues that would include the consideration of other black start additions in other zones in the out years of our plan to consider optimal technologies.
- use of the Modified Track 2 process for the following acquisition proceedings:
 - solar and wind resources that utilize the transmission interconnection at Sherco;
 - solar resource that utilize the transmission interconnection at King;
 - approximately 400 MWs of CTs in Lyon County to connect to the transmission interconnection at Sherco;
 - any wind or solar additions needed before the next resource plan.

Department Staff's recommendations regarding the Company's requests are as follows. First, regarding approval of Company ownership of Sherco and King gen-tie lines plus renewable resources added on the lines: Department Staff agrees with Xcel that one of the few realistic paths in the near term for adding substantial, cost-effective capacity of any type is through Company ownership of Sherco and King gen-tie lines and re-use of the existing interconnection rights.

Second, regarding approval of 400 MW of CTs in Lyon County, Minnesota and 400 MW CTs in Fargo, North Dakota. Department Staff recommend that no Commission determination be made regarding these requests. No optional capacity resources were added in Department Staff's CEM modeling in the near-term and any units associated with the black start plan should be addressed in the proposed black start proceeding.

Third, regarding approval to continue pursuing a 10-year extension for Monticello, Department Staff recommend that no Commission determination be made regarding this request. This is because the Company has since filed the requisite CN.

Fourth, regarding approval for black start shift to zonal approach and need for black start resources in each zone, Department Staff recommend that no Commission determination be made regarding this request. This request and all requests related to black start should be addressed by the Commission as part of the proposed black start proceeding.

Fifth, regarding approval to use of the Modified Track 2 process, Department Staff agree with the Company that the Commission should approve use of the Track 1/Modified Track 2 process as discussed in Department Staff's February 11, 2021 comments. However, Department Staff recommend that the Commission determine that the Commission-approved Track 1/Modified Track 2 bidding process applies in all instances where Xcel intends to acquire 100 MW of capacity for a duration longer than five years.

B. DEPARTMENT STAFF RECOMMENDATIONS

Regarding forecasting, Department Staff considers Xcel's reply comments to have partially explained the poor quality of the Company's forecasts. Department Staff will continue to review the Company's forecasts for accuracy in future proceedings as time and resources allow.

Regarding the baseload study, Department Staff recommends the Commission order Xcel to:

- retire King by the early date, 2028;
- retire Sherco unit 3 by the early date, 2030;
- retire Monticello by the normal date—the end of current license life in 2030; and
- proceed assuming Prairie Island will undergo a 10-year license extension and re-study the retirement date in the next resource plan.

Regarding supply units in the action plan, Department Staff recommends:

- proceed assuming the Company will not add wind resources during the action plan period;
- proceed assuming the Company will not add capacity resources during the action plan period; and
- acquire a total of approximately 1,125 MW of solar capacity, both distributed and central station, by 2024, contingent upon prices being reasonable.

Regarding energy efficiency, Department Staff recommends that the Commission take no action regarding the Company's proposed level of energy efficiency resources.

Regarding resource acquisition, Department Staff recommends that the Commission:

- approve the Track 1 bidding process, as outlined in Department Staff's February 11, 2021 comments, for resource acquisitions in which Xcel determines to not bid;
- approve the Modified Track 2 bidding process, as outlined in Department Staff's February 11, 2021 comments, for resource acquisitions in which Xcel determines to bid;
- require that any RFP documents for peaking resources issued by Xcel be technology neutral;
- cap any ROFO offer made by Xcel at net book value;
- require any RFP issued by Xcel to include the option for both PPAs and BOTs unless the Company can demonstrate why either a PPA or BOT proposal is not feasible; and
- take no action on the request for "flexibility to evaluate and pursue the required incremental DR."

Baseload Scenario	Description	Base	Base - PVSC	A-PVRR	B-Low Gas/Coal/ Markets	C-High Gas/Coal/ Markets	D-Low Load (High DER)	D - PVSC	E-High Load (Electrification)	E - PVSC	F-Low Resource PCR	G-High Resource PCR	I-Low Externality	J-Low Externality, Low Regulatory	K-Mid Externality, Mid Regulatory	L-High Externality	M-No Reg or Externality PCRs	N- Markets Off	ND Plan	ND Plan - PC	P - Combo "DBF"	P - PVSC	Q - Combo "ECF"	Q - PVSC	S - No Carbon Adder for Sales	S - PVSC	U - Hourly Carbon, Retail Load Shape	U - PVSC	V - EPR with Externality in model	V - PVSC
Scenario 1	BASE CASE	Expansion Plan Run (EPR)	Production Cost Run (PCR)	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 2	EARLY KING	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 3	EARLY SH3	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 4	EARLY COAL	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 5	EARLY MONTI	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 6	EARLY PI	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 7	EARLY ALL NUCLEAR	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 8	EARLY BASELOAD	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 9	EARLY COAL; EXTEND MONTI	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
	Wind Available 2023 @ \$500/kW	EPR	PCR	PCR																										
	Solar @ 50% ELCC Throughout	EPR	PCR	PCR																										
	Unconstrained Sales/Purchase Volume	EPR	PCR	PCR																										
	Sherco CC Alternatives - 7HAD1 1x1	EPR	PCR	PCR									PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
	Sherco CC Alternatives - 7HAD2 1x1	EPR	PCR	PCR									PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
	Sherco CC Alternatives - 7HAD2 2x1	EPR	PCR	PCR									PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
	Sherco CC Alternatives - No CC	EPR	PCR	PCR									PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
	Solar + Storage: "swap" 1st solar addition	EPR	PCR	PCR									PCR	PCR	PCR	PCR	PCR													
	Solar + Storage: "EPR" 1st solar addition	EPR																												
	Wind + Storage: "swap" 1st wind addition	EPR	PCR	PCR									PCR	PCR	PCR	PCR	PCR													
	Wind + Storage: "EPR" 1st wind addition	EPR																												
	DSM/DR - Add DR Bundle 2	EPR	PCR	PCR									PCR	PCR	PCR	PCR	PCR													
	DSM/DR - Add EE Bundle 3	EPR	PCR	PCR									PCR	PCR	PCR	PCR	PCR													
Scenario 10	EARLY KING; EXTEND MONTI	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 11	EARLY COAL; EXTEND PI	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 12	EARLY COAL; EXTEND ALL NUCLEAR	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 13	EXTEND MONTI	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 14	EXTEND PI	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 15	EXTEND ALL NUCLEAR	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR			EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR

Expansion Plan Runs
 Production Cost Runs

Parent Run	Description	Base	Base - PVSC	A-PVRR	B-Low Gas/Coal/ Markets	C-High Gas/Coal/ Markets	D-Low Load (High DER)	D - PVSC	E-High Load (Electrification)	E - PVSC	F-Low Resource PCR	G-High Resource PCR	I-Low Externality	J-Low Externality, Low Regulatory	K-Mid Externality, Mid Regulatory	L-High Externality	M-No Reg or Externality PCRs	ND Plan	ND Plan - PC	P - Combo "DBF"	P - PVSC	Q - Combo "ECF"	Q - PVSC	Z - PRMR	Z - PVSC
Scenario 1 - Reply	BASE CASE	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 4 - Reply	EARLY COAL	EPR	PCR	PCR																					
Scenario 4 - BlackStart	EARLY COAL BLACKSTART	EPR	PCR	PCR																					
Scenario 9 - Reply	EARLY COAL; EXTEND MONTI	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 9 - BlackStart	EARLY COAL; EXTEND MONTI BLACKSTART	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 12 - Reply	EARLY COAL; EXTEND ALL NUCLEAR	EPR	PCR	PCR																					
Scenario 12 - BlackStart	EARLY COAL; EXTEND ALL NUCLEAR BLACKSTART	EPR	PCR	PCR																					

Expansion Plan Runs
Production Cost Runs

Expansion Plan Scenario	Datasets	Corresponding Output File
Scenario 1 - Reply	NSP_ReferenceCase_2020-05-21_11AM Simplify Mower Ownership ADD Deuel Harvest Elk Creek RR Update Borders Repower Ewington Repower Grand Meadows Repower 2023 Nobles Repower 60Pct Pleasant Valley Repower Heartland Divide PPA Ridgewind Fix 50MW Generic Three Generic CTs King Asset Update NSP IRP_Generic Storage_2019 ATB_2020-03-03 50MW NSP IRP_Generic Wind and Solar_2019 ATB_2020-04-10	EO - 6-10-21
Scenario 1 – Reply – D	Sens D – Low Load	EO - 6-10-21 Sens D
Scenario 1 – Reply – E	Sens E – High Load	EO - 6-10-21 Sens E
Scenario 1 – Reply – ND Plan	ND Plan Sens M – No Ext, No Reg	EO - 6-10-21 - ND Plan
Scenario 1 – Reply – Z	Sens Z - PRMR	EO - 6-10-21 Sens Z
Scenario 4 – Reply	Early King Early SH3 LBC 4	EO - 6-10-21 with 4 and 12
Scenario 4 – BlackStart – Sherco King	Remove BlackStart Placeholders Black Start Plan Final Black Start NO SHCC SherCo Extension Cord – 1996MW – New King Extension Cord – 591MW - New	EO - 6-10-21 with 4 and 12
Scenario 9 - Reply	Early King Early SH3 Extend Monti LBC 9	EO - 6-10-21
Scenario 12 - Reply	Early King Early SH3 Extend Monti Extend PI LBC 12	EO - 6-10-21 with 4 and 12
Production Cost Run	Datasets	Corresponding Output File
Scenario 1 – Reply - PVSC	Expansion Plan Time Series Locked Expansion Plan - Scenario 1 - Reply	EO - 6-10-21
Scenario 1 – Reply - A	Sens A - PVRR	EO - 6-10-21
Scenario 1 – Reply – B	Sens B – Low Gas, Market	EO - 6-10-21 Sens B
Scenario 1 – Reply – C	Sens C – High Gas, Market	EO - 6-10-21 Sens C
Scenario 1 – Reply – F	Sens F – Low Resource Cost – Tax Changes	EO - 6-10-21 Sens F
Scenario 1 – Reply – G	Sens G – High Resource Cost – Tax Changes	EO - 6-10-21 Sens G
Scenario 1 – Reply – I	Sens I – Low Externality	EO - 6-10-21 Sens I
Scenario 1 – Reply – J	Sens J – Low Ext, Low Reg	EO - 6-10-21 Sens J
Scenario 1 – Reply – K	Sens K – Mid Ext, Mid Reg	EO - 6-10-21 Sens K
Scenario 1 – Reply – L	Sens L – High Externality	EO - 6-10-21 Sens L
Scenario 1 – Reply – M	Sens M – No Ext, No Reg	EO - 6-10-21 Sens M

Runs to match

Parent Run	Description	Base	Base - PVSC	A- PVRR	B-Low Gas/Coal/ Markets	C-High Gas/Coal/ Markets	D-Low Load (High DER)	D - PVSC	E-High Load (Electrification)	E - PVSC	F-Low Resource PCR	G-High Resource PCR	I-Low Externality	J-Low Externality, Low Regulatory	K-Mid Externality, Mid Regulatory	L-High Externality	M-No Reg or Externality PCRs	ND Plan	ND Plan - PC	P - Combo "DBF"	P - PVSC	Q - Combo "ECF"	Q - PVSC	Z - PRMR	Z - PVSC
Scenario 1 - Reply	BASE CASE	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 4 - Reply	EARLY COAL	EPR	PCR	PCR																					
Scenario 4 - BlackStart	EARLY COAL; BLACKSTART	EPR	PCR	PCR																					
Scenario 9 - Reply	EARLY COAL; EXTEND MONTI	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 9 - BlackStart	EARLY COAL; EXTEND MONTI; BLACKSTART	EPR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	PCR	EPR	PCR	EPR	PCR	EPR	PCR	EPR	PCR
Scenario 12 - Reply	EARLY COAL; EXTEND ALL NUCLEAR	EPR	PCR	PCR																					
Scenario 12 - BlackStart	EARLY COAL; EXTEND ALL NUCLEAR; BLACKSTART	EPR	PCR	PCR																					

Runs to match

Expansion Plan (Optimized Database)	MIP Stop Basis	
Scenario 1 - Reply	40	\$ 11,628,859
Dept Scenario 1 - Reply	40	\$ 11,631,961
Delta		\$ 3,102
%Change		0.03%
Scenario 1 - Reply - D	40	\$ 9,530,897
Dept Scenario 1 - Reply - D	40	\$ 9,544,288
Delta		\$ 13,391
%Change		0.14%
Scenario 1 - Reply - E	40	\$ 14,705,455
Dept Scenario 1 - Reply - E	40	\$ 14,359,386
Delta		\$ (346,069)
%Change		-2.35%
Scenario 1 - Reply - ND Plan	40	\$ 11,202,107
Dept Scenario 1 - Reply - ND Plan	40	\$ 11,200,907
Delta		\$ (1,200)
%Change		-0.01%
Scenario 1 - Reply - P	40	\$ 7,631,629
Dept Scenario 1 - Reply - P	40	\$ 7,638,581
Delta		\$ 6,952
%Change		0.09%
Scenario 1 - Reply - Q	40	\$ 10,905,936
Dept Scenario 1 - Reply - Q	40	\$ 10,756,858
Delta		\$ (149,078)
%Change		-1.37%
Scenario 1 - Reply - Z	40	\$ 11,981,875
Dept Scenario 1 - Reply - Z	40	\$ 11,970,320
Delta		\$ (11,555)
%Change		-0.10%
Scenario 4 - Reply	40	\$ 12,278,007
Dept Scenario 4 - Reply	40	\$ 12,308,231
Delta		\$ 30,224
%Change		0.25%
Scenario 4 - BlackStart - Sherco King	40	\$ 10,986,014
Dept Scenario 4 - BlackStart - Sherco King	40	\$ 10,982,951
Delta		\$ (3,063)
%Change		-0.03%
Scenario 9 - Reply	40	\$ 10,800,100
Dept Scenario 9 - Reply	40	\$ 10,817,176
Delta		\$ 17,075
%Change		0.16%
Scenario 12 - Reply	40	\$ 8,724,487
Dept Scenario 12 - Reply	40	\$ 8,736,584
Delta		\$ 12,097
%Change		0.14%

Production Cost Runs (Locked Database)	MIP Stop Basis	
Scenario 1 - Reply - PVSC	20	\$ 29,804,556
Dept Scenario 1 - Reply - PVSC	20	\$ 29,802,145
Delta		\$ (2,411)
%Change		-0.01%
Scenario 1 - Reply - A	20	\$ 29,344,750
Dept Scenario 1 - Reply - A	20	\$ 29,342,308
Delta		\$ (2,442)
%Change		-0.01%
Scenario 1 - Reply - B	20	\$ 29,680,635
Dept Scenario 1 - Reply - B	20	\$ 29,678,187
Delta		\$ (2,447)
%Change		-0.01%
Scenario 1 - Reply - C	20	\$ 29,986,781
Dept Scenario 1 - Reply - C	20	\$ 29,984,406
Delta		\$ (2,375)
%Change		-0.01%
Scenario 1 - Reply - F	20	\$ 28,363,031
Dept Scenario 1 - Reply - F	20	\$ 28,360,620
Delta		\$ (2,411)
%Change		-0.01%
Scenario 1 - Reply - G	20	\$ 31,866,911
Dept Scenario 1 - Reply - G	20	\$ 31,864,500
Delta		\$ (2,411)
%Change		-0.01%
Scenario 1 - Reply - I	20	\$ 29,077,756
Dept Scenario 1 - Reply - I	20	\$ 29,075,314
Delta		\$ (2,442)
%Change		-0.01%
Scenario 1 - Reply - J	20	\$ 29,259,549
Dept Scenario 1 - Reply - J	20	\$ 29,257,094
Delta		\$ (2,456)
%Change		-0.01%
Scenario 1 - Reply - K	20	\$ 29,553,572
Dept Scenario 1 - Reply - K	20	\$ 29,551,108
Delta		\$ (2,464)
%Change		-0.01%
Scenario 1 - Reply - L	20	\$ 29,077,756
Dept Scenario 1 - Reply - L	20	\$ 29,075,314
Delta		\$ (2,442)
%Change		-0.01%
Scenario 1 - Reply - M	20	\$ 29,077,756
Dept Scenario 1 - Reply - M	20	\$ 29,075,314
Delta		\$ (2,442)
%Change		-0.01%

Expansion Plan Runs	MIP Stop Basis		Datasets Validated (Optimized Database)
Scenario 1 - Reply - E	40	\$ 14,705,455	Sens E - High Load
Dept Scenario 1 - Reply - E	40	\$ 14,359,386	
Delta		\$ (346,069)	
%Change		-2.35%	
Scenario 9 - Reply - E	40	\$ 13,898,599	Sens E - High Load
Dept Scenario 9 - Reply - E	40	\$ 13,543,125	
Delta		\$ (355,474)	
%Change		-2.56%	
Scenario 9 - BlackStart - Sherco King - E	40	\$ 12,590,608	Sens E - High Load
Dept Scenario 9 - BlackStart - Sherco King - E	40	\$ 12,216,527	
Delta		\$ (374,082)	
%Change		-2.97%	
Production Cost Runs	MIP Stop Basis		Relevant Datasets Validated (Locked Database)
Scenario 1 - Reply - E - PVSC	20	\$ 32,372,389	Expansion Plan Time Series Locked Exp Plan - Scenario 1 - Reply - E
Dept Scenario 1 - Reply - E - PVSC	20	\$ 32,368,363	
Delta		\$ (4,025)	
%Change		-0.01%	
Scenario 9 - Reply - E - PVSC	20	\$ 32,094,072	Expansion Plan Time Series Locked Exp Plan - Scenario 9 - Reply - E
Dept Scenario 9 - Reply - E - PVSC	20	\$ 32,090,780	
Delta		\$ (3,292)	
%Change		-0.01%	
Scenario 9 - BlackStart - Sherco King - E - PVSC	20	\$ 31,392,234	Expansion Plan Time Series Locked Exp Plan - Scenario 9 - Sherco King - E
Dept Scenario 9 - BlackStart - Sherco King - E - PVSC	20	\$ 31,387,600	
Delta		\$ (4,634)	
%Change		-0.01%	

Input or Time Series	Department Assumption	Incorporated in Dept Original New Base filed 2/11/2021	Incorporated in Dept Original New Base filed 6/25/2021	Incorporated in Dept Updated New Base 1 filed 10/15/2021	Incorporated in Dept Updated New Base 2 (Use Xcel's forecast) filed 10/15/2021	Incorporated in Dept Updated New Base 3 (No nuclear cost changes) filed 10/15/2021
Monticello Early Fixed Cost	Added 1% compound annual growth rate		x	x	x	
Monticello Extend Fixed Cost	Added 1% compound annual growth rate		x	x	x	
Monticello Fixed Cost	Added 1% compound annual growth rate		x	x	x	
Prairie Island 1 Early Fixed Cost	Added 1% compound annual growth rate		x	x	x	
Prairie Island 1 Extend Fixed Cost	Added 1% compound annual growth rate		x	x	x	
Prairie Island 1 Fixed Cost	Added 1% compound annual growth rate		x	x	x	
Prairie Island 2 Early Fixed Cost	Added 1% compound annual growth rate		x	x	x	
Prairie Island 2 Extend Fixed Cost	Added 1% compound annual growth rate		x	x	x	
Prairie Island 2 Fixed Cost	Added 1% compound annual growth rate		x	x	x	
Monticello Capex	Added 10% to cost		x	x	x	
Monticello Early Capex	Added 10% to cost		x	x	x	
Monticello Extend Capex	Added 10% to cost		x	x	x	
Prairie Island 1 Capex	Added 10% to cost		x	x	x	
Prairie Island 1 Early Capex	Added 10% to cost		x	x	x	
Prairie Island 1 Extend Capex	Added 10% to cost		x	x	x	
Prairie Island 2 Capex	Added 10% to cost		x	x	x	
Prairie Island 2 Early Capex	Added 10% to cost		x	x	x	
Prairie Island 2 Extend Capex	Added 10% to cost		x	x	x	
Borders Repower	Added dataset		x			
DeuelHarvest	Added dataset	x	x			
ElkCreek	Added dataset	x	x			
Ewington Repower	Added dataset		x			
GrandMeadow Repower 2023	Added dataset		x			
MowerCo - Owned	Added dataset	x	x			
Nobles Repower	Added dataset		x			
PleasantValley Repower	Added dataset		x			
MISO_ Capacity Prices	Change to average price (multiplied by 0.25)	x	x	x	x	x
CO MetroFRG	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
CO MetroFRG Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
CO Rural	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
CO Rural Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
CO Urban	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
CO Urban Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
CO2 Cost	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
CO2 Cost	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
CO2 Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
NOX <200 Miles	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
NOX <200 Miles Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
NOX MetroFRG	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
NOX MetroFRG Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
NOX Rural	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
NOX Rural Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
NOX Urban	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
NOX Urban Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
PB MetroFRG	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
PB MetroFRG Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x

PB Rural	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
PB Rural Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
PM2.5 <200 Miles	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
PM2.5 <200 Miles Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
PM2.5 MetroFRG	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
PM2.5 MetroFRG Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
PM2.5 Rural	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
PM2.5 Rural Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
PM2.5 Urban	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
PM2.5 Urban Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
SOX MetroFRG	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
SOX MetroFRG Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
SOX Rural	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
SOX Rural Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
SOX Urban	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
SOX Urban Externality	Change to Xcel Sensitivity K (mid reg/mid ext) values	x	x	x	x	x
NSP Monthly Energy	Incorporate Dept forecast	x	x	x		x
NSP Monthly Peak	Incorporate Dept forecast	x	x	x		x
FUTDSM Peak	Incorporate Dept forecast pre-2020	x	x	x		x
HISTDSM Peak	Incorporate Dept forecast pre-2020	x	x	x		x
Wheaton 1	Release Rate 3360 for CO2	x	x	x	x	x
Wheaton 2	Release Rate 3360 for CO2	x	x	x	x	x
Wheaton 3	Release Rate 3360 for CO2	x	x	x	x	x
Wheaton 4	Release Rate 3360 for CO2	x	x	x	x	x
Wheaton 6	Release Rate 3360 for CO2	x	x	x	x	x
Blue Lake 1	Release Rate 4570 for CO2	x	x	x	x	x
CSG_Capacity	Repeat 2035 data from 2036 through 2045	x	x	x	x	x
DGSolar_Capacity	Repeat 2035 data from 2036 through 2045	x	x	x	x	x
DR_CP_1_Capacity	Repeat 2035 data from 2036 through 2045	x	x	x	x	x
DR_INT_1_Capacity	Repeat 2035 data from 2036 through 2045	x	x	x	x	x
DR_INT_2_Capacity	Repeat 2035 data from 2036 through 2045	x	x	x	x	x
DR_INT_3_Capacity	Repeat 2035 data from 2036 through 2045	x	x	x	x	x
DR_SS_1_Capacity	Repeat 2035 data from 2036 through 2045	x	x	x	x	x
DR_SS_2_Capacity	Repeat 2035 data from 2036 through 2045	x	x	x	x	x
DR_SS_3_Capacity	Repeat 2035 data from 2036 through 2045	x	x	x	x	x
EE_MAX Load Shape	Repeat 2035 data from 2036 through 2045			x	x	x
EE_MAX Peak	Repeat 2035 data from 2036 through 2045	x	x	x	x	x
EE_OPT Load Shape	Repeat 2035 data from 2036 through 2045			x	x	x
EE_OPT Peak	Repeat 2035 data from 2036 through 2045	x	x	x	x	x
EE_PROG Load Shape	Repeat 2035 data from 2036 through 2045			x	x	x
EE_PROG Peak	Repeat 2035 data from 2036 through 2045	x	x	x	x	x
EV Monthly Energy	Repeat 2035 data from 2036 through 2045	x	x	x	x	x
EV Monthly Peak	Repeat 2035 data from 2036 through 2045	x	x	x	x	x
FUTDSM Load Shape	Repeat 2035 data from 2036 through 2045			x	x	x
FUTDSM Peak	Repeat 2035 data from 2036 through 2045	x	x	x	x	x
HISTDSM Load Shape	Repeat 2035 data from 2036 through 2045			x	x	x
HISTDSM Peak	Repeat 2035 data from 2036 through 2045	x	x	x	x	x
NSP Monthly Energy	Repeat 2035 data from 2036 through 2045	x		x	x	x
NSP Monthly Peak	Repeat 2035 data from 2036 through 2045	x		x	x	x
NSP Weighted Shape	Repeat 2035 data from 2036 through 2045			x	x	x
SS_DLC_Capacity	Repeat 2035 data from 2036 through 2045	x	x	x	x	x

Angus Anson 2	Retirement Date 12/31/2045	x	x	x	x	x
Angus Anson 3	Retirement Date 12/31/2045	x	x	x	x	x
Angus Anson 4	Retirement Date 12/31/2045	x	x	x	x	x
Aurora	Retirement Date 12/31/2045	x	x	x	x	x
Bay Front 5	Retirement Date 12/31/2045	x	x	x	x	x
Bay Front 6	Retirement Date 12/31/2045	x	x	x	x	x
BlazingStar1	Retirement Date 12/31/2045	x	x	x	x	x
BlazingStar2	Retirement Date 12/31/2045	x	x	x	x	x
Blue Lake 7	Retirement Date 12/31/2045	x	x	x	x	x
Blue Lake 8	Retirement Date 12/31/2045	x	x	x	x	x
CleanEnergy1	Retirement Date 12/31/2045	x	x	x	x	x
CommWindNorth1	Retirement Date 12/31/2045	x	x	x	x	x
Courtenay	Retirement Date 12/31/2045	x	x	x	x	x
CrownedRidgeBOT	Retirement Date 12/31/2045	x	x	x	x	x
CrownedRidgePPA	Retirement Date 12/31/2045	x	x	x	x	x
DeuelHarvest	Retirement Date 12/31/2045	x	x	x	x	x
ElkCreek	Retirement Date 12/31/2045	x	x	x	x	x
Foxtail	Retirement Date 12/31/2045	x	x	x	x	x
Freeborn	Retirement Date 12/31/2045	x	x	x	x	x
GrandMeadow Repower 2023	Retirement Date 12/31/2045	x	x	x	x	x
Jeffers	Retirement Date 12/31/2045	x	x	x	x	x
LakeBenton2Repower	Retirement Date 12/31/2045	x	x	x	x	x
Mankato Energy Center 2	Retirement Date 12/31/2045	x	x	x	x	x
Marshall	Retirement Date 12/31/2045	x	x	x	x	x
MowerCo - Owned	Retirement Date 12/31/2045	x	x	x	x	x
NorthStar	Retirement Date 12/31/2045	x	x	x	x	x
Odell	Retirement Date 12/31/2045	x	x	x	x	x
PleasantValley Repower	Retirement Date 12/31/2045	x	x	x	x	x
STCLOUD	Retirement Date 12/31/2045	x	x	x	x	x
StNotreDame	Retirement Date 12/31/2045	x	x	x	x	x
Generic CC Fuel Price (CC_H_GR)	Set fuel price to Gas.Natural.Blackdog	x	x	x	x	x
Generic CT Fuel Price (CT_H_GR)	Set fuel price to Gas.Natural.Cannon Falls	x	x	x	x	x
MISO CO2 Release Rate	Set to 0	x	x			
MISO NSP Spinning Reserve Requirement	Set to 0	x	x	x	x	x

Select EnCompass Outputs--Standard Assumptions

Scenario 1	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,822	132,685	-	-	2,150	850	850	750	-	-	2,244	179,589
B-Low Gas, Market	\$ 36,591	130,601	-	-	1,750	650	550	950	-	374	1,870	167,720
C-High Gas, Market	\$ 36,716	134,782	-	50	3,000	800	900	1,450	-	-	748	190,310
D-Low Load	\$ 36,073	128,974	-	-	2,150	700	300	850	-	-	1,870	186,796
E-High Load	\$ 37,716	139,491	-	-	2,150	750	850	1,000	-	374	1,870	171,071
H-High Ext, High Reg	\$ 38,372	128,340	-	50	2,300	700	800	1,000	-	374	1,496	177,028
I-Low Externality	\$ 36,205	158,734	-	-	1,950	700	200	950	-	374	1,870	195,617
J-Low Ext, Low Reg	\$ 35,295	149,173	-	-	2,100	700	200	1,100	-	374	1,870	190,352
K2-Mid Externality	\$ 39,696	158,734	-	-	1,950	700	200	950	-	374	1,870	195,617
L-High Externality	\$ 43,216	158,734	-	-	1,950	700	200	950	-	374	1,870	195,617
M-No Externality	\$ 34,031	158,734	-	-	1,950	700	200	950	-	374	1,870	195,617
W-Low Wind	\$ 36,560	134,250	-	250	1,900	700	400	650	-	374	1,870	180,827
X-High Wind	\$ 37,125	135,091	-	-	2,000	700	850	450	-	374	1,870	178,383
Y-Low Solar	\$ 36,583	132,405	-	-	2,100	750	1,000	1,150	-	-	1,870	179,287
Z-High Solar	\$ 37,125	136,020	-	-	2,150	-	950	1,000	-	374	1,870	178,323

Select EnCompass Outputs--Standard Assumptions

Scenario 2	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,816	132,495	-	-	2,100	700	1,000	1,300	-	374	1,870	180,175
B-Low Gas, Market	\$ 36,546	130,397	-	-	1,500	700	850	550	-	374	2,618	168,059
C-High Gas, Market	\$ 36,701	132,592	-	150	2,900	700	1,250	1,500	-	374	374	190,691
D-Low Load	\$ 35,941	127,765	-	-	2,150	700	750	950	-	374	1,870	188,110
E-High Load	\$ 37,686	139,427	-	-	2,150	700	1,200	150	-	748	2,244	173,404
H-High Ext, High Reg	\$ 38,294	127,910	-	150	2,100	700	1,250	700	-	374	1,870	178,651
I-Low Externality	\$ 36,177	149,917	-	-	1,950	700	450	700	-	748	2,244	190,656
J-Low Ext, Low Reg	\$ 35,224	143,711	-	-	2,050	700	550	700	-	748	2,244	188,296
K2-Mid Externality	\$ 39,346	149,917	-	-	1,950	700	450	700	-	748	2,244	190,656
L-High Externality	\$ 42,690	149,917	-	-	1,950	700	450	700	-	748	2,244	190,656
M-No Externality	\$ 34,011	149,917	-	-	1,950	700	450	700	-	748	2,244	190,656
W-Low Wind	\$ 36,440	130,003	-	100	2,550	700	950	1,350	-	374	1,496	183,914
X-High Wind	\$ 37,109	134,184	-	-	1,800	700	1,000	650	-	374	2,244	177,754
Y-Low Solar	\$ 36,537	132,483	-	-	2,100	750	1,200	350	-	374	2,244	180,139
Z-High Solar	\$ 37,063	134,874	-	-	2,200	-	1,150	950	-	748	1,870	180,941

Select EnCompass Outputs--Standard Assumptions

Scenario 3	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,708	123,632	-	-	2,050	700	1,000	1,650	-	-	2,244	173,426
B-Low Gas, Market	\$ 36,439	122,503	-	-	1,650	700	1,000	850	-	-	2,618	162,587
C-High Gas, Market	\$ 36,610	122,879	-	50	3,800	700	950	2,200	-	-	748	186,180
D-Low Load	\$ 35,851	118,812	-	-	2,050	700	350	2,450	-	-	1,870	180,041
E-High Load	\$ 37,599	130,012	-	-	2,150	700	900	1,550	-	374	2,244	166,136
H-High Ext, High Reg	\$ 38,125	118,681	-	50	2,950	700	1,000	1,700	-	-	1,870	175,587
I-Low Externality	\$ 36,192	143,655	-	-	2,000	700	600	1,000	-	374	2,244	187,312
J-Low Ext, Low Reg	\$ 35,235	136,419	-	-	2,150	550	600	1,100	-	374	2,244	182,733
K2-Mid Externality	\$ 39,302	143,655	-	-	2,000	700	600	1,000	-	374	2,244	187,312
L-High Externality	\$ 42,582	143,655	-	-	2,000	700	600	1,000	-	374	2,244	187,312
M-No Externality	\$ 34,091	144,087	-	-	2,000	700	500	1,100	-	374	2,244	187,457
W-Low Wind	\$ 36,361	121,366	-	300	2,650	700	850	1,000	-	-	2,244	177,543
X-High Wind	\$ 36,988	125,048	-	-	1,950	700	1,000	1,650	-	-	2,244	171,004
Y-Low Solar	\$ 36,405	122,281	-	-	2,150	750	1,000	1,750	-	-	2,244	174,620
Z-High Solar	\$ 37,002	126,393	-	-	2,200	-	1,050	1,250	-	374	2,244	173,129

Select EnCompass Outputs--Standard Assumptions

Scenario 4	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,658	122,969	-	-	2,650	700	950	1,900	-	374	2,244	177,269
B-Low Gas, Market	\$ 36,377	121,379	-	-	1,750	750	1,000	1,350	-	374	2,618	166,230
C-High Gas, Market	\$ 36,628	119,764	-	200	3,950	700	1,200	2,250	-	374	374	188,577
D-Low Load	\$ 35,759	116,969	-	-	2,450	700	1,000	2,100	-	-	2,244	183,123
E-High Load	\$ 37,529	128,690	-	-	2,750	750	1,100	1,550	-	748	2,244	169,348
H-High Ext, High Reg	\$ 38,093	118,806	-	150	3,100	700	1,300	1,450	-	374	1,870	178,038
I-Low Externality	\$ 36,075	137,540	-	-	2,000	700	250	1,950	-	748	2,244	181,236
J-Low Ext, Low Reg	\$ 35,197	132,625	-	-	2,150	700	200	1,900	-	748	2,244	179,876
K2-Mid Externality	\$ 39,050	137,540	-	-	2,000	700	250	1,950	-	748	2,244	181,236
L-High Externality	\$ 42,189	137,540	-	-	2,000	700	250	1,950	-	748	2,244	181,236
M-No Externality	\$ 34,108	137,540	-	-	2,000	700	250	1,950	-	748	2,244	181,236
W-Low Wind	\$ 36,371	122,842	-	250	3,000	700	500	1,700	-	748	1,870	179,706
X-High Wind	\$ 36,987	124,718	-	-	1,900	700	850	1,650	-	374	2,618	172,193
Y-Low Solar	\$ 36,381	121,711	-	-	2,550	750	1,350	1,650	-	374	2,244	176,814
Z-High Solar	\$ 36,987	126,428	-	50	2,500	-	850	1,700	-	748	2,244	175,020

Select EnCompass Outputs--Standard Assumptions

Scenario 5	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,858	138,826	-	50	2,000	700	900	550	-	748	1,496	169,574
B-Low Gas, Market	\$ 36,538	135,275	-	-	1,700	700	1,000	500	-	748	1,496	157,023
C-High Gas, Market	\$ 36,806	136,367	-	400	2,650	700	1,600	750	-	374	374	183,320
D-Low Load	\$ 35,948	131,858	-	50	2,050	700	1,050	350	-	374	1,496	177,540
E-High Load	\$ 37,785	145,604	-	50	2,100	700	800	650	-	1,122	1,496	162,383
H-High Ext, High Reg	\$ 38,404	130,779	-	400	1,900	700	1,200	550	-	748	1,122	169,774
I-Low Externality	\$ 36,262	162,703	-	-	1,800	800	850	500	-	748	1,496	185,869
J-Low Ext, Low Reg	\$ 35,222	153,716	-	-	1,950	700	950	400	-	748	1,496	180,192
K2-Mid Externality	\$ 39,697	162,703	-	-	1,800	800	850	500	-	748	1,496	185,869
L-High Externality	\$ 43,312	162,714	-	-	1,800	800	850	500	-	748	1,496	185,868
M-No Externality	\$ 33,898	162,714	-	-	1,800	800	850	500	-	748	1,496	185,868
W-Low Wind	\$ 36,526	136,926	-	500	1,850	650	800	650	-	748	1,496	173,230
X-High Wind	\$ 36,571	140,618	-	-	1,950	700	950	400	-	748	1,496	166,579
Y-Low Solar	\$ 36,558	134,590	-	-	2,000	750	1,700	300	-	374	1,496	169,636
Z-High Solar	\$ 37,123	138,594	-	100	2,200	50	1,600	950	-	748	1,122	170,274

Select EnCompass Outputs--Standard Assumptions

Scenario 6	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,785	139,110	-	-	2,100	800	1,850	400	-	748	1,122	141,400
B-Low Gas, Market	\$ 36,383	137,696	-	-	1,900	700	1,300	350	-	1,122	1,122	126,408
C-High Gas, Market	\$ 36,926	142,106	-	600	2,800	750	1,700	600	-	748	374	160,715
D-Low Load	\$ 35,880	132,782	-	100	2,050	700	2,000	450	-	374	1,122	150,470
E-High Load	\$ 37,721	145,010	-	-	2,150	750	1,900	400	-	1,122	1,122	133,620
H-High Ext, High Reg	\$ 38,465	132,097	-	550	2,050	700	1,700	600	-	748	1,122	142,118
I-Low Externality	\$ 36,175	173,918	-	-	2,050	700	1,100	600	-	1,496	748	162,136
J-Low Ext, Low Reg	\$ 35,079	161,779	-	-	2,150	700	1,150	550	-	1,122	1,122	154,039
K2-Mid Externality	\$ 39,834	173,918	-	-	2,050	700	1,100	600	-	1,496	748	162,136
L-High Externality	\$ 43,659	173,918	-	-	2,050	700	1,100	600	-	1,496	748	162,136
M-No Externality	\$ 33,679	173,763	-	-	1,950	750	1,100	600	-	1,122	1,122	161,144
W-Low Wind	\$ 36,486	139,515	-	900	1,800	700	1,250	600	-	1,122	748	149,039
X-High Wind	\$ 37,060	140,012	-	-	2,100	700	1,950	550	-	748	1,122	139,228
Y-Low Solar	\$ 36,526	139,159	-	-	2,150	750	1,900	350	-	748	1,122	141,642
Z-High Solar	\$ 37,146	144,163	-	400	1,750	100	1,550	600	-	1,122	1,122	141,788

Select EnCompass Outputs--Standard Assumptions

Scenario 7	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,768	153,429	-	50	2,150	750	1,950	350	-	1,496	374	132,553
B-Low Gas, Market	\$ 36,279	151,435	-	-	1,750	750	1,900	350	-	1,496	374	114,823
C-High Gas, Market	\$ 36,933	152,604	-	750	1,900	600	2,500	600	-	1,122	374	146,807
D-Low Load	\$ 35,849	145,964	-	50	2,150	700	2,100	400	-	1,122	374	140,789
E-High Load	\$ 37,729	161,340	-	-	2,150	700	1,950	400	-	1,870	374	123,987
H-High Ext, High Reg	\$ 38,570	147,792	-	650	1,450	700	1,650	650	-	1,496	374	130,380
I-Low Externality	\$ 36,141	185,251	-	-	1,950	700	1,450	400	-	1,870	374	151,052
J-Low Ext, Low Reg	\$ 34,978	170,472	-	-	2,050	700	1,900	350	-	1,496	374	142,912
K2-Mid Externality	\$ 39,929	185,251	-	-	1,950	700	1,450	400	-	1,870	374	151,052
L-High Externality	\$ 43,873	185,262	-	-	1,950	700	1,450	400	-	1,870	374	151,051
M-No Externality	\$ 33,622	185,732	-	-	1,950	650	1,450	400	-	1,870	374	150,958
W-Low Wind	\$ 36,410	151,382	-	950	1,450	750	1,600	600	-	1,496	374	138,807
X-High Wind	\$ 37,082	156,326	-	-	2,000	650	2,100	300	-	1,496	374	126,960
Y-Low Solar	\$ 36,517	154,289	-	-	2,100	750	2,000	250	-	1,496	374	131,626
Z-High Solar	\$ 37,118	154,221	-	350	1,800	100	2,350	500	374	1,122	374	134,490

Select EnCompass Outputs--Standard Assumptions

Scenario 8	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,940	142,653	-	900	1,550	700	2,250	500	-	1,496	1,122	130,300
B-Low Gas, Market	\$ 36,424	142,760	-	-	1,900	650	2,300	50	-	1,870	1,122	117,085
C-High Gas, Market	\$ 37,038	136,638	-	950	2,950	600	2,950	350	-	1,496	-	147,530
D-Low Load	\$ 36,118	138,444	-	250	2,300	700	1,950	50	-	1,496	1,122	136,790
E-High Load	\$ 37,798	149,439	-	500	2,300	750	2,250	400	-	2,244	748	123,323
H-High Ext, High Reg	\$ 38,833	136,948	-	900	2,400	700	2,450	200	-	1,496	1,122	134,508
I-Low Externality	\$ 35,807	161,067	-	-	2,100	750	1,800	300	-	1,870	1,122	138,891
J-Low Ext, Low Reg	\$ 35,000	154,543	-	-	2,150	650	1,900	250	-	1,870	1,122	134,118
K2-Mid Externality	\$ 39,446	161,067	-	-	2,100	750	1,800	300	-	1,870	1,122	138,891
L-High Externality	\$ 43,088	161,078	-	-	2,100	750	1,800	300	-	1,870	1,122	138,890
M-No Externality	\$ 33,613	161,078	-	-	2,100	750	1,800	300	-	1,870	1,122	138,890
W-Low Wind	\$ 36,162	140,086	-	1,300	2,050	700	1,900	400	-	1,870	748	139,621
X-High Wind	\$ 36,925	146,362	-	-	2,000	750	2,150	50	-	1,870	1,122	123,142
Y-Low Solar	\$ 36,233	141,802	-	150	2,350	750	2,550	400	-	1,496	1,122	129,284
Z-High Solar	\$ 36,937	145,468	-	700	2,050	50	2,200	350	-	1,870	1,122	131,830

Select EnCompass Outputs--Standard Assumptions

Scenario 9	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,817	118,597	-	-	1,950	700	1,000	1,100	-	374	1,870	183,739
B-Low Gas, Market	\$ 36,697	117,793	-	-	1,500	700	1,000	450	-	374	2,244	175,597
C-High Gas, Market	\$ 36,607	118,081	-	150	3,000	750	1,250	1,600	-	374	374	193,578
D-Low Load	\$ 36,028	115,112	-	-	1,950	700	300	1,100	-	374	1,870	190,683
E-High Load	\$ 37,680	124,699	-	-	2,050	750	1,100	950	-	748	1,870	177,441
H-High Ext, High Reg	\$ 38,159	115,472	-	100	2,000	650	1,450	1,050	-	374	1,496	185,085
I-Low Externality	\$ 36,324	132,936	-	-	1,700	550	500	1,000	-	748	1,870	189,718
J-Low Ext, Low Reg	\$ 35,368	124,841	-	-	1,850	700	1,050	1,200	-	374	1,870	187,240
K2-Mid Externality	\$ 39,184	132,936	-	-	1,700	550	500	1,000	-	748	1,870	189,718
L-High Externality	\$ 42,213	132,936	-	-	1,700	550	500	1,000	-	748	1,870	189,718
M-No Externality	\$ 34,373	132,584	-	-	1,800	700	250	1,000	-	748	1,870	190,202
W-Low Wind	\$ 36,515	118,077	-	550	1,950	700	600	1,000	-	374	1,870	188,193
X-High Wind	\$ 37,063	119,141	-	-	1,700	700	1,000	1,300	-	374	1,870	182,370
Y-Low Solar	\$ 36,561	118,451	-	-	1,950	750	1,300	900	-	374	1,870	183,818
Z-High Solar	\$ 37,075	122,084	-	50	2,100	-	850	900	-	748	1,870	183,948

Select EnCompass Outputs--Standard Assumptions

Scenario 10	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 37,022	129,913	-	50	1,850	700	800	350	-	374	1,870	189,465
B-Low Gas, Market	\$ 36,899	127,747	-	-	1,250	700	450	800	-	748	1,496	177,586
C-High Gas, Market	\$ 36,777	130,157	-	150	2,050	700	1,300	700	-	374	374	197,876
D-Low Load	\$ 36,228	125,055	-	-	1,900	700	300	750	-	374	1,496	196,441
E-High Load	\$ 37,819	134,315	-	-	2,100	750	1,100	200	-	748	1,496	182,384
H-High Ext, High Reg	\$ 38,406	124,164	-	50	1,950	750	1,300	50	-	374	1,496	187,777
I-Low Externality	\$ 36,470	146,286	-	-	1,600	700	250	1,100	-	748	1,496	198,278
J-Low Ext, Low Reg	\$ 35,512	140,902	-	-	1,800	600	500	650	-	748	1,496	195,401
K2-Mid Externality	\$ 39,530	146,286	-	-	1,600	700	250	1,100	-	748	1,496	198,278
L-High Externality	\$ 42,770	146,286	-	-	1,600	700	250	1,100	-	748	1,496	198,278
M-No Externality	\$ 34,325	146,214	-	-	1,600	750	200	1,050	-	748	1,496	197,973
W-Low Wind	\$ 36,726	128,886	-	350	1,700	800	500	650	-	748	1,122	192,581
X-High Wind	\$ 37,231	129,353	-	-	1,700	700	1,000	650	-	374	1,496	187,666
Y-Low Solar	\$ 36,763	128,402	-	-	1,900	750	1,350	100	-	374	1,496	189,557
Z-High Solar	\$ 37,254	131,725	-	50	2,000	-	1,100	400	-	748	1,496	188,728

Select EnCompass Outputs--Standard Assumptions

Scenario 11	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,479	122,239	-	-	2,050	700	1,000	700	-	374	1,496	177,593
B-Low Gas, Market	\$ 36,432	120,597	-	-	1,550	750	950	500	-	374	1,870	168,826
C-High Gas, Market	\$ 36,186	119,982	-	200	2,500	700	1,200	1,250	-	374	374	188,259
D-Low Load	\$ 35,603	116,284	-	50	2,000	700	950	650	-	-	1,496	185,893
E-High Load	\$ 37,307	128,099	-	-	2,100	700	1,150	650	-	748	1,496	170,900
H-High Ext, High Reg	\$ 37,841	119,154	-	150	1,900	700	1,150	550	-	374	1,496	177,495
I-Low Externality	\$ 35,975	136,196	-	-	1,850	700	200	900	-	748	1,496	184,000
J-Low Ext, Low Reg	\$ 35,091	131,647	-	-	1,950	700	200	750	-	748	1,496	182,208
K2-Mid Externality	\$ 38,745	136,196	-	-	1,850	700	200	900	-	748	1,496	184,000
L-High Externality	\$ 41,672	136,196	-	-	1,850	700	200	900	-	748	1,496	184,000
M-No Externality	\$ 34,056	136,196	-	-	1,850	700	200	900	-	748	1,496	184,000
W-Low Wind	\$ 36,142	120,590	-	300	1,900	700	850	850	-	374	1,496	180,342
X-High Wind	\$ 36,688	122,643	-	-	1,850	700	1,000	950	-	374	1,496	176,223
Y-Low Solar	\$ 36,197	121,012	-	-	2,000	750	1,050	900	-	374	1,496	178,382
Z-High Solar	\$ 36,718	125,316	-	-	2,150	-	900	600	-	748	1,496	177,501

Select EnCompass Outputs--Standard Assumptions

Scenario 12	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,686	117,465	-	-	1,800	700	1,000	500	-	374	748	186,875
B-Low Gas, Market	\$ 36,789	116,995	-	-	1,250	700	850	600	-	374	1,122	177,881
C-High Gas, Market	\$ 36,248	118,181	-	150	1,900	750	1,250	350	-	374	374	193,565
D-Low Load	\$ 35,884	113,050	-	100	1,600	800	850	500	-	-	748	194,074
E-High Load	\$ 37,557	123,879	-	-	1,900	700	950	500	-	748	748	180,258
H-High Ext, High Reg	\$ 37,977	114,815	-	100	1,850	750	1,200	150	-	374	748	187,550
I-Low Externality	\$ 36,265	131,066	-	-	1,350	700	350	1,050	-	748	748	191,783
J-Low Ext, Low Reg	\$ 35,365	123,555	-	-	1,650	700	1,000	450	-	374	748	190,775
K2-Mid Externality	\$ 38,908	131,066	-	-	1,350	700	350	1,050	-	748	748	191,783
L-High Externality	\$ 41,711	131,066	-	-	1,350	700	350	1,050	-	748	748	191,783
M-No Externality	\$ 34,401	131,102	-	-	1,350	700	350	1,050	-	748	748	191,670
W-Low Wind	\$ 36,464	116,534	-	200	1,800	650	950	550	-	374	374	189,485
X-High Wind	\$ 36,921	119,020	-	-	1,500	700	1,000	550	-	374	748	183,972
Y-Low Solar	\$ 36,470	117,650	-	-	1,700	750	950	550	-	374	748	186,739
Z-High Solar	\$ 36,927	118,408	-	100	1,750	-	1,550	450	-	374	748	187,354

Select EnCompass Outputs--Standard Assumptions

Scenario 13	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 37,137	130,833	-	-	1,950	700	500	600	-	374	1,122	189,132
B-Low Gas, Market	\$ 36,978	127,519	-	-	1,350	700	200	1,200	-	374	1,122	176,970
C-High Gas, Market	\$ 36,859	132,257	-	50	2,100	800	900	650	-	-	748	197,469
D-Low Load	\$ 36,310	124,739	-	-	1,850	700	400	950	-	-	1,122	196,434
E-High Load	\$ 37,933	135,258	-	-	2,000	750	850	400	-	374	1,496	181,107
H-High Ext, High Reg	\$ 38,497	124,159	-	50	1,900	700	950	450	-	-	1,496	185,946
I-Low Externality	\$ 36,519	153,090	-	-	1,550	750	150	1,050	-	374	1,496	203,631
J-Low Ext, Low Reg	\$ 35,584	143,996	-	-	1,800	700	250	1,000	-	374	1,122	198,818
K2-Mid Externality	\$ 40,116	153,090	-	-	1,550	750	150	1,050	-	374	1,496	203,631
L-High Externality	\$ 43,292	153,090	-	-	1,550	750	150	1,050	-	374	1,496	203,631
M-No Externality	\$ 34,405	153,090	-	-	1,550	750	150	1,050	-	374	1,496	203,631
W-Low Wind	\$ 36,840	129,784	-	350	1,650	700	250	800	-	374	1,122	190,816
X-High Wind	\$ 37,316	129,641	-	-	1,600	700	1,000	600	-	-	1,496	186,878
Y-Low Solar	\$ 36,888	129,011	-	-	1,850	750	950	450	-	-	1,496	188,258
Z-High Solar	\$ 37,309	131,578	-	50	2,050	-	850	950	-	374	1,122	188,863

Select EnCompass Outputs--Standard Assumptions

Scenario 14	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,634	131,279	-	-	2,000	800	900	450	-	-	1,122	182,246
B-Low Gas, Market	\$ 36,653	130,255	-	-	1,450	600	300	950	-	374	748	168,937
C-High Gas, Market	\$ 36,355	134,534	-	50	2,100	800	900	600	-	-	748	190,877
D-Low Load	\$ 35,888	127,633	-	-	1,950	700	300	750	-	-	748	188,745
E-High Load	\$ 37,513	138,174	-	-	2,050	700	900	400	-	374	1,122	174,078
H-High Ext, High Reg	\$ 38,046	125,697	-	100	2,000	750	950	550	-	-	748	179,650
I-Low Externality	\$ 36,324	156,214	-	-	1,700	750	250	1,000	-	374	748	197,149
J-Low Ext, Low Reg	\$ 35,174	147,196	-	-	1,900	700	200	1,000	-	374	1,122	192,536
K2-Mid Externality	\$ 40,095	156,214	-	-	1,700	750	250	1,000	-	374	748	197,149
L-High Externality	\$ 42,652	156,214	-	-	1,700	750	250	1,000	-	374	748	197,149
M-No Externality	\$ 33,999	156,511	-	-	1,700	700	200	1,150	-	374	748	196,987
W-Low Wind	\$ 36,398	131,996	-	400	1,800	700	50	1,200	-	374	374	183,974
X-High Wind	\$ 36,873	132,430	-	-	1,750	700	1,000	750	-	-	1,122	180,100
Y-Low Solar	\$ 36,457	131,633	-	-	1,900	800	900	400	-	-	1,122	181,470
Z-High Solar	\$ 36,899	134,477	-	50	2,050	-	850	650	-	374	748	181,077

Select EnCompass Outputs--Standard Assumptions

Scenario 15	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 37,007	128,095	-	-	1,600	700	1,000	400	-	-	748	190,821
B-Low Gas, Market	\$ 37,093	127,454	-	-	1,000	700	200	850	-	374	374	178,430
C-High Gas, Market	\$ 36,585	131,185	-	50	1,750	800	900	450	-	-	748	199,367
D-Low Load	\$ 36,290	125,176	-	-	1,450	700	300	650	-	-	748	198,139
E-High Load	\$ 37,782	133,682	-	-	1,800	750	900	450	-	374	374	183,877
H-High Ext, High Reg	\$ 38,367	122,971	-	50	1,700	700	950	450	-	-	748	188,824
I-Low Externality	\$ 36,740	153,567	-	-	1,200	700	200	750	-	374	374	205,302
J-Low Ext, Low Reg	\$ 35,623	144,094	-	-	1,350	700	350	600	-	374	374	200,443
K2-Mid Externality	\$ 40,459	153,567	-	-	1,200	700	200	750	-	374	374	205,302
L-High Externality	\$ 42,902	153,567	-	-	1,200	700	200	750	-	374	374	205,302
M-No Externality	\$ 34,447	153,567	-	-	1,200	700	200	750	-	374	374	205,302
W-Low Wind	\$ 36,775	128,182	-	300	1,600	750	250	850	-	374	374	193,703
X-High Wind	\$ 37,245	129,869	-	-	1,250	700	1,000	150	-	-	748	188,843
Y-Low Solar	\$ 36,794	127,961	-	-	1,550	750	950	500	-	-	748	190,916
Z-High Solar	\$ 37,238	131,546	-	50	1,650	-	900	600	-	374	374	190,134

Select EnCompass Outputs--Standard Assumptions

Scenario 16	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,695	153,164	-	300	1,850	700	2,250	50	-	1,870	748	133,598
B-Low Gas, Market	\$ 36,195	146,355	-	-	1,800	700	2,350	-	-	1,870	748	118,043
C-High Gas, Market	\$ 36,817	151,266	-	1,050	2,250	800	2,900	100	-	1,122	374	151,620
D-Low Load	\$ 35,832	147,688	-	100	2,050	700	2,000	200	-	1,496	748	140,429
E-High Load	\$ 37,597	158,850	-	400	1,750	700	2,300	50	-	1,870	748	125,802
H-High Ext, High Reg	\$ 38,428	144,567	-	900	1,750	750	2,350	50	-	1,496	748	135,204
I-Low Externality	\$ 35,963	182,929	-	-	2,050	750	1,800	50	-	2,244	374	145,907
J-Low Ext, Low Reg	\$ 34,877	169,035	-	-	2,000	700	2,200	50	-	1,870	748	139,683
K2-Mid Externality	\$ 39,898	182,929	-	-	2,050	750	1,800	50	-	2,244	374	145,907
L-High Externality	\$ 43,221	182,942	-	-	2,050	750	1,800	50	-	2,244	374	145,906
M-No Externality	\$ 33,535	183,181	-	-	2,000	750	1,750	50	-	1,870	748	144,887
W-Low Wind	\$ 36,370	152,779	-	1,400	1,000	700	1,150	650	-	1,870	748	139,939
X-High Wind	\$ 37,067	156,335	-	-	1,950	100	2,850	-	-	1,870	748	127,053
Y-Low Solar	\$ 36,400	152,678	-	150	2,000	700	2,400	150	-	1,870	374	132,981
Z-High Solar	\$ 37,056	156,296	-	550	1,600	100	2,250	100	-	1,870	748	134,474

Select EnCompass Outputs--Standard Assumptions

Scenario 17	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,601	144,395	-	100	2,150	750	1,950	550	-	1,496	748	125,897
B-Low Gas, Market	\$ 36,128	143,938	-	-	1,750	700	1,900	400	-	1,496	1,122	111,641
C-High Gas, Market	\$ 36,740	139,509	-	750	2,800	750	2,500	600	-	1,122	374	144,512
D-Low Load	\$ 35,733	137,815	-	-	2,250	700	2,000	450	-	1,122	1,122	133,724
E-High Load	\$ 37,567	152,597	-	50	2,350	750	1,800	650	-	1,870	748	117,637
H-High Ext, High Reg	\$ 38,312	139,614	-	700	2,150	550	1,850	550	-	1,496	748	128,206
I-Low Externality	\$ 35,923	167,519	-	-	2,050	700	1,900	400	-	1,496	1,122	140,752
J-Low Ext, Low Reg	\$ 34,903	158,045	-	-	2,150	700	1,900	350	-	1,496	1,122	135,053
K2-Mid Externality	\$ 39,742	167,519	-	-	2,050	700	1,900	400	-	1,496	1,122	140,752
L-High Externality	\$ 42,992	167,530	-	-	2,050	700	1,900	400	-	1,496	1,122	140,751
M-No Externality	\$ 33,609	167,530	-	-	2,050	700	1,900	400	-	1,496	1,122	140,751
W-Low Wind	\$ 36,249	141,555	-	950	1,950	700	1,650	600	-	1,496	748	135,347
X-High Wind	\$ 36,882	146,308	-	-	2,100	800	1,850	700	-	1,496	748	121,731
Y-Low Solar	\$ 36,313	144,295	-	-	2,150	750	2,100	450	-	1,496	748	125,234
Z-High Solar	\$ 36,895	144,349	-	400	2,100	100	2,300	750	-	1,496	748	127,755

Select EnCompass Outputs--Standard Assumptions

Scenario 18	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,599	126,704	-	150	2,450	700	1,550	1,350	-	748	1,870	166,983
B-Low Gas, Market	\$ 36,291	126,376	-	-	2,000	700	1,050	1,100	-	1,122	1,870	157,162
C-High Gas, Market	\$ 36,559	121,626	-	500	3,650	700	1,850	1,550	-	748	-	180,399
D-Low Load	\$ 35,820	122,931	-	50	2,400	700	1,000	1,050	-	748	1,870	173,953
E-High Load	\$ 37,501	132,368	-	150	2,600	700	1,550	1,150	-	1,122	1,870	160,362
H-High Ext, High Reg	\$ 38,093	121,227	-	550	2,800	700	1,700	1,050	-	748	1,496	171,671
I-Low Externality	\$ 36,007	140,740	-	-	1,950	700	950	1,300	-	1,122	1,870	173,264
J-Low Ext, Low Reg	\$ 35,052	135,375	-	-	2,050	700	1,100	1,250	-	1,122	1,870	170,512
K2-Mid Externality	\$ 39,423	140,740	-	-	1,950	700	950	1,300	-	1,122	1,870	173,264
L-High Externality	\$ 42,177	140,751	-	-	1,950	700	950	1,300	-	1,122	1,870	173,264
M-No Externality	\$ 33,945	140,751	-	-	1,950	700	950	1,300	-	1,122	1,870	173,264
W-Low Wind	\$ 36,281	121,275	-	750	2,500	700	1,300	1,050	-	748	1,870	171,616
X-High Wind	\$ 36,958	124,798	-	-	1,900	700	1,400	1,100	-	1,122	1,870	162,014
Y-Low Solar	\$ 36,335	120,545	-	50	2,450	750	1,650	1,250	-	748	1,870	167,749
Z-High Solar	\$ 36,932	125,417	-	400	1,800	-	1,300	1,450	-	1,122	1,870	166,181

Select EnCompass Outputs--Standard Assumptions

Scenario 19	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,791	137,823	-	50	2,050	700	1,350	250	-	1,122	1,496	170,728
B-Low Gas, Market	\$ 36,455	135,636	-	-	1,700	650	1,100	300	-	1,122	1,870	157,426
C-High Gas, Market	\$ 36,701	134,343	-	450	2,650	700	1,900	750	-	748	-	182,261
D-Low Load	\$ 35,888	131,182	-	-	2,100	700	1,050	600	-	748	1,496	177,966
E-High Load	\$ 37,674	143,921	-	100	2,000	700	1,450	350	-	1,496	1,496	163,403
H-High Ext, High Reg	\$ 38,348	131,451	-	500	1,950	500	1,700	250	-	748	1,496	170,722
I-Low Externality	\$ 36,157	155,679	-	-	1,800	750	850	450	-	1,122	1,870	179,905
J-Low Ext, Low Reg	\$ 35,162	151,005	-	-	2,050	700	800	150	-	1,122	1,870	178,144
K2-Mid Externality	\$ 39,881	155,679	-	-	1,800	750	850	450	-	1,122	1,870	179,905
L-High Externality	\$ 42,820	155,689	-	-	1,800	750	850	450	-	1,122	1,870	179,905
M-No Externality	\$ 33,875	155,689	-	-	1,800	750	850	450	-	1,122	1,870	179,905
W-Low Wind	\$ 36,385	135,917	-	650	1,500	700	1,350	250	-	748	1,870	173,700
X-High Wind	\$ 37,008	139,189	-	-	2,000	700	1,350	450	-	1,122	1,496	167,701
Y-Low Solar	\$ 36,536	136,395	-	-	2,050	750	1,650	-	-	748	1,870	170,957
Z-High Solar	\$ 37,059	139,881	-	400	1,750	-	1,300	850	-	1,122	1,496	171,826

Select EnCompass Outputs--Standard Assumptions

Scenario 20	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,995	127,042	-	100	2,200	700	1,150	1,350	-	748	1,496	165,831
B-Low Gas, Market	\$ 36,706	127,223	-	-	1,850	700	1,000	700	-	748	1,870	153,113
C-High Gas, Market	\$ 36,952	123,945	-	400	3,450	750	1,600	1,500	-	374	374	178,665
D-Low Load	\$ 36,164	121,766	-	-	2,200	700	1,050	1,350	-	374	1,496	171,691
E-High Load	\$ 37,944	134,398	-	-	2,250	700	1,100	1,300	-	1,122	1,496	156,759
H-High Ext, High Reg	\$ 38,712	119,860	-	400	2,850	700	1,600	700	-	374	1,496	168,107
I-Low Externality	\$ 36,183	150,382	-	-	1,700	650	1,000	850	-	748	1,870	175,218
J-Low Ext, Low Reg	\$ 35,259	140,990	-	-	2,000	750	900	1,000	-	748	1,870	171,905
K2-Mid Externality	\$ 39,870	150,382	-	-	1,700	650	1,000	850	-	748	1,870	175,218
L-High Externality	\$ 43,559	150,393	-	-	1,700	650	1,000	850	-	748	1,870	175,217
M-No Externality	\$ 33,948	150,393	-	-	1,700	650	1,000	850	-	748	1,870	175,217
W-Low Wind	\$ 36,350	131,956	-	550	2,450	700	800	1,200	-	748	1,496	169,140
X-High Wind	\$ 36,971	138,630	-	-	2,000	700	950	1,150	-	748	1,870	160,640
Y-Low Solar	\$ 36,371	131,158	-	-	2,150	750	1,700	1,000	-	374	1,870	164,374
Z-High Solar	\$ 36,998	138,366	-	150	2,050	-	1,000	1,200	-	1,122	1,496	163,661

Select EnCompass Outputs--Standard Assumptions

Scenario 21	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,426	126,774	-	-	2,050	700	1,000	850	-	1,122	748	168,582
B-Low Gas, Market	\$ 36,367	126,911	-	-	1,550	700	950	300	-	1,122	1,122	157,676
C-High Gas, Market	\$ 36,143	121,715	-	500	2,300	700	1,800	700	-	748	-	180,639
D-Low Load	\$ 35,553	119,757	-	400	1,650	700	1,450	150	-	374	1,122	177,163
E-High Load	\$ 37,283	132,295	-	100	1,950	700	1,500	300	-	1,122	1,122	161,671
H-High Ext, High Reg	\$ 37,756	119,362	-	450	1,750	700	2,050	200	-	748	748	171,541
I-Low Externality	\$ 35,948	140,751	-	-	1,650	700	950	250	-	1,122	1,122	173,867
J-Low Ext, Low Reg	\$ 34,976	134,932	-	-	1,800	750	950	350	-	1,122	1,122	172,259
K2-Mid Externality	\$ 39,297	140,751	-	-	1,650	700	950	250	-	1,122	1,122	173,867
L-High Externality	\$ 41,752	140,751	-	-	1,650	700	950	250	-	1,122	1,122	173,867
M-No Externality	\$ 33,924	140,751	-	-	1,650	700	950	250	-	1,122	1,122	173,867
W-Low Wind	\$ 36,109	124,852	-	750	1,500	700	1,300	200	-	748	1,122	172,676
X-High Wind	\$ 36,654	127,633	-	-	1,900	800	900	900	-	1,122	748	165,708
Y-Low Solar	\$ 36,134	122,979	-	-	2,000	750	1,850	150	-	748	1,122	169,006
Z-High Solar	\$ 36,677	129,320	-	400	1,700	-	1,300	350	-	1,122	1,122	168,609

Select EnCompass Outputs--Standard Assumptions

Scenario 22	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,568	136,419	-	100	1,950	700	900	400	-	1,122	374	174,058
B-Low Gas, Market	\$ 36,486	134,040	-	-	1,550	700	1,050	300	-	1,122	748	160,737
C-High Gas, Market	\$ 36,305	133,979	-	450	1,750	700	1,850	250	-	748	-	183,495
D-Low Load	\$ 35,708	129,911	-	-	1,950	700	1,050	450	-	748	374	180,875
E-High Load	\$ 37,424	142,231	-	50	1,950	750	1,450	-	-	1,122	748	166,457
H-High Ext, High Reg	\$ 38,057	130,047	-	450	1,700	600	1,650	-	-	748	374	173,597
I-Low Externality	\$ 36,071	153,879	-	-	1,700	700	850	500	-	1,122	748	182,628
J-Low Ext, Low Reg	\$ 35,033	147,629	-	-	1,750	700	1,050	300	-	1,122	748	179,117
K2-Mid Externality	\$ 39,693	153,879	-	-	1,700	700	850	500	-	1,122	748	182,628
L-High Externality	\$ 42,269	153,879	-	-	1,700	700	850	500	-	1,122	748	182,628
M-No Externality	\$ 33,847	153,890	-	-	1,700	700	850	500	-	1,122	748	182,628
W-Low Wind	\$ 36,262	133,779	-	700	1,500	700	1,350	150	-	748	374	177,899
X-High Wind	\$ 36,832	138,175	-	-	1,800	700	1,150	300	-	1,122	374	169,991
Y-Low Solar	\$ 36,325	134,806	-	50	1,950	750	1,600	-	-	748	748	174,554
Z-High Solar	\$ 36,828	138,076	-	100	1,850	-	1,550	350	-	1,122	748	172,537

Select EnCompass Outputs--Standard Assumptions

Scenario 23	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,461	126,747	-	-	2,100	650	1,100	500	-	748	748	167,257
B-Low Gas, Market	\$ 36,431	126,943	-	-	1,400	700	950	300	-	748	1,122	154,000
C-High Gas, Market	\$ 36,201	124,751	-	400	2,050	700	1,600	500	-	374	374	177,792
D-Low Load	\$ 35,606	121,038	-	-	1,950	700	1,050	400	-	374	748	173,623
E-High Load	\$ 37,348	133,102	-	50	2,100	700	1,100	400	-	1,122	748	160,488
H-High Ext, High Reg	\$ 37,829	119,228	-	350	1,800	700	1,650	550	-	374	748	168,873
I-Low Externality	\$ 36,034	148,344	-	-	1,800	700	950	450	-	748	748	179,098
J-Low Ext, Low Reg	\$ 35,026	139,552	-	-	1,850	700	950	400	-	748	1,122	174,539
K2-Mid Externality	\$ 39,566	148,344	-	-	1,800	700	950	450	-	748	748	179,098
L-High Externality	\$ 42,064	148,344	-	-	1,800	700	950	450	-	748	748	179,098
M-No Externality	\$ 33,889	148,344	-	-	1,800	700	950	450	-	748	748	179,098
W-Low Wind	\$ 36,188	125,151	-	550	1,600	700	850	650	-	748	748	170,584
X-High Wind	\$ 36,715	129,002	-	-	1,850	700	1,000	600	-	748	748	163,396
Y-Low Solar	\$ 36,173	123,079	-	-	2,050	750	1,700	400	-	374	748	167,591
Z-High Solar	\$ 36,680	127,591	-	200	1,950	-	1,550	550	-	748	748	167,452

Select EnCompass Outputs--Standard Assumptions

Scenario 24	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,654	136,211	-	-	2,000	700	1,150	350	-	748	374	173,615
B-Low Gas, Market	\$ 36,587	134,411	-	-	1,400	650	1,000	250	-	748	374	158,088
C-High Gas, Market	\$ 36,356	135,039	-	400	1,750	750	1,600	500	-	374	374	183,969
D-Low Load	\$ 35,804	130,532	-	-	1,900	700	1,050	400	-	374	374	179,882
E-High Load	\$ 37,548	143,447	-	50	2,050	700	850	450	-	1,122	374	165,961
H-High Ext, High Reg	\$ 38,170	130,956	-	400	1,700	700	850	500	-	748	374	170,822
I-Low Externality	\$ 36,289	161,868	-	-	1,500	750	900	350	-	748	374	187,887
J-Low Ext, Low Reg	\$ 35,154	152,889	-	-	1,700	700	950	200	-	748	374	182,033
K2-Mid Externality	\$ 40,147	161,868	-	-	1,500	750	900	350	-	748	374	187,887
L-High Externality	\$ 42,835	161,878	-	-	1,500	750	900	350	-	748	374	187,887
M-No Externality	\$ 33,915	161,878	-	-	1,500	750	900	350	-	748	374	187,887
W-Low Wind	\$ 36,374	134,520	-	500	1,650	750	800	600	-	748	374	177,152
X-High Wind	\$ 36,924	138,653	-	-	1,800	700	1,000	400	-	748	374	169,716
Y-Low Solar	\$ 36,382	132,845	-	-	1,850	750	1,800	200	-	374	374	172,716
Z-High Solar	\$ 36,908	137,727	-	100	1,850	-	1,600	450	-	748	374	172,591

Select EnCompass Outputs--Standard Assumptions

Scenario 25	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,730	139,066	-	300	1,850	750	1,650	400	-	1,122	1,870	138,964
B-Low Gas, Market	\$ 36,225	138,397	-	-	1,900	700	1,850	400	-	1,496	1,496	128,173
C-High Gas, Market	\$ 36,699	130,577	-	850	3,350	750	2,250	1,000	-	748	374	160,744
D-Low Load	\$ 35,809	132,496	-	250	2,300	700	1,850	200	-	748	1,870	147,803
E-High Load	\$ 37,534	143,273	-	300	2,500	700	2,200	450	-	1,496	1,496	132,871
H-High Ext, High Reg	\$ 38,249	132,158	-	800	2,200	750	2,200	300	-	1,122	1,496	144,063
I-Low Externality	\$ 35,800	155,814	-	-	2,100	700	1,450	700	-	1,496	1,496	147,768
J-Low Ext, Low Reg	\$ 34,978	148,861	-	-	2,150	700	1,650	650	-	1,496	1,496	144,106
K2-Mid Externality	\$ 39,070	155,814	-	-	2,100	700	1,450	700	-	1,496	1,496	147,768
L-High Externality	\$ 42,547	155,814	-	-	2,100	700	1,450	700	-	1,496	1,496	147,768
M-No Externality	\$ 33,752	155,814	-	-	2,100	700	1,450	700	-	1,496	1,496	147,768
W-Low Wind	\$ 36,244	134,192	-	1,100	2,250	700	1,700	600	-	1,122	1,496	149,033
X-High Wind	\$ 37,019	140,473	-	-	2,150	700	1,900	200	-	1,122	1,870	136,493
Y-Low Solar	\$ 36,308	136,377	-	-	2,500	750	2,300	700	-	1,122	1,496	139,205
Z-High Solar	\$ 37,001	140,929	-	500	2,000	100	1,950	700	-	1,496	1,496	139,694

Select EnCompass Outputs--Standard Assumptions

Scenario 26	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,779	148,974	-	650	1,500	700	1,600	950	-	1,122	1,122	143,911
B-Low Gas, Market	\$ 36,307	146,705	-	-	1,950	700	1,200	700	-	1,496	1,122	130,379
C-High Gas, Market	\$ 36,868	143,867	-	850	2,600	750	2,250	600	-	748	374	162,456
D-Low Load	\$ 35,933	142,078	-	250	1,900	700	1,850	50	-	748	1,496	152,294
E-High Load	\$ 37,655	153,409	-	250	1,900	700	2,150	200	-	1,496	1,122	136,018
H-High Ext, High Reg	\$ 38,450	140,651	-	850	1,700	700	2,150	200	-	1,122	1,122	146,093
I-Low Externality	\$ 36,104	170,016	-	-	2,100	700	1,350	350	-	1,496	1,122	158,862
J-Low Ext, Low Reg	\$ 35,017	162,745	-	-	2,000	700	1,600	-	-	1,496	1,122	150,691
K2-Mid Externality	\$ 40,003	170,016	-	-	2,100	700	1,350	350	-	1,496	1,122	158,862
L-High Externality	\$ 43,176	170,016	-	-	2,100	700	1,350	350	-	1,496	1,122	158,862
M-No Externality	\$ 33,703	169,895	-	-	2,100	700	1,350	350	-	1,496	1,122	158,265
W-Low Wind	\$ 36,422	146,805	-	1,100	1,350	700	1,550	350	-	1,122	1,496	148,890
X-High Wind	\$ 37,129	150,141	-	-	2,050	700	1,900	100	-	1,122	1,496	140,983
Y-Low Solar	\$ 36,462	146,548	-	-	2,150	750	2,200	250	-	1,122	1,496	143,786
Z-High Solar	\$ 37,068	150,592	-	500	1,650	100	2,050	200	-	1,496	1,122	144,099

Select EnCompass Outputs--Standard Assumptions

Scenario 27	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,660	137,866	-	-	2,250	700	1,950	600	-	748	1,496	136,453
B-Low Gas, Market	\$ 36,270	139,137	-	-	2,000	700	1,300	600	-	1,122	1,496	125,913
C-High Gas, Market	\$ 36,821	134,740	-	650	3,050	650	1,900	1,000	-	748	374	157,864
D-Low Load	\$ 35,866	133,760	-	-	2,200	700	1,300	650	-	748	1,496	144,642
E-High Load	\$ 37,609	145,303	-	50	2,350	650	1,850	700	-	1,122	1,496	128,741
H-High Ext, High Reg	\$ 38,294	132,253	-	550	2,450	700	1,700	850	-	748	1,496	141,210
I-Low Externality	\$ 36,102	165,507	-	-	2,000	750	1,100	600	-	1,496	1,122	153,656
J-Low Ext, Low Reg	\$ 35,037	154,178	-	-	2,000	750	1,350	400	-	1,122	1,496	146,518
K2-Mid Externality	\$ 39,958	165,507	-	-	2,000	750	1,100	600	-	1,496	1,122	153,656
L-High Externality	\$ 43,113	165,507	-	-	2,000	750	1,100	600	-	1,496	1,122	153,656
M-No Externality	\$ 33,767	165,507	-	-	2,000	750	1,100	600	-	1,496	1,122	153,656
W-Low Wind	\$ 36,336	135,547	-	1,000	2,200	600	1,500	650	-	1,122	1,122	146,407
X-High Wind	\$ 36,931	138,579	-	-	2,100	700	2,000	650	-	748	1,496	134,549
Y-Low Solar	\$ 36,390	137,722	-	-	2,150	750	1,950	700	-	748	1,496	136,419
Z-High Solar	\$ 37,040	142,318	-	400	2,000	100	1,550	650	-	1,122	1,496	136,614

Select EnCompass Outputs--Standard Assumptions

Scenario 28	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,613	132,921	-	50	2,000	700	800	400	-	374	1,122	183,211
B-Low Gas, Market	\$ 36,568	125,360	-	-	1,600	700	1,000	400	-	374	1,496	172,677
C-High Gas, Market	\$ 36,322	133,588	-	100	2,100	700	1,300	650	-	374	374	191,731
D-Low Load	\$ 35,789	127,257	-	-	1,900	700	1,000	200	-	-	1,496	190,031
E-High Load	\$ 37,422	135,598	-	-	2,100	750	1,100	400	-	748	1,122	176,873
H-High Ext, High Reg	\$ 37,950	123,325	-	150	2,050	700	1,300	400	-	374	748	182,400
I-Low Externality	\$ 36,179	153,406	-	-	1,700	700	450	800	-	748	1,122	193,130
J-Low Ext, Low Reg	\$ 35,128	146,280	-	-	1,900	700	300	750	-	748	1,122	190,693
K2-Mid Externality	\$ 39,732	153,406	-	-	1,700	700	450	800	-	748	1,122	193,130
L-High Externality	\$ 42,206	153,406	-	-	1,700	700	450	800	-	748	1,122	193,130
M-No Externality	\$ 33,995	153,784	-	-	1,650	700	400	800	-	748	1,122	192,954
W-Low Wind	\$ 36,333	131,905	-	400	1,750	700	650	450	-	374	1,122	185,168
X-High Wind	\$ 36,801	132,117	-	-	1,950	700	1,000	500	-	374	1,122	181,747
Y-Low Solar	\$ 36,366	130,756	-	-	1,950	750	950	600	-	374	1,122	183,790
Z-High Solar	\$ 36,851	134,114	-	-	2,050	-	950	600	-	748	1,122	183,046

Select EnCompass Outputs--Standard Assumptions

Scenario 29	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,487	120,955	-	50	1,900	700	950	650	-	-	1,496	177,337
B-Low Gas, Market	\$ 36,490	120,753	-	-	1,650	700	1,000	450	-	-	1,496	166,784
C-High Gas, Market	\$ 36,237	123,256	-	100	2,400	700	950	1,150	-	-	748	185,598
D-Low Load	\$ 35,673	117,481	-	-	2,050	700	350	1,150	-	-	1,122	183,428
E-High Load	\$ 37,387	128,859	-	-	1,950	750	900	450	-	374	1,496	168,902
H-High Ext, High Reg	\$ 37,875	118,174	-	50	2,100	700	950	800	-	-	1,122	176,171
I-Low Externality	\$ 36,103	140,406	-	-	1,800	700	1,000	500	-	-	1,496	188,845
J-Low Ext, Low Reg	\$ 35,092	133,342	-	-	1,850	700	1,000	500	-	-	1,496	183,408
K2-Mid Externality	\$ 39,516	140,406	-	-	1,800	700	1,000	500	-	-	1,496	188,845
L-High Externality	\$ 41,881	140,406	-	-	1,800	700	1,000	500	-	-	1,496	188,845
M-No Externality	\$ 34,027	140,398	-	-	1,800	700	1,000	500	-	-	1,496	188,811
W-Low Wind	\$ 36,230	121,035	-	150	2,150	700	800	850	-	374	748	178,843
X-High Wind	\$ 36,745	123,532	-	-	1,750	700	1,000	600	-	-	1,496	173,935
Y-Low Solar	\$ 36,282	121,792	-	-	1,900	750	950	600	-	-	1,496	176,250
Z-High Solar	\$ 36,740	124,695	-	50	2,100	-	850	1,100	-	374	1,122	176,248

Select EnCompass Outputs--Standard Assumptions

Scenario 30	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,839	133,307	-	300	1,900	700	1,950	150	-	1,122	1,122	150,038
B-Low Gas, Market	\$ 36,608	136,895	-	-	1,600	700	1,000	550	-	1,496	1,122	133,802
C-High Gas, Market	\$ 36,742	129,059	-	850	2,450	750	2,300	500	-	748	374	164,154
D-Low Load	\$ 36,008	128,767	-	200	1,950	700	1,600	50	-	1,122	1,122	156,568
E-High Load	\$ 37,719	138,687	-	250	1,900	700	2,200	50	-	1,496	1,122	140,980
H-High Ext, High Reg	\$ 38,366	128,131	-	850	1,300	750	2,250	-	-	748	1,496	150,776
I-Low Externality	\$ 36,284	153,253	-	-	1,950	700	1,150	200	-	1,496	1,122	158,432
J-Low Ext, Low Reg	\$ 35,272	144,203	-	-	2,000	700	1,550	50	-	1,496	1,122	153,060
K2-Mid Externality	\$ 39,862	153,253	-	-	1,950	700	1,150	200	-	1,496	1,122	158,432
L-High Externality	\$ 42,717	153,253	-	-	1,950	700	1,150	200	-	1,496	1,122	158,432
M-No Externality	\$ 34,118	153,193	-	-	1,950	700	1,150	200	-	1,496	1,122	157,989
W-Low Wind	\$ 36,485	125,438	-	1,050	1,500	700	1,750	150	-	1,122	1,122	154,513
X-High Wind	\$ 37,103	126,362	-	-	1,950	700	2,300	-	-	1,122	1,122	145,463
Y-Low Solar	\$ 36,516	124,446	-	-	2,150	750	2,300	50	-	1,122	1,122	148,810
Z-High Solar	\$ 37,132	128,982	-	700	1,450	100	2,150	400	-	1,122	1,122	148,816

Select EnCompass Outputs--Standard Assumptions

Scenario 31	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,986	143,436	-	250	1,900	700	1,850	100	-	1,122	748	154,493
B-Low Gas, Market	\$ 36,742	143,467	-	-	1,600	700	1,450	-	-	1,496	748	137,895
C-High Gas, Market	\$ 36,970	142,622	-	800	1,600	750	2,200	50	-	1,122	-	165,676
D-Low Load	\$ 36,148	139,053	-	-	2,000	700	1,250	400	-	1,122	374	159,600
E-High Load	\$ 37,876	148,043	-	300	1,800	750	2,100	50	-	1,496	748	146,320
H-High Ext, High Reg	\$ 38,575	135,284	-	850	1,300	750	2,200	100	-	1,122	374	154,771
I-Low Externality	\$ 36,454	168,453	-	-	1,950	700	1,000	150	-	1,496	748	165,696
J-Low Ext, Low Reg	\$ 35,296	156,817	-	-	2,000	700	1,600	-	-	1,496	374	160,874
K2-Mid Externality	\$ 40,342	168,453	-	-	1,950	700	1,000	150	-	1,496	748	165,696
L-High Externality	\$ 43,359	168,453	-	-	1,950	700	1,000	150	-	1,496	748	165,696
M-No Externality	\$ 34,057	169,169	-	-	2,000	700	350	650	-	1,870	374	165,349
W-Low Wind	\$ 36,675	141,788	-	950	1,200	700	1,700	100	-	1,122	748	158,395
X-High Wind	\$ 37,243	142,937	-	-	1,900	650	2,400	-	-	1,122	748	149,435
Y-Low Solar	\$ 36,696	141,306	-	-	2,100	750	2,150	100	-	1,122	748	153,750
Z-High Solar	\$ 37,266	144,693	-	750	1,400	100	2,150	-	-	1,122	748	155,210

Select EnCompass Outputs--Standard Assumptions

Scenario 32	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 37,277	132,770	-	50	1,950	700	1,900	400	-	748	1,122	146,576
B-Low Gas, Market	\$ 37,019	136,185	-	-	1,600	750	1,100	200	-	1,122	1,122	131,336
C-High Gas, Market	\$ 37,240	133,016	-	600	2,400	600	1,900	600	-	748	374	160,630
D-Low Load	\$ 36,429	128,606	-	50	2,100	700	1,400	400	-	748	748	155,195
E-High Load	\$ 38,157	139,553	-	100	2,050	700	1,800	400	-	1,122	1,122	139,331
H-High Ext, High Reg	\$ 39,038	128,504	-	550	1,750	700	1,700	550	-	748	1,122	147,915
I-Low Externality	\$ 36,357	159,042	-	-	1,950	800	1,100	550	-	1,122	748	160,862
J-Low Ext, Low Reg	\$ 35,448	149,189	-	-	2,050	700	1,250	500	-	1,122	748	155,429
K2-Mid Externality	\$ 40,095	159,042	-	-	1,950	800	1,100	550	-	1,122	748	160,862
L-High Externality	\$ 43,834	159,042	-	-	1,950	800	1,100	550	-	1,122	748	160,862
M-No Externality	\$ 34,091	159,042	-	-	1,950	800	1,100	550	-	1,122	748	160,862
W-Low Wind	\$ 36,598	133,042	-	900	1,300	700	1,250	600	-	1,122	748	151,769
X-High Wind	\$ 37,170	134,296	-	-	1,950	700	2,000	300	-	748	1,122	142,743
Y-Low Solar	\$ 36,627	132,569	-	-	2,050	750	1,900	350	-	748	1,122	146,630
Z-High Solar	\$ 37,176	136,569	-	350	1,800	100	1,600	650	-	1,122	748	146,652

Select EnCompass Outputs--Standard Assumptions

Scenario 33	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 37,097	142,438	-	-	2,000	650	2,000	150	-	748	374	151,919
B-Low Gas, Market	\$ 36,820	143,886	-	-	1,550	750	1,100	250	-	1,122	374	134,954
C-High Gas, Market	\$ 37,025	145,037	-	550	1,600	750	1,650	600	-	748	374	164,712
D-Low Load	\$ 36,240	138,164	-	100	2,050	700	1,300	450	-	748	374	161,366
E-High Load	\$ 37,965	148,181	-	50	2,100	700	1,900	400	-	1,122	374	145,425
H-High Ext, High Reg	\$ 38,629	135,696	-	600	1,550	700	1,700	650	-	748	374	152,266
I-Low Externality	\$ 36,594	173,681	-	-	1,750	750	1,100	350	-	1,122	374	169,896
J-Low Ext, Low Reg	\$ 35,416	162,371	-	-	1,950	700	1,150	400	-	1,122	374	163,111
K2-Mid Externality	\$ 40,658	173,681	-	-	1,750	750	1,100	350	-	1,122	374	169,896
L-High Externality	\$ 43,753	173,681	-	-	1,750	750	1,100	350	-	1,122	374	169,896
M-No Externality	\$ 34,096	173,681	-	-	1,750	750	1,100	350	-	1,122	374	169,896
W-Low Wind	\$ 36,808	144,185	-	800	1,350	700	950	600	-	1,122	374	155,781
X-High Wind	\$ 37,317	143,610	-	-	1,950	700	1,950	350	-	748	374	148,555
Y-Low Solar	\$ 36,787	141,628	-	-	2,100	750	1,900	350	-	748	374	152,496
Z-High Solar	\$ 37,402	146,008	-	350	1,750	100	1,600	550	-	1,122	374	153,063

Select EnCompass Outputs--Standard Assumptions

Scenario 34	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,918	120,209	-	-	2,050	700	750	900	-	374	1,496	184,064
B-Low Gas, Market	\$ 36,808	120,048	-	50	1,500	700	200	900	-	374	1,870	172,641
C-High Gas, Market	\$ 36,662	120,388	-	50	2,800	800	900	1,650	-	-	748	192,821
D-Low Load	\$ 36,072	114,976	-	-	2,000	700	350	1,500	-	-	1,496	190,636
E-High Load	\$ 37,754	125,398	-	50	2,000	700	900	900	-	374	1,870	175,717
H-High Ext, High Reg	\$ 38,239	115,728	-	50	2,100	700	950	1,550	-	-	1,496	182,896
I-Low Externality	\$ 36,550	140,692	-	-	1,650	700	200	1,250	-	374	1,870	194,166
J-Low Ext, Low Reg	\$ 35,496	132,898	-	-	1,900	700	200	800	-	374	1,870	189,669
K2-Mid Externality	\$ 40,077	140,692	-	-	1,650	700	200	1,250	-	374	1,870	194,166
L-High Externality	\$ 42,669	140,692	-	-	1,650	700	200	1,250	-	374	1,870	194,166
M-No Externality	\$ 34,410	140,692	-	-	1,650	700	200	1,250	-	374	1,870	194,166
W-Low Wind	\$ 36,605	119,448	-	300	2,000	750	350	1,100	-	374	1,496	185,654
X-High Wind	\$ 37,131	120,579	-	50	1,650	700	950	950	-	-	1,870	180,420
Y-Low Solar	\$ 36,688	119,292	-	-	1,850	800	900	1,100	-	-	1,870	182,449
Z-High Solar	\$ 37,166	122,654	-	50	2,000	-	850	800	-	374	1,870	181,486

Select EnCompass Outputs--Standard Assumptions

Scenario 35	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,873	127,184	-	-	1,700	700	1,050	400	-	374	374	191,323
B-Low Gas, Market	\$ 36,969	126,582	-	-	1,050	750	200	1,200	-	748	374	180,575
C-High Gas, Market	\$ 36,432	129,480	-	150	1,700	700	1,350	50	-	374	374	198,773
D-Low Load	\$ 36,090	123,873	-	-	1,550	700	300	950	-	374	374	198,376
E-High Load	\$ 37,688	133,084	-	-	1,850	750	1,100	300	-	748	374	185,360
H-High Ext, High Reg	\$ 38,236	122,805	-	150	1,600	700	1,300	150	-	374	374	189,855
I-Low Externality	\$ 36,488	144,615	-	-	1,250	700	400	1,050	-	748	374	200,341
J-Low Ext, Low Reg	\$ 35,468	138,799	-	-	1,350	700	550	850	-	748	374	197,777
K2-Mid Externality	\$ 39,961	144,615	-	-	1,250	700	400	1,050	-	748	374	200,341
L-High Externality	\$ 42,295	144,615	-	-	1,250	700	400	1,050	-	748	374	200,341
M-No Externality	\$ 34,349	144,615	-	-	1,250	700	400	1,050	-	748	374	200,341
W-Low Wind	\$ 36,637	127,721	-	400	1,550	700	650	500	-	374	374	194,067
X-High Wind	\$ 37,069	128,639	-	-	1,350	700	850	750	-	374	374	190,096
Y-Low Solar	\$ 36,627	126,786	-	-	1,650	800	1,300	200	-	374	374	191,562
Z-High Solar	\$ 37,099	130,576	-	50	1,650	-	1,050	700	-	748	374	190,890

Select EnCompass Outputs--Standard Assumptions

Scenario 36	PVSC System (\$ Million)	CO2 Emissions 2020-'34 (Million tons)	Wind MW 2020-'24	Wind MW 2025-'29	Wind MW 2030-'34	Solar MW 2020-'24	Solar MW 2025-'29	Solar MW 2030-'34	CT MW 2020-'24	CT MW 2025-'29	CT MW 2030-'34	Net Sales 2030-'35 (GWh)
Base Case	\$ 36,778	118,323	-	-	1,700	700	1,000	400	-	-	748	185,221
B-Low Gas, Market	\$ 36,895	118,574	-	-	1,200	650	500	800	-	374	748	175,359
C-High Gas, Market	\$ 36,340	120,449	-	50	1,850	750	900	450	-	-	748	192,085
D-Low Load	\$ 36,009	114,820	-	-	1,600	700	300	850	-	-	748	192,032
E-High Load	\$ 37,633	124,686	-	-	1,800	700	900	400	-	374	748	177,509
H-High Ext, High Reg	\$ 38,064	115,289	-	50	1,750	700	950	400	-	-	748	184,146
I-Low Externality	\$ 36,527	139,905	-	-	1,300	700	250	950	-	374	748	195,904
J-Low Ext, Low Reg	\$ 35,476	131,754	-	-	1,450	700	250	900	-	374	748	191,567
K2-Mid Externality	\$ 39,949	139,905	-	-	1,300	700	250	950	-	374	748	195,904
L-High Externality	\$ 42,244	139,905	-	-	1,300	700	250	950	-	374	748	195,904
M-No Externality	\$ 34,448	139,905	-	-	1,300	700	250	950	-	374	748	195,904
W-Low Wind	\$ 36,544	118,379	-	250	1,800	700	400	650	-	374	374	188,289
X-High Wind	\$ 36,960	119,471	-	-	1,450	700	1,000	650	-	-	748	182,431
Y-Low Solar	\$ 36,555	118,246	-	-	1,600	750	950	550	-	-	748	184,827
Z-High Solar	\$ 37,016	120,812	-	-	1,800	-	950	950	-	374	374	185,013

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 1	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	1,028	1,028	1,028	1,028
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,092	1,092	1,092	546
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,196	2,410	2,410	3,158	3,532
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,036	2,784	3,532
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	50	350	700
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,633	4,492	4,739	5,562	6,204	5,581	6,479
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,289	5,262	6,204	5,581	5,579
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,362	5,804	5,181	5,179
	Solar-Max	999	1,148	1,233	1,300	2,173	2,287	2,300	2,864	3,127	3,141	3,554	3,567	3,580	4,393	4,605
	Solar-Base	999	1,148	1,233	1,300	2,173	2,287	2,300	2,864	3,077	3,091	3,504	3,517	3,530	3,543	3,905
	Solar-Min	999	1,148	1,233	1,300	1,323	2,087	2,100	2,114	2,277	2,291	2,754	2,817	3,080	3,093	3,205

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 2	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	517	517	517	517
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,092	1,092	1,092	546
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	2,196	2,944	2,784	3,158	3,906	4,280
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,822	2,570	2,410	2,410	3,158	3,532
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,822	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	50	100	400	700	1,100
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	100	100	100
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,433	4,392	4,989	5,762	6,254	5,681	6,479
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,289	5,162	6,154	5,531	5,529
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,762	5,554	4,931	4,929
	Solar-Max	999	1,148	1,233	1,300	2,073	2,187	2,200	2,864	3,077	3,341	3,554	3,717	3,780	4,793	4,905
	Solar-Base	999	1,148	1,233	1,300	2,023	2,137	2,150	2,864	3,077	3,091	3,504	3,517	3,530	3,693	4,455
	Solar-Min	999	1,148	1,233	1,300	1,323	2,087	2,100	2,214	2,377	2,541	3,104	3,167	3,180	3,193	3,305

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 3	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	511	511	511	511
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,092	1,092	1,092	546
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,570	2,784	3,158	3,906	3,906
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,570	2,410	2,784	3,532	3,532
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	50	100	400	700	900
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,683	4,542	5,189	5,912	6,204	5,881	7,279
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,639	5,462	6,104	5,481	5,479
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,712	5,704	5,081	5,079
	Solar-Max	999	1,148	1,233	1,300	2,073	2,237	2,250	2,914	3,127	3,141	3,704	3,717	3,730	4,893	5,305
	Solar-Base	999	1,148	1,233	1,300	2,023	2,187	2,200	2,864	3,077	3,091	3,504	3,517	3,530	3,543	4,805
	Solar-Min	999	1,148	1,233	1,300	1,323	1,937	1,950	2,214	2,427	2,441	3,054	3,067	3,080	3,093	3,705

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 4	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	-	-	-	-
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,092	1,092	1,092	546
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	2,196	3,318	3,158	3,532	4,280	4,280
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,944	2,784	3,158	3,906	3,906
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	400	400	750	1,050	1,250
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,583	4,492	5,439	6,112	6,254	6,081	7,579
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,839	5,612	6,204	5,581	6,079
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	5,112	5,804	5,181	5,179
	Solar-Max	999	1,148	1,233	1,300	2,073	2,237	2,250	2,914	3,127	3,491	3,654	3,917	4,030	5,243	5,605
	Solar-Base	999	1,148	1,233	1,300	2,023	2,087	2,100	2,714	2,877	3,041	3,454	3,467	3,480	3,493	5,005
	Solar-Min	999	1,148	1,233	1,300	1,323	2,037	2,050	2,114	2,227	2,241	2,854	2,867	2,880	2,893	4,005

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 5	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	1,028	1,028	1,028	1,028
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,092	1,092	1,092	1,092	1,092	1,092	1,092	546
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	2,191	2,939	2,570	2,570	2,944	2,784	2,784	3,532	3,906
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,196	2,570	2,410	2,410	2,784	3,532
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	100	400	750
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,833	4,742	5,289	5,412	6,204	5,581	6,479
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,433	4,292	4,889	5,062	6,104	5,481	5,479
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,162	5,754	5,131	5,129
	Solar-Max	999	1,148	1,233	1,300	2,123	2,837	2,850	3,564	3,827	3,841	4,204	4,217	4,230	4,293	4,505
	Solar-Base	999	1,148	1,233	1,300	2,023	2,187	2,200	2,814	2,977	2,991	3,454	3,467	3,480	3,493	3,605
	Solar-Min	999	1,148	1,233	1,300	1,373	2,087	2,100	2,714	2,827	2,841	3,354	3,367	3,380	3,393	3,505

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 6	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	1,028	1,028	1,028	1,028
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,192	646	646	646	646	646	-	-	-	-
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,389	1,817	2,939	2,944	2,944	2,944	2,784	3,158	3,532	3,532
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,196	2,570	2,410	2,784	3,158	3,158
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,196	2,036	2,410	2,410	2,410
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	300	400	400
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	5,083	5,142	5,839	6,312	6,554	6,581	6,829
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	5,389	5,912	6,154	5,531	5,529
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,239	5,312	5,954	5,331	5,329
	Solar-Max	999	1,148	1,233	1,300	2,123	3,137	3,150	3,864	4,077	4,091	4,504	4,517	4,530	4,643	4,655
	Solar-Base	999	1,148	1,233	1,300	2,123	3,137	3,150	3,764	4,027	4,041	4,454	4,467	4,480	4,493	4,505
	Solar-Min	999	1,148	1,233	1,300	1,423	2,437	2,450	3,014	3,027	3,041	3,654	3,667	3,680	3,693	3,705

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 7	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	1,028	1,028	1,028	1,028
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,192	646	-	-	-	-	-	-	-	-
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,662	2,531	2,565	3,687	3,318	3,318	3,692	3,532	3,532	3,532	3,532
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	2,191	3,313	2,944	2,944	3,318	3,158	3,158	3,158	3,158
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	2,191	2,939	2,570	2,570	2,944	2,784	2,784	2,784	2,784
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	5,233	5,192	6,189	6,312	6,304	5,881	6,079
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,433	4,292	5,739	5,912	6,254	5,631	5,629
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,812	5,804	5,181	5,179
	Solar-Max	999	1,148	1,233	1,300	2,073	3,187	3,400	4,464	4,477	4,491	5,104	5,117	5,130	5,143	5,155
	Solar-Base	999	1,148	1,233	1,300	2,073	3,187	3,200	3,814	4,077	4,091	4,454	4,467	4,480	4,493	4,505
	Solar-Min	999	1,148	1,233	1,300	1,423	2,637	2,650	3,264	3,477	3,491	3,904	3,917	3,930	3,943	3,955

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 8	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	-	-	-	-
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,192	646	-	-	-	-	-	-	-	-
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,531	2,565	3,687	3,318	3,692	4,066	3,906	4,280	4,280	4,280
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	2,191	3,313	2,944	2,944	3,692	3,532	3,906	3,906	3,906
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	2,191	2,939	2,570	2,944	2,944	2,784	2,784	2,784	2,784
	Battery-Max	-	-	-	-	-	-	-	-	-	-	100	250	600	650	650
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	50	100	100
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	5,383	5,542	6,389	6,712	6,804	7,081	7,329
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,483	5,142	5,939	6,062	6,204	5,881	5,879
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	5,439	5,612	5,954	5,331	5,329
	Solar-Max	999	1,148	1,233	1,300	2,073	3,187	3,450	4,464	4,477	4,941	5,204	5,217	5,330	5,343	5,355
	Solar-Base	999	1,148	1,233	1,300	2,023	3,137	3,150	3,714	3,927	4,341	4,354	4,367	4,480	4,893	4,905
	Solar-Min	999	1,148	1,233	1,300	1,373	2,787	2,800	3,264	3,277	3,641	3,904	3,917	3,980	4,043	4,055

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 9	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	-	-	-	-
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,192
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	2,196	2,570	2,784	2,784	3,532	3,906
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,822	2,196	2,036	2,410	3,158	3,532
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,822	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	100	450	750	950
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	50	50	50	50
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,583	4,792	4,989	5,512	6,204	5,581	6,579
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,439	5,262	6,004	5,381	5,379
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,239	4,412	5,554	4,931	4,929
	Solar-Max	999	1,148	1,233	1,300	2,073	2,237	2,250	2,914	3,127	3,491	3,604	3,667	3,680	4,443	5,055
	Solar-Base	999	1,148	1,233	1,300	2,023	2,037	2,050	2,864	3,077	3,091	3,554	3,567	3,580	3,593	4,255
	Solar-Min	999	1,148	1,233	1,300	1,323	1,937	1,950	2,164	2,227	2,241	2,804	2,817	2,880	2,893	3,205

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

Scenario	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	517	517	517	517
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,192
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	2,196	2,196	2,196	2,036	2,410	3,158	3,532
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,196	2,036	2,036	2,784	3,532
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,822	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	400	400	800
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,633	4,592	4,589	4,912	6,154	5,531	5,629
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,292	4,239	4,612	5,954	5,331	5,329
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,162	5,304	4,681	4,679
	Solar-Max	999	1,148	1,233	1,300	2,123	2,187	2,200	2,864	3,077	3,491	3,504	3,517	3,580	3,843	4,155
	Solar-Base	999	1,148	1,233	1,300	2,023	2,087	2,100	2,564	2,777	2,891	3,204	3,217	3,280	3,293	3,305
	Solar-Min	999	1,148	1,233	1,300	1,323	1,937	1,950	2,114	2,227	2,341	2,754	2,767	2,930	2,943	2,955

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 1 1	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	-	-	-	-
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,092	1,092	1,092	1,092
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	2,196	3,318	3,158	3,532	3,532	3,532
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,822	2,944	3,158	3,158	3,158	3,158
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	400	400	700	700	700
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	50	100
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,683	4,542	5,439	6,112	6,204	5,931	6,129
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,539	5,312	6,104	5,481	5,479
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	5,162	5,604	4,981	4,979
	Solar-Max	999	1,148	1,233	1,300	2,073	2,237	2,250	2,914	3,177	3,291	3,704	3,917	4,130	4,593	4,605
	Solar-Base	999	1,148	1,233	1,300	2,023	2,137	2,150	2,864	3,077	3,091	3,454	3,467	3,480	3,743	3,855
	Solar-Min	999	1,148	1,233	1,300	1,323	2,037	2,050	2,164	2,277	2,291	2,904	2,917	2,930	2,943	2,955

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 1 2	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	-	-	-	-
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	2,196	2,570	2,410	2,784	2,784	2,784
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,822	2,196	2,036	2,410	2,410	2,410
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	50	50	50	50	100	350	450	500
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	50	100	200	200
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,583	4,442	4,839	5,362	6,104	5,481	5,479
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,489	5,162	5,854	5,231	5,229
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,262	5,304	4,681	4,679
	Solar-Max	999	1,148	1,233	1,300	2,123	2,187	2,200	2,864	3,077	3,391	3,604	3,617	3,680	3,793	3,805
	Solar-Base	999	1,148	1,233	1,300	2,023	2,087	2,100	2,864	3,077	3,091	3,554	3,617	3,630	3,643	3,655
	Solar-Min	999	1,148	1,233	1,300	1,323	2,087	2,100	2,264	2,427	2,441	3,104	3,117	3,430	3,443	3,455

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 1 3	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	1,028	1,028	1,028	1,028
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,192
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,196	2,036	2,036	2,410	3,158
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,196	2,036	2,036	2,410	2,784
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	50	50	450
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,733	4,592	4,589	4,962	6,154	5,531	5,579
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,662	6,004	5,381	5,379
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,162	5,404	4,781	4,779
	Solar-Max	999	1,148	1,233	1,300	2,123	2,187	2,200	2,864	3,077	3,091	3,504	3,517	3,730	3,743	3,805
	Solar-Base	999	1,148	1,233	1,300	2,023	2,087	2,100	2,414	2,577	2,591	3,054	3,067	3,230	3,243	3,255
	Solar-Min	999	1,148	1,233	1,300	1,323	2,087	2,100	2,114	2,227	2,241	2,754	2,767	3,180	3,193	3,205

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

Scenario	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	1,028	1,028	1,028	1,028
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,092	1,092	1,092	1,092
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,196	2,036	2,410	2,784	2,784
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,036	2,410	2,410
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	100	150
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,683	4,642	4,789	5,712	6,254	5,631	5,629
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,289	5,212	6,054	5,431	5,429
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,312	5,504	4,881	4,879
	Solar-Max	999	1,148	1,233	1,300	2,123	2,287	2,300	2,964	3,077	3,091	3,604	3,617	3,680	3,743	3,905
	Solar-Base	999	1,148	1,233	1,300	2,123	2,237	2,250	2,864	3,077	3,091	3,504	3,517	3,530	3,543	3,605
	Solar-Min	999	1,148	1,233	1,300	1,323	2,087	2,100	2,114	2,127	2,141	2,754	2,767	2,930	2,943	2,955

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 1 5	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	1,028	1,028	1,028	1,028
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,196	2,036	2,036	2,036	2,036
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,036	2,036	2,036
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,683	4,542	4,539	4,912	5,954	5,331	5,329
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,362	5,654	5,031	5,029
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,162	5,054	4,431	4,429
	Solar-Max	999	1,148	1,233	1,300	2,123	2,187	2,200	2,864	3,077	3,091	3,504	3,517	3,630	3,643	3,655
	Solar-Base	999	1,148	1,233	1,300	2,023	2,087	2,100	2,864	3,077	3,091	3,504	3,517	3,530	3,543	3,555
	Solar-Min	999	1,148	1,233	1,300	1,323	2,087	2,100	2,114	2,277	2,291	2,354	2,367	2,930	2,943	2,955

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

Scenario	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	517	517	517	517
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,192	646	-	-	-	-	-	-	-	-
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,531	2,565	3,687	3,692	3,692	3,692	3,532	3,906	3,906	3,906
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	2,191	3,313	2,944	3,318	3,318	3,158	3,532	3,906	3,906
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,939	2,570	2,570	2,944	2,784	2,784	2,784	2,784
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	250	300	350
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	5,483	5,642	6,339	6,362	6,454	6,481	6,729
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,433	4,542	5,839	5,912	6,204	5,581	5,579
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,589	5,012	5,854	5,231	5,229
	Solar-Max	999	1,148	1,233	1,300	2,123	3,237	3,500	4,514	4,627	5,091	5,204	5,217	5,230	5,243	5,255
	Solar-Base	999	1,148	1,233	1,300	2,023	3,137	3,150	3,714	3,927	4,341	4,404	4,417	4,430	4,443	4,455
	Solar-Min	999	1,148	1,233	1,300	1,423	2,687	2,700	3,164	3,177	3,241	3,804	3,817	3,880	3,893	3,905

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 1 7	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	511	511	511	511
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,192	646	-	-	-	-	-	-	-	-
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,531	2,565	3,687	3,318	3,318	3,692	3,532	3,906	3,906	3,906
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	2,191	3,313	2,944	2,944	3,318	3,158	3,532	3,532	3,532
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	2,191	2,939	2,570	2,570	2,944	2,784	2,784	2,784	2,784
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	200	300	300
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	5,233	5,192	6,289	6,312	6,604	6,781	6,979
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,483	4,342	5,939	5,962	6,204	5,581	5,679
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,789	5,162	5,804	5,181	5,179
	Solar-Max	999	1,148	1,233	1,300	2,123	3,237	3,400	4,614	4,627	4,641	5,254	5,267	5,280	5,293	5,305
	Solar-Base	999	1,148	1,233	1,300	2,073	3,187	3,200	3,814	4,077	4,091	4,504	4,517	4,530	4,593	4,705
	Solar-Min	999	1,148	1,233	1,300	1,423	3,087	3,100	3,664	3,727	3,741	4,304	4,317	4,330	4,393	4,405

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 1 8	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	-	-	-	-
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,092	1,092	1,092	1,092	1,092	1,092	1,092	546
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,939	2,570	2,570	3,318	3,158	3,532	4,280	4,280
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,196	2,944	2,784	3,158	3,906	3,906
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	2,196	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	150	300	650	1,000	1,200
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,833	4,992	5,739	6,112	6,254	6,081	7,579
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,433	4,392	5,289	5,412	6,154	5,531	6,029
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,689	4,812	5,954	5,331	5,329
	Solar-Max	999	1,148	1,233	1,300	2,073	2,837	2,850	3,564	3,677	3,941	4,254	4,267	4,330	5,343	5,555
	Solar-Base	999	1,148	1,233	1,300	2,023	2,237	2,250	2,914	3,177	3,641	3,654	3,667	3,680	3,693	5,055
	Solar-Min	999	1,148	1,233	1,300	1,323	2,087	2,100	2,514	2,527	2,691	3,154	3,167	3,180	3,193	4,205

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

Scenario	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	517	517	517	517
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,092	1,092	1,092	1,092	1,092	1,092	1,092	546
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,939	2,570	2,944	2,944	2,784	2,784	3,906	4,280
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,570	2,570	2,410	2,784	3,158	3,906
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	2,196	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	150	700	1,100
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	100	100
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,833	4,892	5,289	5,512	6,204	5,581	6,529
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,292	4,889	5,162	6,154	5,531	5,529
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,462	5,754	5,131	5,129
	Solar-Max	999	1,148	1,233	1,300	2,073	2,837	2,850	3,564	3,727	3,991	4,204	4,217	4,230	4,793	4,805
	Solar-Base	999	1,148	1,233	1,300	2,023	2,137	2,150	2,814	3,027	3,441	3,554	3,567	3,580	3,593	3,755
	Solar-Min	999	1,148	1,233	1,300	1,323	2,087	2,100	2,414	2,477	2,691	3,054	3,067	3,080	3,093	3,105

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 2 0	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	511	511	511	511
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,092	1,092	1,092	1,092	1,092	1,092	1,092	546
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,939	2,570	2,570	2,944	2,784	2,784	3,906	3,906
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,196	2,570	2,410	2,410	3,158	3,532
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	200	700	900
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,883	4,792	5,589	5,812	6,304	5,881	7,279
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,483	4,342	5,289	5,412	6,304	5,681	5,729
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,412	5,754	5,131	5,129
	Solar-Max	999	1,148	1,233	1,300	2,073	2,937	2,950	3,614	3,827	3,841	4,304	4,317	4,330	4,893	5,305
	Solar-Base	999	1,148	1,233	1,300	2,023	2,337	2,350	3,014	3,227	3,241	3,704	3,717	3,730	3,943	4,655
	Solar-Min	999	1,148	1,233	1,300	1,323	2,037	2,050	2,364	2,377	2,391	3,004	3,017	3,030	3,043	3,655

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 2 1	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	-	-	-	-
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,092	1,092	1,092	1,092	1,092	1,092	1,092	1,092
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,939	2,570	2,570	3,318	3,158	3,532	3,532	3,532
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,570	2,944	2,784	3,158	3,158	3,158
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	50	150	300	650	700	700
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	50	100
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,833	4,992	5,789	6,162	6,204	5,981	6,229
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	5,239	5,562	6,104	5,481	5,479
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,489	4,812	5,604	4,981	4,979
	Solar-Max	999	1,148	1,233	1,300	2,123	2,887	2,900	3,564	3,827	4,141	4,254	4,267	4,330	4,643	4,655
	Solar-Base	999	1,148	1,233	1,300	2,023	2,137	2,150	2,814	3,077	3,091	3,504	3,517	3,530	3,943	4,005
	Solar-Min	999	1,148	1,233	1,300	1,323	2,087	2,100	2,414	2,427	2,691	3,054	3,067	3,080	3,093	3,105

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 2 2	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	517	517	517	517
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,092	1,092	1,092	1,092	1,092	1,092	1,092	1,092
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,939	2,570	2,570	2,944	2,784	2,784	3,158	3,158
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,570	2,570	2,410	2,410	2,784	2,784
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	2,196	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	150	350	400
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	100	100	100
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,883	4,942	5,289	5,512	6,204	5,581	5,629
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,483	4,342	4,989	5,162	6,104	5,481	5,479
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,462	5,604	4,981	4,979
	Solar-Max	999	1,148	1,233	1,300	2,073	2,787	2,800	3,564	3,727	3,941	4,204	4,217	4,230	4,243	4,255
	Solar-Base	999	1,148	1,233	1,300	2,023	2,137	2,150	2,814	2,977	2,991	3,404	3,417	3,430	3,443	3,455
	Solar-Min	999	1,148	1,233	1,300	1,323	2,087	2,100	2,814	2,827	2,941	3,304	3,317	3,330	3,343	3,355

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 2 3	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	511	511	511	511
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,092	1,092	1,092	1,092	1,092	1,092	1,092	1,092
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,939	2,570	2,570	2,944	2,784	2,784	3,158	3,158
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,196	2,570	2,410	2,784	2,784	2,784
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	200	400	400
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,883	4,792	5,589	5,762	6,204	5,631	5,879
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	5,239	5,362	6,154	5,531	5,529
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,512	5,454	4,831	4,829
	Solar-Max	999	1,148	1,233	1,300	2,073	2,937	2,950	3,614	3,827	3,841	4,304	4,317	4,330	4,343	4,355
	Solar-Base	999	1,148	1,233	1,300	1,973	2,237	2,250	2,914	3,127	3,141	3,604	3,617	3,630	3,693	3,705
	Solar-Min	999	1,148	1,233	1,300	1,323	2,087	2,100	2,814	2,927	2,941	3,354	3,367	3,380	3,393	3,405

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 2 4	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	1,028	1,028	1,028	1,028
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,092	1,092	1,092	1,092	1,092	1,092	1,092	1,092
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,939	2,570	2,570	2,944	2,784	2,784	2,784	2,784
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,196	2,570	2,410	2,410	2,410	2,410
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,883	4,742	5,339	5,462	6,204	5,581	5,579
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,889	5,112	6,054	5,431	5,429
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,162	5,454	4,831	4,829
	Solar-Max	999	1,148	1,233	1,300	2,073	2,887	2,900	3,614	3,927	3,941	4,254	4,267	4,280	4,293	4,305
	Solar-Base	999	1,148	1,233	1,300	2,023	2,237	2,250	2,964	3,227	3,241	3,604	3,617	3,630	3,643	3,655
	Solar-Min	999	1,148	1,233	1,300	1,323	2,037	2,050	2,764	2,927	2,941	3,254	3,267	3,280	3,293	3,305

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 2 5	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	-	-	-	-
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,192	646	646	646	646	646	-	-	-	-
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,939	2,944	2,944	4,066	3,906	4,280	4,280	4,280
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,939	2,570	2,570	3,692	3,532	4,280	4,280	4,280
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,196	2,570	2,410	2,410	2,410	2,410
	Battery-Max	-	-	-	-	-	-	-	-	-	-	500	500	850	900	900
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	5,183	5,342	6,339	7,062	7,104	7,331	7,629
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,542	5,839	6,312	6,204	5,581	5,579
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	5,389	5,612	5,954	5,331	5,329
	Solar-Max	999	1,148	1,233	1,300	2,073	3,187	3,200	3,814	4,077	4,441	4,954	5,267	5,430	5,443	5,455
	Solar-Base	999	1,148	1,233	1,300	2,073	3,087	3,100	3,564	3,577	3,791	4,204	4,217	4,230	4,243	4,255
	Solar-Min	999	1,148	1,233	1,300	1,423	2,487	2,500	3,014	3,077	3,441	3,604	3,617	3,730	4,093	4,205

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 2 6	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	517	517	517	517
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,192	646	646	646	646	646	-	-	-	-
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	2,191	3,313	2,944	2,944	3,692	3,532	3,906	3,906	3,906
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,939	2,570	2,570	3,318	3,158	3,532	3,532	3,532
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,196	2,570	2,410	2,410	2,410	2,410
	Battery-Max	-	-	-	-	-	-	-	-	-	-	200	200	550	650	700
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	5,183	5,342	6,089	6,462	6,654	6,731	6,879
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,483	4,892	5,489	6,162	6,204	5,581	5,579
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,939	5,512	6,004	5,381	5,379
	Solar-Max	999	1,148	1,233	1,300	2,073	3,137	3,150	3,764	4,027	4,391	4,454	4,917	4,980	5,043	5,055
	Solar-Base	999	1,148	1,233	1,300	2,023	2,587	2,600	3,014	3,177	3,691	3,704	3,767	3,930	4,543	4,705
	Solar-Min	999	1,148	1,233	1,300	1,423	2,487	2,500	2,964	2,977	3,291	3,604	3,617	3,630	3,693	3,755

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 2 7	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	511	511	511	511
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,192	646	646	646	646	646	-	-	-	-
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,939	2,570	2,944	3,692	3,532	3,906	3,906	3,906
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,196	2,944	3,158	3,532	3,532	3,532
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,196	2,570	2,410	2,410	2,410	2,410
	Battery-Max	-	-	-	-	-	-	-	-	-	-	250	250	600	650	650
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	5,233	5,242	6,239	6,812	6,954	7,131	7,129
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	5,739	6,162	6,204	5,581	5,679
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	5,239	5,512	6,054	5,431	5,429
	Solar-Max	999	1,148	1,233	1,300	2,073	3,137	3,150	3,914	4,077	4,091	4,554	4,867	4,930	4,993	5,005
	Solar-Base	999	1,148	1,233	1,300	2,023	3,137	3,150	3,764	4,027	4,041	4,454	4,467	4,480	4,593	4,705
	Solar-Min	999	1,148	1,233	1,300	1,423	2,487	2,500	3,014	3,027	3,041	3,654	3,667	3,680	3,693	3,755

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 2 8	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	517	517	517	517
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,092	1,092	1,092	1,092
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	2,196	2,570	2,784	2,784	3,158	3,158
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,570	2,410	2,784	2,784	2,784
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	50	100	400	450	450
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,683	4,642	4,789	5,712	6,254	5,631	5,629
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,292	4,489	5,362	6,104	5,481	5,479
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,512	5,654	5,031	5,029
	Solar-Max	999	1,148	1,233	1,300	2,073	2,187	2,200	2,914	3,077	3,391	3,654	3,667	3,680	4,093	4,105
	Solar-Base	999	1,148	1,233	1,300	2,023	2,087	2,100	2,114	2,277	2,891	2,904	3,017	3,330	3,343	3,355
	Solar-Min	999	1,148	1,233	1,300	1,323	2,087	2,100	2,114	2,127	2,341	2,804	2,917	2,980	2,993	3,005

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 2 9	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	511	511	511	511
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,092	1,092	1,092	1,092
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,570	2,784	3,158	3,158	3,158
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,784	2,784	2,784
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	50	150	400	400	400
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,433	4,392	5,089	6,112	6,204	5,631	5,929
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,433	4,292	4,939	6,112	6,004	5,381	5,379
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,712	5,704	5,081	5,079
	Solar-Max	999	1,148	1,233	1,300	2,073	2,237	2,250	2,914	3,077	3,091	3,704	3,717	3,730	4,243	4,255
	Solar-Base	999	1,148	1,233	1,300	2,023	2,137	2,150	2,864	3,027	3,041	3,704	3,717	3,730	3,743	3,755
	Solar-Min	999	1,148	1,233	1,300	1,323	2,087	2,100	2,114	2,227	2,241	2,804	2,967	3,280	3,293	3,405

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 3 0	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	-	-	-	-
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,192	646	646	646	646	646	646	646	646	646
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,531	2,191	3,313	2,944	2,944	3,318	3,532	3,906	3,906	3,906
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,939	2,570	2,570	2,944	3,158	3,532	3,532	3,532
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,196	2,570	2,410	2,410	2,410	2,410
	Battery-Max	-	-	-	-	-	-	-	-	-	-	100	250	600	600	600
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	5,133	5,292	6,139	6,362	6,304	6,531	6,729
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,433	4,542	5,789	6,012	6,254	5,631	5,629
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,689	5,062	5,654	5,031	5,029
	Solar-Max	999	1,148	1,233	1,300	2,073	3,137	3,150	3,914	4,077	4,441	4,604	4,617	4,780	4,993	5,005
	Solar-Base	999	1,148	1,233	1,300	2,023	2,787	2,800	3,414	3,677	4,041	4,054	4,067	4,080	4,093	4,255
	Solar-Min	999	1,148	1,233	1,300	1,423	2,137	2,150	2,664	2,827	3,091	3,304	3,317	3,330	3,493	3,505

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

Scenario	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	517	517	517	517
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,192	646	646	646	646	646	646	646	646	646
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,297	2,531	2,191	3,313	2,944	3,318	3,318	3,158	3,158	3,532	3,532
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,939	2,570	2,570	2,944	2,784	2,784	3,158	3,158
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,570	2,570	2,410	2,410	2,410	2,410
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	200	350	400
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	5,033	5,192	5,739	5,912	6,204	5,681	5,829
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,492	5,339	5,562	6,204	5,581	5,579
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,239	4,762	5,654	5,031	5,029
	Solar-Max	999	1,148	1,233	1,300	2,073	3,187	3,200	3,814	4,077	4,441	4,454	4,467	4,480	4,493	4,505
	Solar-Base	999	1,148	1,233	1,300	2,023	2,687	2,700	3,314	3,527	3,941	3,954	3,967	3,980	3,993	4,105
	Solar-Min	999	1,148	1,233	1,300	1,423	2,087	2,100	2,214	2,427	2,441	2,854	2,867	3,130	3,143	3,155

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 3 2	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	511	511	511	511
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,192	646	646	646	646	646	646	646	646	646
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,939	2,570	2,570	2,944	2,784	3,158	3,532	3,532
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,196	2,570	2,410	2,784	3,158	3,158
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,196	2,570	2,410	2,410	2,410	2,410
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	200	300	300
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	5,083	5,142	5,889	6,062	6,254	6,181	6,429
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,433	4,292	5,589	5,762	6,054	5,431	5,429
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,812	5,654	5,031	5,029
	Solar-Max	999	1,148	1,233	1,300	2,123	3,137	3,150	3,864	4,077	4,091	4,504	4,517	4,530	4,543	4,555
	Solar-Base	999	1,148	1,233	1,300	2,023	3,087	3,100	3,764	3,977	3,991	4,404	4,417	4,430	4,443	4,455
	Solar-Min	999	1,148	1,233	1,300	1,423	2,487	2,500	3,014	3,077	3,091	3,454	3,467	3,480	3,493	3,505

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 3 3	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	1,028	1,028	1,028	1,028
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,192	646	646	646	646	646	646	646	646	646
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,389	1,817	2,939	2,570	2,570	2,944	2,784	2,784	2,784	2,784
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,196	2,570	2,410	2,410	2,410	2,410
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,565	2,196	2,196	2,570	2,410	2,410	2,410	2,410
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,983	5,042	5,639	5,862	6,204	5,581	5,579
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	5,239	5,362	6,054	5,431	5,429
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,312	5,604	4,981	4,979
	Solar-Max	999	1,148	1,233	1,300	2,073	3,137	3,150	3,764	4,027	4,041	4,454	4,467	4,480	4,493	4,505
	Solar-Base	999	1,148	1,233	1,300	1,973	3,087	3,100	3,764	4,027	4,041	4,204	4,217	4,230	4,243	4,255
	Solar-Min	999	1,148	1,233	1,300	1,423	2,437	2,450	3,014	3,027	3,041	3,504	3,517	3,530	3,543	3,555

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 3 4	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	511	511	511	511
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,192
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,196	2,036	2,410	3,158	3,532
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,196	2,036	2,036	2,784	3,158
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	300	350	550
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,683	4,542	4,839	5,212	6,204	5,581	6,279
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,539	4,912	6,104	5,481	5,479
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,162	5,604	4,981	4,979
	Solar-Max	999	1,148	1,233	1,300	2,123	2,237	2,250	2,864	3,077	3,091	3,554	3,567	3,580	4,093	4,805
	Solar-Base	999	1,148	1,233	1,300	2,023	2,087	2,100	2,664	2,827	2,841	3,304	3,317	3,330	3,343	3,805
	Solar-Min	999	1,148	1,233	1,300	1,323	1,937	1,950	2,114	2,227	2,241	2,754	2,767	3,080	3,093	3,105

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

S c e n a r i o 3 5	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	517	517	517	517	517
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	2,196	2,196	2,036	2,036	2,410	2,410
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,822	2,196	2,036	2,036	2,036	2,036
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,822	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	100	150	150
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,683	4,642	4,639	5,062	6,004	5,381	5,379
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,462	5,754	5,131	5,129
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,162	5,104	4,481	4,479
	Solar-Max	999	1,148	1,233	1,300	2,123	2,187	2,200	2,914	3,127	3,491	3,554	3,567	3,730	3,743	3,755
	Solar-Base	999	1,148	1,233	1,300	2,023	2,137	2,150	2,914	3,127	3,141	3,554	3,567	3,580	3,593	3,605
	Solar-Min	999	1,148	1,233	1,300	1,323	2,087	2,100	2,114	2,127	2,341	2,654	2,667	3,180	3,193	3,205

Department Attachment 4
Annual Nameplate Capacity by Type (MW)

Scenario	Resource Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Coal	2,390	2,390	2,390	2,390	2,390	1,708	1,708	1,708	1,028	1,028	1,028	511	511	511	511
	Nuclear	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738
	Gas CC	2,377	2,377	2,377	2,377	2,377	2,377	2,377	2,002	1,757	1,757	1,757	1,757	1,757	1,459	1,459
	Energy Effic.	1,444	1,611	1,708	1,838	1,967	2,090	2,232	2,355	2,493	2,683	2,812	2,956	3,077	3,188	3,285
	Distrib. Gen.	1,085	1,235	1,317	1,395	1,449	1,497	1,514	1,528	1,543	1,554	1,561	1,570	1,580	1,592	1,605
	Other	141	137	137	135	111	77	77	77	42	42	42	27	27	27	27
	Hydro	687	806	801	801	801	750	300	300	300	300	300	300	291	291	287
	Gas/Oil CT-Max	2,358	2,358	2,358	2,358	2,288	2,157	1,817	2,191	1,822	1,822	2,196	2,036	2,410	2,410	2,410
	Gas/Oil CT-Base	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,036	2,036	2,036
	Gas/Oil CT-Min	2,358	2,358	2,358	2,358	2,288	2,157	1,817	1,817	1,448	1,448	2,196	2,036	2,036	2,036	2,036
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	100	100	150
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	50	50	100
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wind-Max	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,633	4,492	4,889	5,262	6,104	5,481	5,479
	Wind-Base	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,489	4,862	5,754	5,131	5,129
	Wind-Min	3,877	4,627	4,820	4,470	4,622	4,465	4,423	4,390	4,383	4,242	4,189	4,162	5,254	4,631	4,629
	Solar-Max	999	1,148	1,233	1,300	2,073	2,187	2,200	2,864	3,077	3,091	3,504	3,517	3,780	3,793	3,805
	Solar-Base	999	1,148	1,233	1,300	2,023	2,087	2,100	2,864	3,077	3,091	3,504	3,517	3,530	3,543	3,555
	Solar-Min	999	1,148	1,233	1,300	1,323	2,087	2,100	2,164	2,327	2,341	2,804	2,817	3,180	3,193	3,205

Department Attachment 5
Annual Energy by Type (GWh)

S c e n a r i o 1	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	12,331	8,658	8,666	6,839	3,644
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	-	0
	Coal-Max	9,047	6,252	6,497	7,727	6,314	6,663	6,826	4,900	5,027	4,843	5,617	6,100	4,719	5,533	6,020
	Coal-Base	8,798	6,036	6,246	7,426	5,888	2,841	2,584	2,410	2,433	2,117	2,749	2,794	2,446	2,680	2,804
	Coal-Min	8,562	5,893	5,936	7,136	5,580	2,058	1,756	2,026	2,019	1,735	2,062	2,051	1,765	1,987	2,005
	Gas CC-Max	15,278	13,791	12,278	15,071	14,261	15,200	13,716	12,474	10,954	11,050	10,440	10,522	7,574	8,275	8,933
	Gas CC-Base	14,952	13,343	11,763	14,658	13,557	14,709	13,192	11,961	10,314	10,326	9,952	9,487	7,191	8,004	8,474
	Gas CC-Min	14,598	12,870	11,213	14,276	13,210	13,570	11,514	11,700	10,109	10,032	9,194	8,903	6,386	7,362	7,577
	Gas/Oil CT-Max	394	285	280	420	404	317	543	1,236	1,030	908	1,210	1,534	1,176	1,537	2,120
	Gas/Oil CT-Base	358	264	254	373	339	232	500	456	360	304	1,031	839	745	1,221	1,753
	Gas/Oil CT-Min	327	236	222	330	318	162	446	455	355	299	925	824	681	629	636
	Biomass-Max	776	735	749	654	614	405	408	408	232	231	167	166	166	166	166
	Biomass-Base	776	734	747	651	612	383	388	391	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	607	367	370	372	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	(17)	(104)	(207)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,130	17,047	17,005	17,880	17,493	18,325	21,432	23,902	22,136	25,901
	Wind-Base	11,429	14,239	16,868	16,344	16,278	17,115	17,034	16,931	16,869	16,492	16,716	20,388	23,754	22,001	22,117
	Wind-Min	11,428	14,233	16,807	16,341	16,271	17,112	17,029	16,930	16,868	16,492	16,361	17,071	22,504	20,667	20,760
	Solar-Max	1,743	1,861	2,167	2,296	3,921	4,070	4,094	5,199	5,669	5,691	6,367	6,405	6,158	7,536	7,994
	Solar-Base	1,743	1,861	2,162	2,296	3,921	4,070	4,094	5,199	5,591	5,608	6,292	6,306	6,049	6,187	6,882
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,776	3,797	3,805	4,115	4,134	4,966	5,077	5,345	5,478	5,753
	Imports-Max	264	432	123	62	66	454	393	409	715	598	817	1,659	2,797	3,967	5,654
	Imports-Base	197	323	95	39	45	184	192	409	703	557	563	1,291	2,235	3,431	4,716
	Imports-Min	135	237	67	21	25	60	73	150	256	213	273	450	1,454	2,107	2,422
	Exports-Max	12,075	10,940	12,691	16,440	15,925	14,538	14,032	12,651	11,248	11,520	10,796	8,521	2,987	2,235	1,843
	Exports-Base	11,497	10,416	12,413	15,875	14,681	11,862	11,491	9,786	8,525	8,739	8,001	4,359	1,834	1,039	744
	Exports-Min	10,912	9,954	12,022	15,389	14,330	11,275	10,943	9,649	8,339	8,526	7,151	3,918	1,677	966	625

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 2	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	12,331	8,658	8,666	6,839	3,644
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	0	-
	Coal-Max	9,047	6,252	6,497	7,724	6,314	6,663	6,826	4,759	4,986	3,142	3,727	3,768	3,164	3,775	3,902
	Coal-Base	8,794	6,040	6,247	7,424	5,917	2,845	2,588	2,410	2,433	2,114	2,572	2,609	2,238	2,543	2,569
	Coal-Min	8,565	5,897	5,937	7,136	5,564	2,057	1,756	2,033	2,023	1,730	2,037	2,039	1,749	1,984	1,995
	Gas CC-Max	15,278	13,791	12,278	15,074	14,261	15,237	13,758	12,347	10,783	10,856	10,169	10,167	7,920	8,480	9,038
	Gas CC-Base	14,958	13,347	11,762	14,660	13,677	14,811	13,327	11,962	10,324	10,322	9,971	9,640	7,362	8,006	8,206
	Gas CC-Min	14,592	12,873	11,211	14,282	13,180	13,570	11,514	11,481	9,889	9,855	8,696	8,574	6,695	7,503	7,649
	Gas/Oil CT-Max	394	285	280	420	404	317	539	1,125	979	1,257	1,657	1,567	1,649	2,062	2,930
	Gas/Oil CT-Base	358	255	254	373	349	232	504	455	359	526	1,384	1,229	1,041	1,363	1,567
	Gas/Oil CT-Min	327	236	222	330	319	162	443	391	312	419	872	811	728	597	613
	Biomass-Max	776	735	749	654	615	405	408	408	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	612	383	388	391	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	606	367	370	371	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	(33)	(27)	(26)
	Battery-Min	-	-	-	-	-	-	-	-	-	-	(18)	(34)	(126)	(204)	(317)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,132	17,048	16,987	17,069	17,030	19,199	22,184	24,023	22,492	25,948
	Wind-Base	11,429	14,240	16,868	16,344	16,288	17,124	17,041	16,943	16,883	16,500	16,722	20,023	23,676	21,900	22,009
	Wind-Min	11,428	14,233	16,807	16,341	16,271	17,111	17,029	16,930	16,868	16,466	16,346	18,523	21,669	19,773	19,835
	Solar-Max	1,743	1,861	2,167	2,296	3,762	3,955	3,979	5,199	5,592	6,046	6,366	6,667	6,473	8,212	8,549
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,872	3,895	5,189	5,581	5,603	6,285	6,326	6,073	6,435	7,764
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,776	3,798	3,982	4,299	4,603	5,502	5,676	5,490	5,625	5,953
	Imports-Max	264	432	123	62	65	439	380	540	914	711	752	1,490	2,271	3,779	5,453
	Imports-Base	197	324	95	39	45	175	179	398	685	542	518	1,158	2,026	3,209	4,424
	Imports-Min	135	237	67	21	25	60	73	154	260	347	427	895	1,749	2,686	2,580
	Exports-Max	12,072	10,947	12,691	16,436	15,925	14,538	14,032	12,160	10,912	10,034	9,294	5,889	2,629	1,809	2,094
	Exports-Base	11,500	10,416	12,414	15,875	14,853	12,064	11,722	9,878	8,619	8,816	8,294	4,698	1,997	1,186	819
	Exports-Min	10,912	9,954	12,022	15,389	14,409	11,317	10,989	9,475	8,266	8,165	6,385	3,353	1,807	1,119	742

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 3	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	12,331	8,658	8,666	6,839	3,644
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	0	0
	Coal-Max	9,047	6,252	6,497	7,724	6,314	6,663	6,835	4,732	4,978	4,792	2,007	2,021	1,698	1,898	2,149
	Coal-Base	8,798	6,036	6,246	7,426	5,919	2,845	2,586	2,409	2,433	2,116	183	178	227	99	278
	Coal-Min	8,562	5,893	5,936	7,136	5,564	2,057	1,755	2,032	2,022	1,737	-	-	-	-	-
	Gas CC-Max	15,278	13,791	12,278	15,074	14,261	15,194	13,698	12,347	10,900	11,008	10,699	10,754	8,056	8,841	8,942
	Gas CC-Base	14,952	13,343	11,763	14,658	13,677	14,779	13,310	11,966	10,324	10,329	9,975	9,715	7,743	8,576	8,212
	Gas CC-Min	14,598	12,870	11,213	14,276	13,210	13,570	11,514	11,319	9,790	9,644	9,086	9,003	7,088	7,794	6,882
	Gas/Oil CT-Max	394	285	280	420	404	320	540	1,115	999	863	1,690	1,878	1,819	2,255	2,569
	Gas/Oil CT-Base	358	264	254	373	349	232	500	455	359	304	1,463	1,291	1,461	1,914	1,693
	Gas/Oil CT-Min	327	236	222	330	318	162	442	391	291	233	984	871	947	641	582
	Biomass-Max	776	735	748	654	615	405	408	408	232	231	167	166	166	166	166
	Biomass-Base	776	734	747	651	612	383	388	391	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	606	367	370	371	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	(17)	(31)	(121)	(203)	(326)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,131	17,046	16,987	17,992	17,617	20,032	22,793	24,044	23,388	29,076
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,120	17,036	16,931	16,868	16,492	18,067	21,197	23,585	21,749	21,837
	Wind-Min	11,428	14,233	16,807	16,341	16,271	17,112	17,029	16,930	16,868	16,492	16,399	18,382	22,277	20,369	20,417
	Solar-Max	1,743	1,861	2,167	2,296	3,762	4,047	4,070	5,274	5,662	5,687	6,595	6,625	6,427	8,433	8,991
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,939	3,963	5,198	5,592	5,607	6,304	6,319	6,125	6,259	8,375
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,496	3,520	3,982	4,385	4,404	5,473	5,521	5,381	5,512	6,632
	Imports-Max	264	432	123	62	65	424	368	540	920	716	1,288	2,407	3,196	5,086	6,354
	Imports-Base	197	323	95	39	45	184	186	409	702	557	958	2,062	2,799	4,519	5,761
	Imports-Min	135	237	67	21	25	59	63	155	260	227	581	1,124	2,228	3,256	2,462
	Exports-Max	12,075	10,940	12,691	16,440	15,925	14,602	14,097	11,978	10,850	11,053	8,332	5,062	2,084	1,406	2,347
	Exports-Base	11,497	10,416	12,413	15,875	14,855	11,944	11,607	9,790	8,532	8,740	6,310	3,246	1,617	914	571
	Exports-Min	10,912	9,954	12,022	15,389	14,409	11,270	10,926	9,475	8,059	8,275	4,971	2,385	1,400	715	487

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 4	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	12,331	8,658	8,666	6,839	3,644
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	0	0
	Coal-Max	9,047	6,252	6,497	7,727	6,314	6,631	6,835	4,864	5,020	3,159	-	-	-	-	-
	Coal-Base	8,798	6,036	6,246	7,426	5,919	2,848	2,590	2,402	2,432	2,108	-	-	-	-	-
	Coal-Min	8,562	5,893	5,936	7,136	5,546	2,057	1,755	2,032	2,022	1,729	-	-	-	-	-
	Gas CC-Max	15,278	13,791	12,278	15,071	14,261	15,200	13,716	12,478	10,925	11,028	10,631	10,221	7,964	8,700	8,389
	Gas CC-Base	14,952	13,343	11,763	14,658	13,677	14,845	13,368	12,099	10,479	10,388	9,742	9,531	7,550	8,519	7,614
	Gas CC-Min	14,598	12,870	11,213	14,276	13,210	13,661	11,563	11,710	10,080	9,833	9,042	8,944	7,223	7,514	6,468
	Gas/Oil CT-Max	394	285	280	420	404	320	540	1,236	1,030	1,273	2,786	2,556	2,533	3,001	2,818
	Gas/Oil CT-Base	358	264	254	373	349	233	510	1,065	908	752	1,743	1,594	1,746	2,060	1,574
	Gas/Oil CT-Min	327	236	222	330	318	162	442	383	288	285	1,085	980	939	588	531
	Biomass-Max	776	735	749	654	615	405	408	408	232	231	167	166	166	166	166
	Biomass-Base	776	734	747	651	612	383	388	392	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	607	367	370	370	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	(136)	(132)	(218)	(316)	(483)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,130	17,047	17,005	17,686	17,488	21,063	23,586	24,121	24,242	30,247
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,123	17,041	16,962	16,903	16,508	18,786	21,724	23,893	22,099	24,239
	Wind-Min	11,428	14,233	16,807	16,341	16,271	17,112	17,029	16,925	16,860	16,455	16,455	19,898	22,569	20,697	20,769
	Solar-Max	1,743	1,861	2,167	2,296	3,765	4,047	4,070	5,283	5,674	6,301	6,526	6,821	6,975	8,988	9,414
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,780	3,803	4,913	5,228	5,511	6,185	6,213	6,050	6,176	8,530
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,689	3,708	3,805	4,030	4,045	5,111	5,170	5,042	5,169	7,036
	Imports-Max	264	432	123	62	66	424	368	541	923	719	1,173	2,352	3,218	5,108	6,229
	Imports-Base	197	323	95	39	45	184	185	274	497	409	940	2,023	2,893	4,558	4,740
	Imports-Min	135	237	67	21	25	59	73	150	256	342	818	1,576	2,491	3,099	2,345
	Exports-Max	12,075	10,940	12,691	16,440	15,925	14,602	14,097	12,626	11,193	10,250	8,141	4,308	2,004	1,816	3,032
	Exports-Base	11,497	10,416	12,413	15,875	14,855	12,018	11,683	10,432	9,075	9,114	6,128	3,076	1,484	896	883
	Exports-Min	10,912	9,954	12,022	15,389	14,330	11,275	10,943	9,427	8,230	8,227	4,999	2,530	1,351	811	563

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 5	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	12,331	8,658	8,666	8,658	8,640	8,658	8,666	6,839	3,644
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	-	0
	Coal-Max	9,021	6,253	6,494	7,730	6,296	6,597	7,011	5,099	5,348	5,062	5,732	5,919	4,779	5,530	6,010
	Coal-Base	8,794	6,040	6,255	7,405	5,919	2,844	2,590	2,425	2,454	2,190	2,820	2,797	2,426	2,685	2,869
	Coal-Min	8,561	5,858	5,936	7,131	5,563	2,012	1,753	2,026	2,016	1,732	2,053	2,043	1,759	1,986	2,004
	Gas CC-Max	15,281	13,781	12,291	15,064	14,228	15,090	13,961	13,288	11,803	11,736	11,129	10,740	7,620	8,363	8,929
	Gas CC-Base	14,957	13,342	11,744	14,679	13,680	14,749	13,674	13,079	11,553	11,475	10,178	9,803	7,344	8,095	8,760
	Gas CC-Min	14,599	12,902	11,214	14,274	13,204	13,524	11,975	12,234	10,611	10,522	9,031	8,576	6,515	7,358	7,745
	Gas/Oil CT-Max	394	285	280	420	401	312	1,033	2,644	2,372	1,895	1,904	1,587	1,358	1,736	2,148
	Gas/Oil CT-Base	358	262	254	373	350	232	500	1,912	1,694	1,357	1,471	1,239	1,030	1,234	1,830
	Gas/Oil CT-Min	327	238	221	330	319	161	433	1,093	982	779	913	776	641	646	641
	Biomass-Max	777	735	749	654	615	405	408	409	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	612	383	389	398	232	231	166	166	166	166	166
	Biomass-Min	775	733	745	648	606	366	370	378	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	(37)	(116)	(217)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,133	17,052	17,017	18,726	18,497	20,568	20,961	23,966	22,155	25,949
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,122	17,043	17,001	17,172	16,755	19,098	19,659	23,490	21,718	21,811
	Wind-Min	11,428	14,233	16,807	16,341	16,272	17,112	17,036	16,970	16,969	16,553	16,445	16,253	22,325	20,478	20,568
	Solar-Max	1,743	1,861	2,167	2,296	3,845	5,127	5,157	6,466	6,946	6,967	7,375	7,309	6,998	7,380	7,846
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,955	3,982	5,141	5,465	5,481	6,244	6,261	5,994	6,132	6,428
	Solar-Min	1,743	1,860	2,157	2,295	2,422	3,776	3,801	4,959	5,156	5,165	6,069	6,087	5,841	5,982	6,275
	Imports-Max	264	432	123	62	65	351	573	958	1,662	1,332	1,353	1,413	2,547	3,956	5,635
	Imports-Base	197	324	95	39	44	175	435	745	1,327	1,052	977	1,066	1,953	3,352	4,718
	Imports-Min	135	237	67	21	25	60	185	423	772	638	534	487	1,388	2,217	2,326
	Exports-Max	12,074	10,939	12,691	16,438	15,873	14,414	13,072	9,383	7,952	8,257	8,140	8,058	3,141	2,146	1,986
	Exports-Base	11,498	10,418	12,404	15,875	14,857	11,998	10,645	7,986	6,585	6,772	5,608	4,997	2,080	1,162	799
	Exports-Min	10,890	9,944	12,032	15,386	14,417	11,409	10,072	7,469	6,177	6,341	4,923	4,430	1,860	1,075	716

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 6	Nuclear-Base	14,053	13,576	14,013	13,576	12,626	8,188	5,373	4,918	5,388	4,918	3,691	-	-	-	-
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	0	0	-	-	0	0	0
	Coal-Max	9,047	6,252	6,497	7,727	6,502	7,704	8,006	5,439	5,513	5,142	6,034	6,026	5,532	5,905	6,170
	Coal-Base	8,798	6,036	6,246	7,426	6,209	2,909	2,725	2,417	2,443	2,136	2,678	2,821	2,526	2,708	2,831
	Coal-Min	8,562	5,893	5,936	7,137	5,897	2,055	1,822	2,027	2,016	1,732	2,049	2,046	1,763	1,993	2,012
	Gas CC-Max	15,278	13,791	12,278	15,071	14,661	16,032	15,159	13,517	11,714	11,870	11,259	10,920	9,412	9,470	9,336
	Gas CC-Base	14,952	13,343	11,763	14,658	14,075	15,568	14,700	13,046	11,198	11,347	9,885	9,997	8,793	8,918	8,836
	Gas CC-Min	14,598	12,870	11,213	14,276	13,727	14,963	13,932	12,828	10,897	10,928	9,465	9,695	8,312	8,213	8,058
	Gas/Oil CT-Max	394	285	280	420	424	498	666	2,807	2,601	2,243	2,217	2,018	2,127	2,294	2,278
	Gas/Oil CT-Base	358	264	254	373	363	223	548	1,791	1,650	1,299	1,311	1,300	1,574	1,739	1,643
	Gas/Oil CT-Min	327	236	222	330	341	160	466	1,099	987	772	916	854	1,171	1,041	1,014
	Biomass-Max	776	735	749	654	615	407	409	410	232	231	167	166	166	166	166
	Biomass-Base	776	734	747	651	613	387	394	397	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	607	370	376	375	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	(82)	(108)	(114)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,147	17,069	17,032	19,747	20,086	22,805	24,551	25,769	26,480	27,480
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,146	17,068	17,027	17,007	16,579	21,064	23,039	24,101	22,060	22,021
	Wind-Min	11,428	14,233	16,807	16,341	16,279	17,143	17,067	17,019	17,004	16,579	16,685	20,786	23,462	21,420	21,379
	Solar-Max	1,743	1,861	2,167	2,296	3,847	5,755	5,808	7,056	7,410	7,458	7,971	7,929	7,843	8,224	8,267
	Solar-Base	1,743	1,861	2,162	2,296	3,847	5,720	5,783	6,907	7,378	7,425	7,855	7,914	7,832	7,979	8,020
	Solar-Min	1,743	1,860	2,157	2,295	2,518	4,444	4,474	5,541	5,553	5,576	6,549	6,601	6,534	6,634	6,669
	Imports-Max	264	432	123	62	84	948	1,720	1,449	2,259	1,997	2,694	4,634	5,840	6,974	7,468
	Imports-Base	197	323	95	39	55	582	1,150	1,256	2,022	1,783	2,350	4,020	5,097	6,196	6,489
	Imports-Min	135	237	67	21	35	175	510	642	1,173	1,104	1,230	2,427	3,617	3,369	3,062
	Exports-Max	12,075	10,940	12,691	16,440	15,120	12,502	10,170	8,340	6,943	6,844	6,229	2,963	1,392	1,226	1,456
	Exports-Base	11,497	10,416	12,413	15,875	14,139	9,608	7,365	6,298	5,278	5,227	3,007	1,284	686	346	278
	Exports-Min	10,912	9,954	12,022	15,389	13,644	8,841	6,637	6,120	4,831	4,871	2,569	1,032	639	317	275

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 7	Nuclear-Base	14,053	13,576	14,013	13,576	12,626	8,188	5,373	4,918	5,388	4,918	3,691	-	-	-	-
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	0	0	-	-	0	0	0
	Coal-Max	9,021	6,252	6,497	7,727	6,502	7,704	8,006	5,439	5,513	5,142	6,034	6,026	5,532	5,905	6,170
	Coal-Base	8,794	6,036	6,246	7,426	6,209	2,909	2,725	2,417	2,443	2,136	2,678	2,821	2,526	2,708	2,831
	Coal-Min	8,561	5,893	5,936	7,137	5,897	2,055	1,822	2,027	2,016	1,732	2,049	2,046	1,763	1,993	2,012
	Gas CC-Max	15,281	13,791	12,278	15,071	14,661	16,032	15,159	13,517	11,714	11,870	11,259	10,920	9,412	9,470	9,336
	Gas CC-Base	14,957	13,343	11,763	14,658	14,075	15,568	14,700	13,046	11,198	11,347	9,885	9,997	8,793	8,918	8,836
	Gas CC-Min	14,599	12,870	11,213	14,276	13,727	14,963	13,932	12,828	10,897	10,928	9,465	9,695	8,312	8,213	8,058
	Gas/Oil CT-Max	394	285	280	420	424	498	666	2,807	2,601	2,243	2,217	2,018	2,127	2,294	2,278
	Gas/Oil CT-Base	358	264	254	373	363	223	548	1,791	1,650	1,299	1,311	1,300	1,574	1,739	1,643
	Gas/Oil CT-Min	327	236	222	330	341	160	466	1,099	987	772	916	854	1,171	1,041	1,014
	Biomass-Max	777	735	749	654	615	407	409	410	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	613	387	394	397	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	607	370	376	375	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	(82)	(108)	(114)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,147	17,069	17,032	19,747	20,086	22,805	24,551	25,769	26,480	27,480
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,146	17,068	17,027	17,007	16,579	21,064	23,039	24,101	22,060	22,021
	Wind-Min	11,428	14,233	16,807	16,341	16,279	17,143	17,067	17,019	17,004	16,579	16,685	20,786	23,462	21,420	21,379
	Solar-Max	1,743	1,861	2,167	2,296	3,847	5,755	5,808	7,056	7,410	7,458	7,971	7,929	7,843	8,224	8,267
	Solar-Base	1,743	1,861	2,162	2,296	3,847	5,720	5,783	6,907	7,378	7,425	7,855	7,914	7,832	7,979	8,020
	Solar-Min	1,743	1,860	2,157	2,295	2,518	4,444	4,474	5,541	5,553	5,576	6,549	6,601	6,534	6,634	6,669
	Imports-Max	264	432	123	62	84	948	1,720	1,449	2,259	1,997	2,694	4,634	5,840	6,974	7,468
	Imports-Base	197	323	95	39	55	582	1,150	1,256	2,022	1,783	2,350	4,020	5,097	6,196	6,489
	Imports-Min	135	237	67	21	35	175	510	642	1,173	1,104	1,230	2,427	3,617	3,369	3,062
	Exports-Max	12,074	10,940	12,691	16,440	15,120	12,502	10,170	8,340	6,943	6,844	6,229	2,963	1,392	1,226	1,456
	Exports-Base	11,498	10,416	12,413	15,875	14,139	9,608	7,365	6,298	5,278	5,227	3,007	1,284	686	346	278
	Exports-Min	10,890	9,954	12,022	15,389	13,644	8,841	6,637	6,120	4,831	4,871	2,569	1,032	639	317	275

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 8	Nuclear-Base	14,053	13,576	14,013	13,576	12,626	8,188	3,691	-	-	-	-	-	-	-	-
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	0	0	0	-	0	0	0	0	0
	Coal-Max	9,021	6,253	6,494	7,730	6,553	7,142	7,942	5,502	5,731	3,333	-	-	-	-	-
	Coal-Base	8,794	6,032	6,252	7,426	6,216	2,908	2,667	2,423	2,452	2,159	-	-	-	-	-
	Coal-Min	8,561	5,858	5,936	7,131	5,906	2,055	1,818	2,023	2,017	1,722	-	-	-	-	-
	Gas CC-Max	15,281	13,781	12,291	15,064	14,680	15,797	14,986	13,756	12,189	11,767	11,102	10,872	9,375	9,321	9,173
	Gas CC-Base	14,957	13,339	11,747	14,658	14,189	15,555	14,804	13,579	11,919	11,136	10,639	10,420	9,141	8,726	8,650
	Gas CC-Min	14,599	12,902	11,214	14,274	13,719	14,797	13,859	13,149	11,196	10,589	9,760	9,348	8,386	7,653	7,627
	Gas/Oil CT-Max	394	285	280	420	424	999	2,018	4,445	3,890	3,318	3,916	3,453	3,532	3,600	3,594
	Gas/Oil CT-Base	358	263	254	373	367	223	1,292	3,415	3,201	2,058	2,792	2,442	2,595	2,185	2,256
	Gas/Oil CT-Min	327	238	221	330	340	160	1,114	2,652	2,306	1,796	1,921	1,644	1,655	1,231	1,232
	Biomass-Max	777	735	749	654	615	407	409	410	232	231	167	166	166	166	166
	Biomass-Base	775	734	748	651	613	387	395	401	232	231	166	166	166	166	166
	Biomass-Min	775	733	745	648	608	370	376	379	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	(12)	(23)	(23)
	Battery-Min	-	-	-	-	-	-	-	-	-	-	(32)	(80)	(170)	(193)	(205)
	Wind-Max	11,430	14,244	16,916	16,345	16,323	17,147	17,069	17,033	20,907	21,559	24,910	26,149	26,825	28,525	29,500
	Wind-Base	11,429	14,239	16,868	16,344	16,294	17,145	17,068	17,032	17,409	20,066	23,296	23,631	24,332	23,538	23,500
	Wind-Min	11,428	14,233	16,807	16,341	16,280	17,144	17,067	17,030	17,015	16,584	21,400	21,969	23,472	21,416	21,375
	Solar-Max	1,743	1,861	2,167	2,296	3,766	5,829	6,348	8,220	8,165	8,844	9,049	9,063	9,274	9,297	9,262
	Solar-Base	1,743	1,861	2,162	2,296	3,669	5,739	5,806	6,870	7,281	7,864	7,787	7,798	7,884	8,683	8,728
	Solar-Min	1,743	1,860	2,157	2,295	2,423	5,099	5,142	6,031	6,051	6,699	6,985	7,008	7,091	7,266	7,282
	Imports-Max	264	432	123	62	84	915	1,875	2,728	3,865	3,636	5,092	5,282	6,453	7,692	8,014
	Imports-Base	197	323	95	39	53	573	1,572	2,370	3,422	3,355	4,387	4,768	5,869	6,490	6,728
	Imports-Min	135	237	67	21	35	130	626	1,383	2,244	2,681	3,994	3,994	4,461	4,031	3,642
	Exports-Max	12,074	10,939	12,691	16,438	15,191	12,818	10,285	6,848	5,459	4,082	1,748	1,544	1,047	1,228	1,527
	Exports-Base	11,498	10,407	12,405	15,875	14,271	9,678	6,994	4,802	3,737	2,514	1,258	1,002	616	423	366
	Exports-Min	10,890	9,944	12,032	15,386	13,644	8,932	6,501	4,454	3,392	2,514	838	770	527	291	264

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o g	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	11,757	9,017
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
	Coal-Max	9,054	6,305	6,496	7,721	6,314	6,796	6,875	4,806	5,023	3,158	-	-	-	-	-
	Coal-Base	8,794	6,037	6,254	7,424	5,921	2,849	2,592	2,409	2,433	2,114	-	-	-	-	-
	Coal-Min	8,560	5,896	5,943	7,136	5,564	2,057	1,755	2,033	2,023	1,733	-	-	-	-	-
	Gas CC-Max	15,269	13,779	12,277	15,072	14,261	15,228	13,751	12,474	10,927	11,024	10,221	9,957	6,717	7,795	8,432
	Gas CC-Base	14,957	13,368	11,742	14,660	13,685	14,865	13,398	11,966	10,324	10,330	9,970	8,547	6,288	7,442	7,780
	Gas CC-Min	14,599	12,878	11,211	14,271	13,203	13,570	11,514	11,517	9,882	9,653	9,210	8,453	6,037	7,168	6,577
	Gas/Oil CT-Max	394	285	280	420	404	323	552	1,209	1,007	1,273	1,950	1,602	1,587	1,973	2,620
	Gas/Oil CT-Base	358	262	254	373	349	233	511	455	359	510	1,155	829	971	1,288	1,501
	Gas/Oil CT-Min	327	238	223	330	316	162	443	391	291	375	961	743	620	635	578
	Biomass-Max	777	735	748	654	614	405	408	408	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	612	383	388	391	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	606	367	371	371	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	(17)	(20)	(15)	(15)
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	(34)	(174)	(226)	(366)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,132	17,048	17,002	17,671	18,575	19,332	21,195	23,544	22,131	26,076
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,127	17,046	16,931	16,869	16,492	17,297	20,246	22,688	21,262	21,376
	Wind-Min	11,428	14,233	16,807	16,341	16,271	17,112	17,029	16,925	16,861	16,455	16,558	17,141	21,325	19,706	19,761
	Solar-Max	1,743	1,861	2,167	2,296	3,765	4,007	4,031	5,282	5,674	6,283	6,504	6,546	6,260	7,595	8,417
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,687	3,706	5,198	5,591	5,607	6,394	6,324	6,062	6,266	7,314
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,497	3,517	3,899	4,026	4,042	5,009	5,056	4,869	5,062	5,631
	Imports-Max	264	427	123	62	66	454	393	555	920	716	883	1,025	1,625	2,811	3,808
	Imports-Base	197	323	95	39	44	184	185	409	702	557	750	1,025	1,455	2,494	3,375
	Imports-Min	135	237	67	21	25	59	73	150	257	343	507	634	1,182	1,970	1,774
	Exports-Max	12,074	10,951	12,697	16,438	15,925	14,802	14,243	12,465	11,175	10,234	8,596	7,046	3,621	2,240	2,862
	Exports-Base	11,498	10,441	12,401	15,875	14,863	12,043	11,724	9,790	8,533	8,738	7,235	5,107	2,849	1,744	1,354
	Exports-Min	10,912	9,989	12,020	15,385	14,332	11,308	10,983	9,475	8,219	8,101	6,204	4,922	2,525	1,545	1,210

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 1 0	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	11,757	9,017
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
	Coal-Max	9,022	6,309	6,496	7,716	6,314	6,663	6,826	4,900	5,030	3,159	3,731	3,782	3,035	3,676	3,793
	Coal-Base	8,798	6,036	6,246	7,426	5,919	2,848	2,590	2,410	2,436	2,114	2,584	2,594	2,209	2,504	2,569
	Coal-Min	8,562	5,893	5,936	7,136	5,564	2,057	1,756	2,033	2,023	1,730	2,062	2,047	1,752	1,983	1,994
	Gas CC-Max	15,287	13,769	12,281	15,080	14,261	15,193	13,698	12,508	10,924	10,801	10,282	10,423	6,772	7,813	8,433
	Gas CC-Base	14,952	13,343	11,763	14,658	13,677	14,845	13,368	12,194	10,569	10,420	9,999	9,437	6,015	7,068	7,878
	Gas CC-Min	14,598	12,870	11,213	14,276	13,210	13,570	11,514	11,700	10,095	9,825	9,140	8,480	5,585	6,516	7,482
	Gas/Oil CT-Max	394	285	280	420	404	317	541	1,237	1,286	1,273	1,361	1,215	942	1,240	1,971
	Gas/Oil CT-Base	358	264	254	373	349	233	510	1,082	919	769	1,077	857	659	1,023	1,559
	Gas/Oil CT-Min	327	236	222	330	318	162	443	399	311	474	940	748	583	621	672
	Biomass-Max	777	735	749	654	615	405	408	409	232	231	167	166	166	166	166
	Biomass-Base	776	734	747	651	612	383	388	392	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	606	367	370	372	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	(164)	(132)	(227)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,131	17,047	17,005	17,879	17,860	17,776	18,989	23,101	21,737	22,383
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,123	17,041	16,975	16,919	16,712	16,566	17,896	22,408	21,061	21,177
	Wind-Min	11,428	14,233	16,807	16,341	16,271	17,112	17,029	16,930	16,869	16,445	16,332	16,182	20,430	18,762	18,826
	Solar-Max	1,743	1,861	2,167	2,296	3,845	3,939	3,963	5,199	5,591	6,307	6,280	6,345	6,036	6,548	7,224
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,780	3,803	4,638	5,042	5,237	5,749	5,764	5,519	5,705	5,827
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,496	3,520	3,805	4,023	4,226	4,913	4,940	4,921	5,100	5,212
	Imports-Max	264	427	123	62	66	454	393	555	906	602	472	566	1,230	1,911	2,969
	Imports-Base	197	323	95	39	45	184	185	273	495	411	309	368	919	1,536	2,407
	Imports-Min	135	237	67	21	25	60	63	150	256	256	191	231	669	1,262	1,857
	Exports-Max	12,075	10,940	12,691	16,440	15,925	14,541	14,039	12,651	11,237	10,528	10,567	10,223	4,678	3,287	2,751
	Exports-Base	11,497	10,416	12,413	15,875	14,855	12,018	11,683	10,570	9,200	9,185	9,397	8,192	3,803	2,562	1,977
	Exports-Min	10,897	9,984	12,023	15,388	14,324	11,269	10,925	9,582	8,317	8,220	8,170	6,976	2,976	1,977	1,436

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 1 1	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	12,331	8,658	8,666	8,658	8,640
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
	Coal-Max	9,022	6,309	6,496	7,719	6,313	6,663	6,826	4,807	5,032	3,162	-	-	-	-	-
	Coal-Base	8,796	6,038	6,213	7,425	5,921	2,845	2,588	2,410	2,433	2,114	-	-	-	-	-
	Coal-Min	8,564	5,868	5,930	7,136	5,546	2,057	1,756	2,033	2,023	1,735	-	-	-	-	-
	Gas CC-Max	15,287	13,769	12,281	15,077	14,260	15,259	13,807	12,441	10,971	11,077	10,536	10,069	8,135	8,553	8,537
	Gas CC-Base	14,955	13,346	11,771	14,657	13,680	14,809	13,327	11,961	10,305	10,312	10,204	9,960	7,764	8,088	8,173
	Gas CC-Min	14,593	12,900	11,219	14,271	13,206	13,570	11,514	11,683	9,924	9,832	9,040	8,954	7,482	7,584	7,524
	Gas/Oil CT-Max	394	285	280	420	405	317	539	1,231	1,030	1,283	2,713	2,470	2,504	2,432	2,558
	Gas/Oil CT-Base	358	255	254	373	351	232	504	455	359	526	1,858	1,915	1,776	1,493	1,527
	Gas/Oil CT-Min	327	239	223	330	316	162	443	383	292	288	1,085	980	937	671	714
	Biomass-Max	777	735	749	654	615	405	408	408	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	612	383	388	391	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	607	367	371	370	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	(13)	(27)
	Battery-Min	-	-	-	-	-	-	-	-	-	-	(137)	(132)	(209)	(204)	(218)
1	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,134	17,054	17,002	17,992	17,617	21,063	23,585	24,110	23,616	24,397
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,124	17,041	16,943	16,883	16,500	17,714	20,666	23,621	21,795	21,783
	Wind-Min	11,428	14,233	16,807	16,341	16,271	17,111	17,029	16,925	16,865	16,488	16,384	20,121	21,905	19,978	19,945
	Solar-Max	1,743	1,861	2,167	2,296	3,762	4,047	4,070	5,283	5,758	5,924	6,619	6,821	7,120	7,928	7,902
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,872	3,895	5,189	5,580	5,603	6,219	6,252	6,029	6,551	6,735
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,690	3,710	3,898	4,118	4,136	5,199	5,249	5,125	5,247	5,272
	Imports-Max	264	427	123	62	65	439	380	541	920	717	1,157	2,330	3,190	4,106	4,241
	Imports-Base	197	324	95	39	44	176	179	398	686	544	893	1,749	2,666	3,409	3,481
	Imports-Min	135	237	67	21	25	60	73	150	256	337	803	1,593	2,385	2,649	2,435
	Exports-Max	12,072	10,948	12,692	16,438	15,925	14,538	14,032	12,533	11,243	10,319	7,970	4,166	2,152	1,703	1,946
	Exports-Base	11,498	10,413	12,388	15,874	14,859	12,061	11,722	9,878	8,602	8,809	6,833	3,784	1,700	1,129	1,160
	Exports-Min	10,897	9,984	12,023	15,388	14,413	11,345	11,047	9,427	8,057	8,228	4,997	2,535	1,429	904	894

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 1 2	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	14,013
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
	Coal-Max	9,021	6,254	6,499	7,716	6,314	6,663	6,826	4,758	5,011	3,149	-	-	-	-	-
	Coal-Base	8,793	6,039	6,248	7,425	5,921	2,848	2,590	2,410	2,433	2,114	-	-	-	-	-
	Coal-Min	8,565	5,894	5,934	7,137	5,566	2,057	1,756	2,033	2,023	1,735	-	-	-	-	-
	Gas CC-Max	15,283	13,782	12,274	15,080	14,261	15,195	13,696	12,347	10,634	10,724	10,216	10,240	7,122	7,744	7,847
	Gas CC-Base	14,959	13,351	11,751	14,659	13,682	14,849	13,364	11,962	10,318	10,323	9,887	8,713	6,469	7,411	7,389
	Gas CC-Min	14,592	12,874	11,214	14,278	13,067	13,570	11,514	11,529	9,910	9,826	9,300	8,493	6,321	7,245	7,305
	Gas/Oil CT-Max	394	285	280	420	404	317	542	1,161	980	1,268	1,918	1,513	1,601	1,476	1,586
	Gas/Oil CT-Base	358	263	254	373	351	233	509	456	359	514	1,110	835	976	872	903
	Gas/Oil CT-Min	327	238	222	330	305	162	443	391	314	288	977	758	640	598	639
	Biomass-Max	777	735	749	654	614	405	408	408	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	612	383	388	391	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	606	367	371	371	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	(17)	(38)	(60)	(63)
	Battery-Min	-	-	-	-	-	-	-	(14)	(15)	(14)	(15)	(33)	(136)	(132)	(152)
2	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,130	17,047	16,990	17,629	17,253	18,767	20,613	23,214	21,696	21,591
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,123	17,041	16,931	16,869	16,492	17,479	19,885	22,270	20,749	20,652
	Wind-Min	11,428	14,233	16,807	16,341	16,261	17,109	17,025	16,930	16,868	16,491	16,417	16,586	20,509	18,770	18,683
	Solar-Max	1,743	1,861	2,167	2,296	3,839	3,955	3,979	5,199	5,592	6,109	6,504	6,560	6,313	6,518	6,504
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,780	3,803	5,198	5,591	5,607	6,387	6,431	6,191	6,378	6,344
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,780	3,803	4,074	4,393	4,421	5,542	5,569	5,845	6,031	6,013
	Imports-Max	264	432	123	62	65	454	393	555	918	711	855	1,083	1,449	2,148	2,047
	Imports-Base	197	324	95	39	44	184	185	409	702	559	768	1,014	1,420	1,844	1,826
	Imports-Min	135	237	67	21	25	60	73	151	259	344	520	644	1,191	1,536	1,487
	Exports-Max	12,072	10,946	12,690	16,436	15,926	14,538	14,032	12,244	11,023	10,133	8,319	7,236	4,120	3,006	3,099
	Exports-Base	11,499	10,427	12,404	15,874	14,861	12,021	11,679	9,787	8,528	8,733	7,111	5,294	3,096	2,439	2,480
	Exports-Min	10,892	9,948	12,020	15,388	14,412	11,270	10,923	9,476	8,267	8,293	6,506	4,976	2,880	2,068	2,176

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 1 3	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	11,757	9,017
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
	Coal-Max	9,054	6,305	6,496	7,721	6,314	6,661	6,826	4,852	5,030	4,845	5,484	5,743	4,268	5,163	5,623
	Coal-Base	8,798	6,036	6,246	7,426	5,919	2,848	2,590	2,416	2,444	2,129	2,820	2,773	2,353	2,604	2,744
	Coal-Min	8,565	5,897	5,937	7,136	5,564	2,058	1,756	2,033	2,023	1,737	2,063	2,051	1,748	1,985	2,000
	Gas CC-Max	15,269	13,779	12,277	15,072	14,261	15,195	13,714	12,510	10,951	11,029	10,360	10,674	6,513	7,551	8,309
	Gas CC-Base	14,952	13,343	11,763	14,658	13,677	14,845	13,368	12,311	10,754	10,813	10,161	9,481	6,005	7,070	7,840
	Gas CC-Min	14,592	12,873	11,211	14,282	13,180	13,576	11,522	11,711	10,095	10,015	9,103	8,450	5,385	6,374	7,327
	Gas/Oil CT-Max	394	285	280	420	404	317	541	1,237	1,024	908	1,151	1,011	685	863	1,467
	Gas/Oil CT-Base	358	264	254	373	349	233	510	1,104	982	788	1,101	846	649	825	1,169
	Gas/Oil CT-Min	327	236	222	330	319	162	446	399	314	256	926	748	575	506	696
	Biomass-Max	777	735	748	654	614	405	408	409	232	231	167	166	166	166	166
	Biomass-Base	776	734	747	651	612	383	388	392	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	606	368	371	373	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	(22)	(17)	(131)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,130	17,047	17,005	18,272	17,885	17,872	19,191	22,958	21,707	22,174
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,123	17,041	16,987	16,941	16,542	16,398	18,098	22,563	21,237	21,361
	Wind-Min	11,428	14,233	16,807	16,341	16,271	17,109	17,025	16,930	16,868	16,492	16,332	16,182	20,694	19,092	19,164
	Solar-Max	1,743	1,861	2,167	2,296	3,845	3,939	3,963	5,199	5,592	5,608	6,282	6,345	6,288	6,482	6,621
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,780	3,803	4,362	4,676	4,694	5,494	5,499	5,427	5,614	5,734
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,780	3,802	3,805	4,022	4,041	4,915	4,940	5,333	5,521	5,641
	Imports-Max	264	427	123	62	66	454	393	555	905	680	456	514	1,156	2,069	3,075
	Imports-Base	197	323	95	39	45	184	185	273	488	397	252	319	840	1,574	2,498
	Imports-Min	135	237	67	21	25	60	75	150	256	213	122	125	609	1,027	1,361
	Exports-Max	12,072	10,947	12,691	16,436	15,925	14,541	14,039	12,616	11,237	11,505	11,619	11,385	5,194	3,932	3,385
	Exports-Base	11,497	10,416	12,413	15,875	14,855	12,018	11,683	10,730	9,476	9,629	9,796	8,366	3,824	2,477	1,761
	Exports-Min	10,912	9,989	12,020	15,385	14,332	11,271	10,940	9,647	8,336	8,537	8,199	7,183	3,174	1,950	1,485

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 1 4	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	12,331	8,658	8,666	8,658	8,640
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
	Coal-Max	9,022	6,309	6,496	7,719	6,312	6,663	6,826	4,807	5,032	4,844	5,615	6,086	4,829	5,439	5,647
	Coal-Base	8,794	6,037	6,254	7,424	5,910	2,843	2,584	2,410	2,433	2,117	2,747	2,792	2,483	2,667	2,721
	Coal-Min	8,560	5,896	5,943	7,136	5,526	2,057	1,755	2,032	2,021	1,736	2,055	2,057	1,764	1,994	2,005
	Gas CC-Max	15,287	13,769	12,281	15,077	14,261	15,235	13,767	12,511	10,951	11,029	10,659	10,872	8,170	8,405	8,484
	Gas CC-Base	14,957	13,368	11,742	14,660	13,566	14,741	13,249	11,963	10,334	10,321	9,976	9,580	7,393	7,715	7,807
	Gas CC-Min	14,599	12,878	11,211	14,271	13,203	13,570	11,460	11,648	10,062	9,901	9,188	8,889	6,657	7,049	7,157
	Gas/Oil CT-Max	394	285	280	420	405	317	541	1,231	1,030	908	1,199	1,214	1,120	1,236	1,269
	Gas/Oil CT-Base	358	262	254	373	343	232	501	455	359	304	1,031	864	745	907	919
	Gas/Oil CT-Min	327	238	223	330	316	162	442	394	310	254	912	782	676	579	541
	Biomass-Max	777	735	749	654	614	405	408	408	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	612	383	388	391	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	607	367	370	372	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	(28)	(42)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,132	17,048	17,004	18,112	18,091	18,685	22,108	23,989	22,262	22,249
	Wind-Base	11,429	14,239	16,868	16,344	16,281	17,118	17,035	16,930	16,870	16,492	16,716	20,204	23,302	21,496	21,469
	Wind-Min	11,428	14,233	16,807	16,341	16,271	17,112	17,029	16,930	16,869	16,492	16,335	16,871	21,559	19,636	19,602
	Solar-Max	1,743	1,861	2,167	2,296	3,845	4,122	4,146	5,368	5,591	5,608	6,399	6,495	6,415	6,526	6,824
	Solar-Base	1,743	1,861	2,162	2,296	3,845	4,007	4,031	5,198	5,591	5,607	6,292	6,317	6,090	6,208	6,302
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,776	3,797	3,805	3,832	3,846	4,882	4,940	5,095	5,208	5,230
	Imports-Max	264	427	123	62	65	424	368	526	872	647	809	1,627	2,555	3,188	3,265
	Imports-Base	197	323	95	39	45	184	191	409	701	557	563	1,274	2,159	2,664	2,737
	Imports-Min	135	237	67	21	25	60	73	150	256	213	273	549	1,497	1,631	1,592
	Exports-Max	12,074	10,951	12,697	16,438	15,926	14,538	14,032	12,533	11,243	11,517	10,735	8,207	3,197	2,731	2,749
	Exports-Base	11,498	10,441	12,401	15,875	14,719	11,899	11,549	9,788	8,543	8,734	8,023	4,464	2,038	1,458	1,440
	Exports-Min	10,897	9,984	12,023	15,388	14,413	11,315	10,998	9,648	8,341	8,504	7,156	3,902	1,805	1,284	1,255

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 1 5	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	14,013
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
	Coal-Max	9,021	6,303	6,503	7,729	6,313	6,663	6,826	4,900	5,027	4,843	5,631	5,961	4,626	5,306	5,386
	Coal-Base	8,796	6,038	6,213	7,425	5,921	2,848	2,590	2,410	2,433	2,117	2,728	2,755	2,353	2,567	2,609
	Coal-Min	8,560	5,896	5,943	7,137	5,566	2,057	1,756	2,033	2,023	1,737	2,062	2,057	1,760	1,994	2,008
	Gas CC-Max	15,282	13,781	12,273	15,076	14,260	15,196	13,722	12,510	10,952	11,029	10,668	10,896	7,469	7,963	7,953
	Gas CC-Base	14,955	13,346	11,771	14,657	13,680	14,849	13,369	11,973	10,309	10,327	9,731	9,568	6,311	6,919	6,928
	Gas CC-Min	14,599	12,878	11,211	14,271	13,203	13,570	11,514	11,700	10,109	10,032	9,103	8,450	5,951	6,555	6,573
	Gas/Oil CT-Max	394	285	280	420	405	317	541	1,236	1,009	908	1,263	1,113	794	701	764
	Gas/Oil CT-Base	358	255	254	373	351	233	510	455	360	304	981	816	642	566	576
	Gas/Oil CT-Min	327	238	223	330	316	162	443	399	314	256	928	748	605	510	501
	Biomass-Max	777	735	748	654	614	405	408	408	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	612	383	388	391	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	606	367	371	373	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,130	17,046	17,005	18,080	17,692	17,685	19,005	22,409	20,974	20,829
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,123	17,041	16,931	16,868	16,492	16,333	16,950	21,461	19,918	19,787
	Wind-Min	11,428	14,233	16,807	16,341	16,271	17,112	17,029	16,930	16,868	16,492	16,333	16,216	19,617	17,842	17,755
	Solar-Max	1,743	1,861	2,167	2,296	3,845	3,939	3,963	5,199	5,592	5,608	6,280	6,308	6,160	6,309	6,280
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,780	3,803	5,199	5,592	5,607	6,280	6,295	5,993	6,142	6,117
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,776	3,797	3,805	4,114	4,133	4,228	4,265	5,024	5,145	5,142
	Imports-Max	264	427	123	62	66	454	393	555	905	680	448	513	1,118	1,483	1,477
	Imports-Base	197	324	95	39	44	184	185	409	703	557	294	331	823	1,126	1,102
	Imports-Min	135	237	67	21	25	60	73	150	256	213	117	117	436	515	487
	Exports-Max	12,074	10,951	12,697	16,438	15,925	14,538	14,032	12,651	11,248	11,520	12,243	12,084	6,532	5,663	5,782
	Exports-Base	11,498	10,413	12,388	15,874	14,859	12,021	11,684	9,798	8,518	8,739	9,126	8,435	4,302	3,398	3,437
	Exports-Min	10,891	9,989	12,023	15,397	14,329	11,273	10,949	9,592	8,265	8,473	8,194	7,175	3,501	2,700	2,714

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 1 6	Nuclear-Base	14,053	13,576	14,013	13,576	12,626	8,188	3,691	-	-	-	-	-	-	-	-
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	0	0	0	0	0	-	0	0	0
	Coal-Max	9,021	6,253	6,494	7,730	6,506	7,359	7,991	5,501	5,732	3,335	3,877	3,856	3,304	3,873	3,918
	Coal-Base	8,794	6,040	6,255	7,405	6,222	2,909	2,667	2,423	2,453	2,171	2,589	2,633	2,293	2,579	2,604
	Coal-Min	8,561	5,858	5,936	7,131	5,895	2,054	1,818	2,025	2,019	1,723	2,039	2,031	1,743	1,986	2,001
	Gas CC-Max	15,281	13,781	12,291	15,064	14,658	15,847	15,024	13,798	12,232	11,779	11,204	11,069	9,160	9,172	9,118
	Gas CC-Base	14,957	13,342	11,744	14,679	14,177	15,553	14,807	13,579	11,937	11,568	10,335	10,046	8,740	8,869	8,793
	Gas CC-Min	14,599	12,902	11,214	14,274	13,719	14,859	13,930	13,123	11,143	10,392	9,301	9,061	8,229	7,649	7,726
	Gas/Oil CT-Max	394	285	280	420	424	1,045	2,018	4,378	3,965	3,495	3,564	2,949	2,614	2,809	2,937
	Gas/Oil CT-Base	358	262	254	373	367	223	1,292	3,415	3,217	2,444	2,145	1,889	2,068	2,103	2,105
	Gas/Oil CT-Min	327	238	221	330	340	160	529	2,614	2,266	1,564	1,623	1,445	1,454	1,139	1,136
	Biomass-Max	777	735	749	654	615	407	409	410	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	613	387	395	401	232	231	166	166	166	166	166
	Biomass-Min	775	733	745	648	607	370	376	379	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	(76)	(89)	(111)
	Wind-Max	11,430	14,244	16,916	16,345	16,322	17,147	17,068	17,033	21,328	21,993	24,792	24,774	25,319	25,985	26,979
	Wind-Base	11,429	14,239	16,868	16,344	16,294	17,146	17,068	17,032	17,212	17,759	22,885	23,060	24,297	22,261	22,225
	Wind-Min	11,428	14,233	16,807	16,341	16,280	17,143	17,067	17,029	17,014	16,578	18,070	19,622	23,056	21,012	20,974
	Solar-Max	1,743	1,861	2,167	2,296	3,847	5,879	6,415	8,308	8,415	9,031	8,938	8,906	8,987	9,056	9,032
	Solar-Base	1,743	1,861	2,162	2,296	3,669	5,738	5,806	6,870	7,285	8,007	7,825	7,833	7,746	7,894	7,933
	Solar-Min	1,743	1,860	2,157	2,295	2,518	4,913	4,952	5,843	5,817	5,883	6,711	6,745	6,854	6,989	7,031
	Imports-Max	264	432	123	62	82	915	1,910	2,782	3,928	3,674	3,819	4,092	5,394	6,860	7,172
	Imports-Base	197	324	95	39	53	574	1,572	2,370	3,416	3,230	3,327	3,629	4,851	5,982	6,277
	Imports-Min	135	237	67	21	35	185	629	1,419	2,300	2,778	2,522	2,886	3,831	3,643	3,205
	Exports-Max	12,074	10,939	12,691	16,438	15,122	12,339	10,265	6,596	5,240	3,830	3,733	2,824	1,135	1,126	1,444
	Exports-Base	11,498	10,418	12,404	15,875	14,264	9,678	6,996	4,801	3,770	3,027	1,741	1,480	761	426	376
	Exports-Min	10,890	9,944	12,032	15,386	13,722	8,989	6,391	4,257	3,327	2,467	1,389	1,089	709	341	311

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 1 7	Nuclear-Base	14,053	13,576	14,013	13,576	12,626	8,188	3,691	-	-	-	-	-	-	-	-
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	0	0	0	0	0	0	0	0	0
	Coal-Max	9,021	6,253	6,494	7,730	6,506	7,102	7,790	5,491	5,614	5,254	2,083	2,239	2,170	1,982	2,192
	Coal-Base	8,794	6,040	6,255	7,405	6,213	2,904	2,666	2,420	2,448	2,192	181	218	118	98	318
	Coal-Min	8,561	5,858	5,936	7,131	5,895	2,055	1,820	2,028	2,020	1,736	-	-	-	-	-
	Gas CC-Max	15,281	13,781	12,291	15,064	14,658	15,858	15,119	13,748	12,143	12,115	11,178	11,063	9,467	9,334	9,213
	Gas CC-Base	14,957	13,342	11,744	14,679	14,137	15,531	14,771	13,538	11,788	11,827	10,507	10,452	9,117	9,170	8,900
	Gas CC-Min	14,599	12,902	11,214	14,274	13,719	14,486	13,672	12,938	11,090	11,044	9,689	9,490	8,344	7,666	7,761
	Gas/Oil CT-Max	394	285	280	420	424	996	2,034	4,176	3,915	2,975	3,016	2,660	2,831	2,743	2,736
	Gas/Oil CT-Base	358	262	254	373	362	223	1,280	3,331	3,097	2,375	2,389	2,132	2,348	2,332	2,099
	Gas/Oil CT-Min	327	238	221	330	340	161	1,172	2,605	2,220	1,785	1,798	1,609	1,543	1,210	1,219
	Biomass-Max	777	735	749	654	615	406	408	410	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	613	387	395	401	232	231	166	166	166	166	166
	Biomass-Min	775	733	745	648	607	370	376	379	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	(60)	(89)	(94)
	Wind-Max	11,430	14,244	16,916	16,345	16,322	17,147	17,068	17,032	20,314	20,255	24,528	24,488	26,001	27,295	28,075
	Wind-Base	11,429	14,239	16,868	16,344	16,291	17,145	17,068	17,030	17,409	16,981	23,266	23,243	24,292	22,236	22,624
	Wind-Min	11,428	14,233	16,807	16,341	16,280	17,143	17,067	17,029	17,014	16,587	18,856	20,218	22,912	20,857	20,817
	Solar-Max	1,743	1,861	2,167	2,296	3,847	5,879	6,272	8,482	8,397	8,403	9,113	9,112	9,085	9,169	9,142
	Solar-Base	1,743	1,861	2,162	2,296	3,763	5,812	5,881	7,054	7,553	7,574	8,036	8,064	7,963	8,196	8,395
	Solar-Min	1,743	1,860	2,157	2,295	2,518	5,630	5,693	6,788	6,789	6,783	7,713	7,743	7,678	7,792	7,827
	Imports-Max	264	432	123	62	84	915	1,910	2,777	3,937	3,591	4,826	5,147	6,362	7,901	8,203
	Imports-Base	197	324	95	39	55	574	1,575	2,390	3,461	3,147	4,629	4,874	6,074	7,597	7,581
	Imports-Min	135	237	67	21	35	169	651	1,442	2,339	2,130	3,316	3,580	4,518	4,297	3,860
	Exports-Max	12,074	10,939	12,691	16,438	15,122	12,410	9,919	6,278	4,899	4,864	2,663	2,159	977	1,048	1,248
	Exports-Base	11,498	10,418	12,404	15,875	14,208	9,648	6,948	4,682	3,528	3,416	1,107	1,006	523	212	206
	Exports-Min	10,890	9,944	12,032	15,386	13,644	9,006	6,391	4,305	3,230	3,128	915	758	523	212	183

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 1 8	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	12,331	8,658	8,666	8,658	8,640	8,658	8,666	6,839	3,644
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	0	0
	Coal-Max	9,021	6,253	6,494	7,730	6,312	6,595	7,012	5,195	5,340	3,300	-	-	-	-	-
	Coal-Base	8,794	6,040	6,255	7,405	5,919	2,841	2,588	2,425	2,448	2,160	-	-	-	-	-
	Coal-Min	8,561	5,858	5,936	7,131	5,563	2,012	1,753	2,026	2,015	1,724	-	-	-	-	-
	Gas CC-Max	15,281	13,781	12,291	15,064	14,267	14,982	13,843	13,171	11,754	11,404	10,854	10,706	7,884	8,580	8,461
	Gas CC-Base	14,957	13,342	11,744	14,679	13,680	14,727	13,600	13,028	11,410	10,776	10,019	9,661	7,517	8,389	7,710
	Gas CC-Min	14,599	12,902	11,214	14,274	13,204	13,532	11,970	12,291	10,699	10,118	9,100	8,480	7,238	7,425	6,469
	Gas/Oil CT-Max	394	285	280	420	406	312	531	2,566	2,311	1,818	2,739	2,347	2,140	2,622	2,883
	Gas/Oil CT-Base	358	262	254	373	350	232	499	1,824	1,668	1,202	1,899	1,581	1,682	2,013	1,578
	Gas/Oil CT-Min	327	238	221	330	319	161	433	1,211	1,021	953	1,076	900	896	574	542
	Biomass-Max	777	735	749	654	615	405	408	409	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	612	383	389	398	232	231	166	166	166	166	166
	Biomass-Min	775	733	745	648	606	366	370	378	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	(53)	(106)	(204)	(307)	(464)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,132	17,052	17,009	18,721	19,392	22,290	23,556	24,167	24,205	30,220
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,122	17,044	16,994	17,162	17,081	20,595	20,982	23,708	21,905	24,043
	Wind-Min	11,428	14,233	16,807	16,341	16,272	17,112	17,036	16,993	16,972	16,533	18,380	18,764	23,128	21,261	21,339
	Solar-Max	1,743	1,861	2,167	2,296	3,762	5,127	5,157	6,458	6,633	7,013	7,373	7,308	7,427	9,133	9,348
	Solar-Base	1,743	1,861	2,162	2,296	3,668	4,047	4,074	5,327	5,831	6,644	6,572	6,580	6,363	6,502	8,620
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,776	3,801	4,575	4,621	4,908	5,662	5,694	5,506	5,654	7,321
	Imports-Max	264	432	123	62	65	361	577	958	1,650	1,340	2,130	2,222	3,039	4,866	6,325
	Imports-Base	197	324	95	39	44	167	432	742	1,309	1,102	1,739	1,964	2,843	4,550	4,714
	Imports-Min	135	237	67	21	25	60	187	414	762	794	1,525	1,500	2,273	3,127	2,413
	Exports-Max	12,074	10,939	12,691	16,438	15,931	14,420	13,068	9,587	8,026	7,265	4,795	4,658	1,877	1,755	2,902
	Exports-Base	11,498	10,418	12,404	15,875	14,857	12,056	10,658	7,924	6,468	5,937	3,858	3,340	1,513	887	881
	Exports-Min	10,890	9,944	12,032	15,386	14,417	11,454	10,094	7,469	6,146	5,294	3,121	2,447	1,433	830	501

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 1 9	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	12,331	8,658	8,666	8,658	8,640	8,658	8,666	6,839	3,644
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	0	0
	Coal-Max	9,021	6,253	6,494	7,730	6,312	6,595	7,012	5,195	5,340	3,300	-	-	-	-	-
	Coal-Base	8,793	6,040	6,255	7,405	5,919	2,841	2,588	2,425	2,448	2,160	-	-	-	-	-
	Coal-Min	8,560	5,858	5,936	7,131	5,563	2,012	1,753	2,026	2,015	1,724	-	-	-	-	-
	Gas CC-Max	15,281	13,781	12,291	15,064	14,267	14,982	13,843	13,171	11,754	11,404	10,854	10,706	7,884	8,580	8,461
	Gas CC-Base	14,958	13,342	11,744	14,679	13,680	14,727	13,600	13,028	11,410	10,776	10,019	9,661	7,517	8,389	7,710
	Gas CC-Min	14,602	12,902	11,214	14,274	13,204	13,532	11,970	12,291	10,699	10,118	9,100	8,480	7,238	7,425	6,469
	Gas/Oil CT-Max	394	285	280	420	406	312	531	2,566	2,311	1,818	2,739	2,347	2,140	2,622	2,883
	Gas/Oil CT-Base	358	262	254	373	350	232	499	1,824	1,668	1,202	1,899	1,581	1,682	2,013	1,578
	Gas/Oil CT-Min	327	238	221	330	319	161	433	1,211	1,021	953	1,076	900	896	574	542
	Biomass-Max	777	735	749	654	615	405	408	409	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	612	383	389	398	232	231	166	166	166	166	166
	Biomass-Min	775	733	745	648	606	366	370	378	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	(53)	(106)	(204)	(307)	(464)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,132	17,052	17,009	18,721	19,392	22,290	23,556	24,167	24,205	30,220
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,122	17,044	16,994	17,162	17,081	20,595	20,982	23,708	21,905	24,043
	Wind-Min	11,428	14,233	16,807	16,341	16,272	17,112	17,036	16,993	16,972	16,533	18,380	18,764	23,128	21,261	21,339
	Solar-Max	1,743	1,861	2,167	2,296	3,762	5,127	5,157	6,458	6,633	7,013	7,373	7,308	7,427	9,133	9,348
	Solar-Base	1,743	1,861	2,162	2,296	3,668	4,047	4,074	5,327	5,831	6,644	6,572	6,580	6,363	6,502	8,620
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,776	3,801	4,575	4,621	4,908	5,662	5,694	5,506	5,654	7,321
	Imports-Max	264	432	123	62	65	361	577	958	1,650	1,340	2,130	2,222	3,039	4,866	6,325
	Imports-Base	197	324	95	39	44	167	432	742	1,309	1,102	1,739	1,964	2,843	4,550	4,714
	Imports-Min	135	237	67	21	25	60	187	414	762	794	1,525	1,500	2,273	3,127	2,413
	Exports-Max	12,077	10,939	12,691	16,438	15,931	14,420	13,068	9,587	8,026	7,265	4,795	4,658	1,877	1,755	2,902
	Exports-Base	11,498	10,418	12,404	15,875	14,857	12,056	10,658	7,924	6,468	5,937	3,858	3,340	1,513	887	881
	Exports-Min	10,890	9,944	12,032	15,386	14,417	11,454	10,094	7,469	6,146	5,294	3,121	2,447	1,433	830	501

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 2 0	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	12,331	8,658	8,666	8,658	8,640	8,658	8,666	6,839	3,644
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	0	0
	Coal-Max	9,027	6,251	6,493	7,728	6,312	6,626	6,984	5,076	5,346	5,062	2,118	2,246	1,835	1,930	2,263
	Coal-Base	8,794	6,040	6,255	7,405	5,919	2,835	2,584	2,420	2,441	2,178	186	178	194	99	305
	Coal-Min	8,560	5,881	5,924	7,131	5,563	2,009	1,749	2,028	2,017	1,732	-	-	-	-	-
	Gas CC-Max	15,276	13,790	12,287	15,070	14,267	14,982	13,862	13,315	11,836	11,797	11,167	10,738	7,875	8,651	8,901
	Gas CC-Base	14,957	13,342	11,744	14,679	13,680	14,633	13,495	12,971	11,319	11,241	9,907	9,607	7,313	8,050	8,180
	Gas CC-Min	14,602	12,896	11,226	14,266	13,204	13,662	12,164	12,190	10,588	10,490	9,064	8,575	6,991	7,796	6,886
	Gas/Oil CT-Max	394	285	280	420	406	320	546	2,670	2,366	1,895	2,047	1,755	1,604	2,030	2,588
	Gas/Oil CT-Base	358	262	254	373	350	222	496	1,812	1,648	1,300	1,519	1,254	1,125	1,506	1,680
	Gas/Oil CT-Min	327	238	222	330	316	159	422	992	836	697	891	737	662	636	582
	Biomass-Max	777	735	749	654	614	405	408	409	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	612	382	389	398	232	231	166	166	166	166	166
	Biomass-Min	775	733	745	648	606	365	370	378	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	(70)	(203)	(326)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,132	17,051	17,018	18,917	18,688	21,743	22,485	24,176	23,389	29,077
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,123	17,044	16,994	17,360	16,942	20,610	21,001	24,176	22,396	22,700
	Wind-Min	11,428	14,233	16,807	16,341	16,271	17,112	17,037	16,974	16,960	16,544	16,460	17,223	22,400	20,509	20,554
	Solar-Max	1,743	1,861	2,167	2,296	3,762	5,296	5,328	6,549	6,941	6,968	7,479	7,434	7,279	8,432	8,990
	Solar-Base	1,743	1,861	2,162	2,296	3,668	4,230	4,258	5,506	5,909	5,927	6,650	6,652	6,387	6,856	8,099
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,689	3,712	4,299	4,336	4,349	5,427	5,457	5,296	5,427	6,541
	Imports-Max	264	432	124	62	65	322	577	958	1,662	1,332	2,027	2,172	3,158	4,913	6,570
	Imports-Base	197	324	95	39	44	152	418	716	1,268	1,005	1,825	1,979	3,045	4,603	5,800
	Imports-Min	135	237	67	21	25	59	187	428	775	636	1,153	1,205	2,198	3,260	2,459
	Exports-Max	12,077	10,955	12,693	16,435	15,931	14,598	13,262	9,301	7,965	8,277	6,011	5,523	2,332	1,496	2,352
	Exports-Base	11,498	10,418	12,404	15,875	14,857	12,116	10,718	8,004	6,490	6,679	3,801	3,334	1,280	690	491
	Exports-Min	10,892	9,952	12,027	15,389	14,412	11,454	10,094	7,469	6,007	6,287	3,382	2,774	1,280	690	491

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 2 1	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	12,331	8,658	8,666	8,658	8,640	8,658	8,666	8,658	8,640
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
	Coal-Max	9,032	6,320	6,493	7,723	6,312	6,661	7,010	5,195	5,329	3,299	-	-	-	-	-
	Coal-Base	8,795	6,040	6,252	7,407	5,921	2,845	2,592	2,425	2,453	2,181	-	-	-	-	-
	Coal-Min	8,559	5,906	5,930	7,131	5,563	2,010	1,750	2,029	2,018	1,725	-	-	-	-	-
	Gas CC-Max	15,276	13,773	12,279	15,078	14,264	15,061	13,928	13,295	11,927	11,488	11,155	10,768	8,286	8,795	8,773
	Gas CC-Base	14,957	13,339	11,748	14,677	13,678	14,814	13,716	13,077	11,527	11,453	10,179	9,547	7,732	7,876	8,103
	Gas CC-Min	14,602	12,864	11,219	14,273	13,202	13,574	12,074	12,294	10,644	10,166	9,023	8,423	7,234	7,483	7,366
	Gas/Oil CT-Max	394	285	280	420	404	317	542	2,642	2,390	1,818	2,513	2,558	2,549	2,468	2,621
	Gas/Oil CT-Base	358	264	254	373	351	232	504	1,912	1,694	1,765	1,948	1,582	1,764	1,423	1,504
	Gas/Oil CT-Min	327	238	222	330	316	161	425	1,001	841	737	1,072	893	896	663	701
	Biomass-Max	777	735	749	654	615	405	408	409	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	612	383	389	398	232	231	166	166	166	166	166
	Biomass-Min	775	733	745	648	606	365	370	378	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	(14)	(27)
	Battery-Min	-	-	-	-	-	-	-	-	-	(14)	(54)	(107)	(204)	(209)	(229)
1	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,131	17,051	17,017	18,721	19,391	22,465	23,715	24,075	23,795	24,770
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,121	17,043	16,994	16,969	16,555	20,432	21,547	23,570	21,764	21,754
	Wind-Min	11,428	14,233	16,807	16,341	16,272	17,112	17,037	16,983	16,960	16,553	17,630	18,781	21,964	20,027	19,995
	Solar-Max	1,743	1,861	2,167	2,296	3,852	5,210	5,241	6,458	6,941	7,355	7,355	7,293	7,426	8,009	7,969
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,864	3,889	5,148	5,656	5,670	6,334	6,306	6,149	6,888	6,989
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,780	3,805	4,393	4,433	4,902	5,501	5,529	5,388	5,511	5,537
	Imports-Max	264	427	123	62	65	322	577	966	1,662	1,331	2,005	2,218	3,029	3,922	4,111
	Imports-Base	197	323	95	39	44	184	445	760	1,353	939	1,761	2,032	2,784	3,515	3,509
	Imports-Min	135	237	67	21	25	60	185	413	778	908	1,490	1,577	2,371	2,635	2,346
	Exports-Max	12,076	10,949	12,691	16,438	15,926	14,540	13,186	9,589	7,914	7,139	5,274	4,561	2,380	1,724	2,018
	Exports-Base	11,499	10,416	12,405	15,875	14,858	11,980	10,609	7,895	6,484	6,937	3,944	3,128	1,627	1,057	1,128
	Exports-Min	10,896	9,999	12,019	15,393	14,406	11,375	10,035	7,384	6,075	5,288	3,030	2,373	1,539	977	986

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 2 2	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	12,331	8,658	8,666	8,658	8,640	8,658	8,666	8,658	8,640
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
	Coal-Max	9,032	6,320	6,493	7,723	6,312	6,661	7,010	5,195	5,410	3,304	3,814	3,804	3,181	3,760	3,801
	Coal-Base	8,795	6,037	6,254	7,405	5,920	2,846	2,592	2,425	2,453	2,188	2,592	2,620	2,251	2,532	2,558
	Coal-Min	8,559	5,906	5,930	7,131	5,563	2,051	1,755	2,029	2,019	1,727	2,058	2,043	1,750	1,985	1,998
	Gas CC-Max	15,276	13,773	12,279	15,078	14,264	15,074	13,948	13,175	11,723	11,453	11,136	10,715	7,862	8,199	8,253
	Gas CC-Base	14,957	13,342	11,747	14,679	13,679	14,807	13,712	13,076	11,490	11,428	10,131	9,708	7,487	7,907	7,970
	Gas CC-Min	14,602	12,864	11,219	14,273	13,202	13,574	12,074	12,294	10,661	10,200	9,060	8,615	6,864	7,328	7,515
	Gas/Oil CT-Max	394	285	280	420	404	317	542	2,520	2,309	1,882	1,952	1,612	1,635	1,487	1,836
	Gas/Oil CT-Base	358	264	254	373	349	232	504	1,912	1,695	1,561	1,506	1,264	1,066	1,183	1,225
	Gas/Oil CT-Min	327	238	222	330	316	162	441	1,162	1,005	960	997	859	704	667	714
	Biomass-Max	777	735	749	654	615	405	408	409	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	612	383	389	398	232	231	166	166	166	166	166
	Biomass-Min	775	733	745	648	606	367	371	378	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	(33)	(28)	(27)
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	(55)	(108)	(122)
2	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,130	17,054	17,007	18,913	19,195	20,520	21,264	23,914	22,131	22,274
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,121	17,043	16,994	17,361	16,944	19,471	20,041	23,541	21,724	21,693
	Wind-Min	11,428	14,233	16,807	16,341	16,272	17,112	17,037	16,973	16,954	16,539	16,452	17,401	21,853	19,953	19,926
	Solar-Max	1,743	1,861	2,167	2,296	3,765	5,041	5,071	6,466	6,710	7,020	7,330	7,271	7,021	7,258	7,286
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,864	3,889	5,148	5,465	5,479	6,145	6,152	5,922	6,035	6,059
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,780	3,805	5,138	5,146	5,388	5,984	5,981	5,773	5,872	5,894
	Imports-Max	264	427	123	62	66	363	584	958	1,650	1,340	1,336	1,417	2,328	2,866	3,046
	Imports-Base	197	323	95	39	44	184	445	760	1,356	1,075	1,062	1,159	2,004	2,388	2,571
	Imports-Min	135	237	67	21	25	60	185	413	736	899	816	881	1,683	2,001	2,009
	Exports-Max	12,076	10,949	12,691	16,438	15,926	14,540	13,186	9,589	8,160	7,274	7,177	6,376	2,896	2,211	2,372
2	Exports-Base	11,499	10,416	12,405	15,875	14,856	11,975	10,605	7,894	6,448	6,631	5,342	4,747	2,102	1,545	1,515
	Exports-Min	10,896	9,999	12,019	15,393	14,331	11,305	9,973	7,469	6,024	5,309	4,700	3,962	1,863	1,344	1,342

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 2 3	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	12,331	8,658	8,666	8,658	8,640	8,658	8,666	8,658	8,640
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	0	-	-	-	-	-	0
	Coal-Max	9,032	6,320	6,493	7,723	6,312	6,662	7,009	5,194	5,344	5,060	2,161	2,246	1,751	1,821	2,048
	Coal-Base	8,794	6,032	6,252	7,426	5,929	2,841	2,588	2,425	2,451	2,190	185	178	182	127	189
	Coal-Min	8,559	5,906	5,930	7,131	5,563	2,009	1,749	2,028	2,017	1,732	-	-	-	-	-
	Gas CC-Max	15,276	13,773	12,279	15,078	14,265	15,061	13,928	13,177	11,565	11,544	11,230	10,773	8,543	8,906	8,885
	Gas CC-Base	14,957	13,339	11,747	14,658	13,763	14,724	13,589	13,023	11,481	11,435	10,067	9,759	7,515	7,967	8,062
	Gas CC-Min	14,602	12,864	11,219	14,273	13,202	13,575	12,079	12,293	10,611	10,522	9,197	8,656	7,144	7,643	7,833
	Gas/Oil CT-Max	394	285	280	420	405	317	542	2,516	2,288	1,812	1,990	1,649	1,635	1,605	1,690
	Gas/Oil CT-Base	358	263	254	373	361	232	498	1,825	1,692	1,328	1,562	1,309	1,432	1,246	1,269
	Gas/Oil CT-Min	327	238	222	330	316	159	422	992	840	696	896	734	655	735	772
	Biomass-Max	777	735	749	654	615	405	408	409	232	231	167	166	166	166	166
	Biomass-Base	775	734	748	651	612	383	389	398	232	231	166	166	166	166	166
	Biomass-Min	775	733	745	648	606	365	370	378	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	(70)	(110)	(119)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,131	17,052	17,004	18,913	18,682	21,718	22,297	24,018	22,381	23,380
	Wind-Base	11,429	14,239	16,868	16,344	16,292	17,125	17,046	17,001	16,976	16,561	20,434	20,824	23,750	21,923	21,899
	Wind-Min	11,428	14,233	16,807	16,341	16,272	17,112	17,037	16,973	16,954	16,539	16,470	17,617	21,436	19,478	19,448
	Solar-Max	1,743	1,861	2,167	2,296	3,762	5,296	5,328	6,542	6,946	6,969	7,525	7,512	7,260	7,464	7,492
	Solar-Base	1,743	1,861	2,162	2,296	3,571	4,056	4,083	5,320	5,740	5,754	6,494	6,502	6,274	6,489	6,507
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,780	3,805	5,148	5,322	5,331	6,142	6,151	6,023	6,127	6,152
	Imports-Max	264	427	123	62	65	322	577	958	1,650	1,331	2,057	2,252	3,269	4,101	4,346
	Imports-Base	197	323	95	39	44	159	424	728	1,282	1,013	1,806	1,959	2,820	3,736	3,880
	Imports-Min	135	237	67	21	25	60	185	413	772	636	1,112	1,171	2,209	2,944	2,593
	Exports-Max	12,076	10,949	12,691	16,438	15,930	14,542	13,190	9,588	7,946	8,262	6,222	5,547	2,441	1,672	1,652
	Exports-Base	11,498	10,407	12,405	15,875	14,967	12,141	10,734	8,008	6,646	6,854	3,914	3,454	1,522	975	965
	Exports-Min	10,896	9,999	12,019	15,393	14,406	11,375	10,035	7,469	6,073	6,227	3,333	2,788	1,306	868	834

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 2 4	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	12,331	8,658	8,666	8,658	8,640	8,658	8,666	8,658	8,640
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	0	-	-	-	-	-	-
	Coal-Max	9,032	6,320	6,493	7,723	6,308	6,609	7,019	5,107	5,348	5,061	5,787	5,969	4,901	5,544	5,704
	Coal-Base	8,794	6,032	6,253	7,426	5,918	2,841	2,588	2,424	2,447	2,186	2,769	2,785	2,420	2,663	2,717
	Coal-Min	8,559	5,906	5,930	7,131	5,571	2,057	1,755	2,033	2,020	1,736	2,063	2,042	1,763	1,995	2,006
	Gas CC-Max	15,276	13,773	12,279	15,078	14,270	15,098	13,971	13,272	11,757	11,708	11,168	10,690	8,231	8,424	8,514
	Gas CC-Base	14,957	13,339	11,747	14,658	13,688	14,727	13,600	13,004	11,417	11,343	10,083	9,608	7,309	7,630	7,772
	Gas CC-Min	14,602	12,864	11,219	14,273	13,202	13,572	12,047	12,235	10,588	10,490	8,875	8,395	6,559	7,051	7,204
	Gas/Oil CT-Max	394	285	280	420	406	314	537	2,610	2,357	1,884	1,879	1,557	1,365	1,212	1,256
	Gas/Oil CT-Base	358	263	254	373	349	232	499	1,815	1,671	1,312	1,429	1,162	1,010	887	916
	Gas/Oil CT-Min	327	238	222	330	316	162	443	1,079	962	769	888	776	651	569	604
	Biomass-Max	777	735	749	654	614	405	408	409	232	231	167	166	166	166	166
	Biomass-Base	775	734	748	651	612	383	389	398	232	231	166	166	166	166	166
	Biomass-Min	775	733	745	648	607	367	371	378	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(15)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,131	17,051	17,013	18,908	18,487	20,731	21,123	23,792	22,029	21,997
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,122	17,044	16,986	16,966	16,549	19,079	19,831	23,305	21,506	21,474
	Wind-Min	11,428	14,233	16,807	16,341	16,272	17,112	17,036	16,970	16,951	16,536	16,445	16,261	21,363	19,442	19,409
	Solar-Max	1,743	1,861	2,167	2,296	3,762	5,209	5,240	6,549	7,108	7,129	7,381	7,319	7,037	7,199	7,207
	Solar-Base	1,743	1,861	2,162	2,296	3,668	4,047	4,074	5,421	5,923	5,940	6,505	6,497	6,231	6,352	6,373
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,687	3,708	5,054	5,316	5,333	5,953	5,959	5,751	5,843	5,868
	Imports-Max	264	427	123	62	65	424	636	958	1,650	1,331	1,327	1,404	2,327	3,022	3,254
	Imports-Base	197	323	95	39	44	167	432	742	1,311	1,044	993	1,091	1,952	2,612	2,705
	Imports-Min	135	237	67	21	25	60	175	423	772	638	510	476	1,211	1,465	1,423
	Exports-Max	12,076	10,949	12,691	16,438	15,930	14,479	13,158	9,379	7,946	8,263	8,330	8,229	3,809	3,127	3,153
	Exports-Base	11,498	10,407	12,404	15,875	14,862	12,056	10,658	7,877	6,480	6,661	5,523	4,803	2,109	1,474	1,452
	Exports-Min	10,896	9,999	12,019	15,393	14,406	11,334	9,999	7,467	6,021	6,256	4,717	4,119	1,873	1,279	1,247

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 2 5	Nuclear-Base	14,053	13,576	14,013	13,576	12,626	8,188	5,373	4,918	5,388	4,918	3,691	-	-	-	-
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	0	0	0	0	0	0	0
	Coal-Max	9,047	6,252	6,497	7,724	6,502	7,430	7,971	5,430	5,562	3,229	-	-	-	-	-
	Coal-Base	8,798	6,036	6,246	7,426	6,215	2,909	2,684	2,409	2,441	2,127	-	-	-	-	-
	Coal-Min	8,562	5,893	5,936	7,136	5,897	2,054	1,822	2,027	2,016	1,716	-	-	-	-	-
	Gas CC-Max	15,278	13,791	12,278	15,074	14,661	16,032	15,159	13,517	11,655	11,409	10,668	10,913	9,629	9,413	9,240
	Gas CC-Base	14,952	13,343	11,763	14,658	14,131	15,599	14,727	13,175	11,587	11,279	9,963	10,229	9,249	9,327	9,240
	Gas CC-Min	14,598	12,870	11,213	14,276	13,727	14,934	13,838	12,851	10,818	10,214	9,347	9,090	8,091	7,410	7,275
	Gas/Oil CT-Max	394	285	280	420	424	340	651	2,749	2,689	2,408	3,446	3,765	3,694	3,590	3,597
	Gas/Oil CT-Base	358	264	254	373	364	225	549	2,409	2,326	1,708	2,353	2,416	2,901	2,828	2,882
	Gas/Oil CT-Min	327	236	222	330	341	160	466	1,634	1,390	1,173	1,401	1,267	1,253	942	903
	Biomass-Max	776	735	749	654	615	407	409	410	232	231	167	166	166	166	166
	Biomass-Base	776	734	747	651	613	387	395	398	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	607	370	376	375	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	(163)	(165)	(247)	(272)	(299)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,147	17,068	17,032	20,128	20,823	24,589	27,592	28,074	29,556	30,709
	Wind-Base	11,429	14,239	16,868	16,344	16,291	17,146	17,068	17,032	17,012	17,753	22,860	24,536	24,394	22,324	22,284
	Wind-Min	11,428	14,233	16,807	16,341	16,279	17,143	17,067	17,027	17,005	16,571	21,144	21,965	23,462	21,416	21,375
	Solar-Max	1,743	1,861	2,167	2,296	3,763	5,812	5,877	6,995	7,464	8,116	8,570	9,157	9,439	9,463	9,413
	Solar-Base	1,743	1,861	2,162	2,296	3,763	5,658	5,720	6,547	6,578	6,944	7,383	7,502	7,471	7,633	7,675
	Solar-Min	1,743	1,860	2,157	2,295	2,518	4,547	4,580	5,541	5,648	6,300	6,418	6,514	6,665	7,383	7,509
	Imports-Max	264	432	123	62	82	915	1,623	1,449	2,252	2,062	3,488	5,235	6,400	7,757	8,025
	Imports-Base	197	323	95	39	55	572	1,147	1,070	1,697	1,594	3,039	4,835	5,673	7,237	7,551
	Imports-Min	135	237	67	21	35	196	502	624	1,100	1,519	2,735	3,566	4,108	3,772	3,404
	Exports-Max	12,075	10,940	12,691	16,440	15,120	12,225	10,172	8,456	7,267	5,600	3,258	1,548	1,349	1,577	1,909
	Exports-Base	11,497	10,416	12,413	15,875	14,206	9,729	7,447	6,977	6,148	5,468	2,351	851	754	349	326
	Exports-Min	10,912	9,954	12,022	15,389	13,714	8,939	6,703	6,190	4,859	4,111	1,563	821	564	299	266

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 2 6	Nuclear-Base	14,053	13,576	14,013	13,576	12,626	8,188	5,373	4,918	5,388	4,918	3,691	-	-	-	-
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	0	-	0	-	0	0	0
	Coal-Max	9,047	6,252	6,497	7,724	6,502	7,617	7,992	5,424	5,613	3,229	3,785	3,839	3,308	3,879	3,919
	Coal-Base	8,794	6,040	6,247	7,424	6,225	2,935	2,749	2,433	2,454	2,117	2,591	2,651	2,316	2,578	2,599
	Coal-Min	8,562	5,893	5,936	7,136	5,897	2,055	1,822	2,018	2,013	1,717	2,028	2,036	1,750	1,990	2,007
	Gas CC-Max	15,278	13,791	12,278	15,074	14,661	16,000	15,152	13,518	11,794	11,926	10,834	10,748	9,395	9,375	9,276
	Gas CC-Base	14,958	13,347	11,762	14,660	14,168	15,949	15,098	13,514	11,794	10,926	10,330	10,227	9,249	8,792	8,638
	Gas CC-Min	14,598	12,870	11,213	14,276	13,727	14,978	13,896	12,878	10,960	10,212	9,256	9,369	8,376	7,821	7,830
	Gas/Oil CT-Max	394	285	280	420	424	342	1,300	3,265	2,869	2,605	2,773	2,936	2,990	2,940	2,918
	Gas/Oil CT-Base	358	255	254	373	367	240	566	2,712	2,424	1,634	2,185	2,053	2,298	1,886	1,835
	Gas/Oil CT-Min	327	236	222	330	341	160	466	1,791	1,628	1,173	1,319	1,256	1,218	941	934
	Biomass-Max	776	735	748	654	615	407	409	410	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	613	389	396	399	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	607	370	376	376	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(11)
	Battery-Min	-	-	-	-	-	-	-	-	-	-	(68)	(63)	(155)	(185)	(203)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,147	17,068	17,033	20,137	20,838	23,655	25,073	26,183	27,075	27,671
	Wind-Base	11,429	14,240	16,868	16,344	16,294	17,146	17,068	17,032	17,402	19,087	21,460	23,972	24,285	22,261	22,226
	Wind-Min	11,428	14,233	16,807	16,341	16,279	17,143	17,067	17,029	17,003	16,570	19,382	21,557	23,597	21,562	21,522
	Solar-Max	1,743	1,861	2,167	2,296	3,763	5,755	5,808	6,904	7,377	7,941	7,823	8,532	8,682	8,810	8,827
	Solar-Base	1,743	1,861	2,162	2,296	3,669	4,723	4,760	5,540	5,845	6,726	6,649	6,739	6,951	8,056	8,353
	Solar-Min	1,743	1,860	2,157	2,295	2,518	4,538	4,569	5,448	5,482	6,061	6,546	6,601	6,461	6,645	6,772
	Imports-Max	264	432	123	62	82	986	1,774	1,451	2,313	2,053	2,673	4,510	5,663	6,916	7,307
	Imports-Base	197	324	95	39	55	697	1,297	1,163	1,898	1,900	2,212	3,873	4,935	6,066	6,252
	Imports-Min	135	237	67	21	35	196	411	577	1,020	1,445	1,790	3,047	3,664	3,293	3,128
	Exports-Max	12,075	10,940	12,691	16,440	15,120	12,365	10,686	8,854	7,725	5,914	4,573	2,344	1,322	1,448	1,629
	Exports-Base	11,500	10,416	12,414	15,875	14,261	9,226	7,004	6,713	5,642	4,239	3,308	1,194	741	372	346
	Exports-Min	10,912	9,954	12,022	15,389	13,714	8,664	6,487	6,095	5,036	4,112	2,361	1,021	735	368	319

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 2 7	Nuclear-Base	14,053	13,576	14,013	13,576	12,626	8,188	5,373	4,918	5,388	4,918	3,691	-	-	-	-
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	0	-	0	0	0	0	0
	Coal-Max	9,047	6,252	6,497	7,724	6,502	7,655	7,998	5,439	5,508	5,137	1,951	2,332	2,322	2,108	2,392
	Coal-Base	8,798	6,036	6,246	7,426	6,219	2,909	2,683	2,417	2,445	2,135	99	175	172	98	315
	Coal-Min	8,562	5,893	5,936	7,136	5,897	2,055	1,822	2,027	2,016	1,732	-	-	-	-	-
	Gas CC-Max	15,278	13,791	12,278	15,074	14,661	15,977	15,133	13,517	11,716	11,872	10,593	10,950	9,669	9,682	9,387
	Gas CC-Base	14,952	13,343	11,763	14,658	14,181	15,555	14,684	13,043	11,202	11,341	9,895	10,231	9,122	9,098	8,870
	Gas CC-Min	14,598	12,870	11,213	14,276	13,727	14,963	13,932	12,873	10,782	10,663	9,461	9,420	8,357	7,772	7,978
	Gas/Oil CT-Max	394	285	280	420	424	345	661	2,774	2,361	2,207	2,759	2,983	3,011	3,098	3,046
	Gas/Oil CT-Base	358	264	254	373	367	223	548	1,791	1,627	1,299	1,799	2,111	2,345	2,323	2,093
	Gas/Oil CT-Min	327	236	222	330	341	160	466	1,634	1,397	1,162	1,417	1,321	1,294	1,004	1,024
	Biomass-Max	776	735	749	654	615	407	409	410	232	231	167	166	166	166	166
	Biomass-Base	776	734	747	651	613	387	395	397	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	607	370	376	375	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	(82)	(79)	(167)	(189)	(189)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,147	17,069	17,032	20,319	20,456	24,301	26,619	27,530	28,827	28,811
	Wind-Base	11,429	14,239	16,868	16,344	16,294	17,146	17,068	17,030	17,009	16,581	22,445	23,959	24,310	22,253	22,640
	Wind-Min	11,428	14,233	16,807	16,341	16,279	17,143	17,067	17,030	17,004	16,581	20,552	21,575	23,807	21,759	21,720
	Solar-Max	1,743	1,861	2,167	2,296	3,763	5,738	5,803	7,165	7,463	7,509	8,012	8,515	8,626	8,741	8,778
	Solar-Base	1,743	1,861	2,162	2,296	3,669	5,738	5,803	6,904	7,376	7,423	7,822	7,938	7,885	8,203	8,402
	Solar-Min	1,743	1,860	2,157	2,295	2,518	4,519	4,549	5,540	5,551	5,577	6,498	6,610	6,575	6,676	6,790
	Imports-Max	264	432	123	62	82	915	1,671	1,449	2,253	1,964	3,571	5,233	6,358	8,055	8,236
	Imports-Base	197	323	95	39	55	573	1,147	1,242	2,005	1,764	3,294	4,982	6,037	7,596	7,547
	Imports-Min	135	237	67	21	35	198	514	642	1,171	1,105	2,448	3,630	4,017	3,673	3,716
	Exports-Max	12,075	10,940	12,691	16,440	15,120	12,297	10,125	8,339	6,921	6,786	3,499	1,951	1,298	1,483	1,484
	Exports-Base	11,497	10,416	12,413	15,875	14,267	9,679	7,400	6,389	5,341	5,305	1,999	833	534	217	212
	Exports-Min	10,912	9,954	12,022	15,389	13,807	8,868	6,650	6,246	4,832	4,733	1,614	732	533	217	192

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 2 8	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	12,331	8,658	8,666	8,658	8,640
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
	Coal-Max	9,022	6,309	6,496	7,716	6,313	6,663	6,826	4,759	4,989	3,148	3,721	3,771	3,198	3,774	3,812
	Coal-Base	8,794	6,040	6,250	7,407	5,921	2,848	2,590	2,426	2,454	2,115	2,600	2,627	2,250	2,539	2,564
	Coal-Min	8,560	5,896	5,943	7,136	5,564	2,057	1,756	2,033	2,023	1,733	2,037	2,041	1,752	1,988	1,997
	Gas CC-Max	15,287	13,769	12,281	15,080	14,260	15,193	13,698	12,512	10,967	11,058	10,176	10,615	7,768	8,060	8,165
	Gas CC-Base	14,956	13,355	11,744	14,677	13,673	14,849	13,366	12,512	10,967	10,421	10,176	9,679	7,410	7,813	7,915
	Gas CC-Min	14,599	12,878	11,211	14,271	13,203	13,570	11,514	11,481	9,889	9,896	9,261	8,819	7,046	7,397	7,564
	Gas/Oil CT-Max	394	285	280	420	405	317	539	1,173	1,012	1,263	1,666	1,572	1,674	1,769	1,918
	Gas/Oil CT-Base	358	255	254	373	349	233	510	1,173	1,009	767	1,526	1,314	1,335	1,183	1,220
	Gas/Oil CT-Min	327	238	223	330	316	162	443	391	291	288	883	764	927	685	746
	Biomass-Max	777	735	749	654	615	405	408	408	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	612	383	388	394	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	606	367	371	371	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(14)
	Battery-Min	-	-	-	-	-	-	-	-	-	-	(17)	(34)	(125)	(130)	(132)
8	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,130	17,047	17,004	18,112	18,045	18,539	22,013	23,939	22,167	22,328
	Wind-Base	11,429	14,240	16,868	16,344	16,288	17,123	17,041	17,004	16,969	16,713	17,563	20,817	23,524	21,724	21,715
	Wind-Min	11,428	14,233	16,807	16,341	16,271	17,112	17,029	16,930	16,868	16,486	16,334	17,575	22,012	20,122	20,092
	Solar-Max	1,743	1,861	2,167	2,296	3,765	3,955	3,979	5,283	5,592	6,112	6,526	6,568	6,359	7,080	7,088
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,780	3,803	3,805	4,116	5,236	5,193	5,438	5,764	5,883	5,909
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,776	3,797	3,805	3,832	4,234	4,991	5,209	5,190	5,303	5,323
	Imports-Max	264	427	123	62	66	439	380	540	920	677	790	1,679	2,466	3,004	3,125
	Imports-Base	197	324	95	39	45	184	185	272	484	411	505	1,135	1,905	2,486	2,624
	Imports-Min	135	237	67	21	25	60	73	151	260	340	428	893	1,640	1,933	1,918
	Exports-Max	12,074	10,951	12,697	16,438	15,925	14,538	14,032	12,244	10,975	10,137	9,370	5,981	3,094	2,490	2,545
	Exports-Base	11,496	10,424	12,399	15,875	14,853	12,022	11,682	11,033	9,762	9,187	8,639	4,713	2,155	1,521	1,491
	Exports-Min	10,897	9,984	12,023	15,388	14,324	11,269	10,925	9,475	8,263	8,195	6,703	3,518	1,702	1,202	1,212

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 2 9	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	12,331	8,658	8,666	8,658	8,640
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
	Coal-Max	9,022	6,309	6,496	7,716	6,312	6,663	6,830	4,655	4,770	4,547	1,948	1,952	1,727	1,815	2,000
	Coal-Base	8,794	6,040	6,250	7,407	5,921	2,845	2,588	2,409	2,432	2,116	184	179	182	127	215
	Coal-Min	8,564	5,877	5,938	7,132	5,568	2,057	1,756	2,033	2,023	1,737	-	-	-	-	-
	Gas CC-Max	15,287	13,769	12,281	15,080	14,268	15,233	13,770	12,510	10,908	11,013	10,569	10,747	8,156	8,739	8,624
	Gas CC-Base	14,956	13,355	11,744	14,677	13,673	14,809	13,323	11,963	10,270	10,305	9,365	8,534	7,685	8,100	8,244
	Gas CC-Min	14,593	12,897	11,212	14,225	13,202	13,574	11,502	11,085	9,385	9,313	9,229	8,534	7,179	7,737	7,799
	Gas/Oil CT-Max	394	285	280	420	406	317	539	1,173	1,007	806	1,660	1,649	1,817	1,674	1,662
	Gas/Oil CT-Base	358	255	254	373	349	232	505	455	359	304	990	823	1,428	1,270	1,282
	Gas/Oil CT-Min	327	238	222	330	318	162	443	391	292	233	951	789	947	741	775
	Biomass-Max	777	735	749	654	615	405	408	407	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	612	383	388	391	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	606	367	370	371	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	(16)	(44)	(121)	(110)	(120)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,132	17,048	17,004	17,160	17,067	19,661	23,406	24,022	22,345	23,547
	Wind-Base	11,429	14,240	16,868	16,344	16,288	17,124	17,041	16,943	17,069	16,691	19,131	23,406	23,249	21,391	21,364
	Wind-Min	11,428	14,233	16,807	16,341	16,271	17,112	17,029	16,930	16,866	16,492	16,398	18,381	22,265	20,348	20,326
	Solar-Max	1,743	1,861	2,167	2,296	3,765	4,047	4,070	5,274	5,592	5,608	6,608	6,672	6,487	7,383	7,353
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,872	3,895	5,189	5,494	5,512	6,578	6,468	6,465	6,602	6,621
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,776	3,797	3,805	4,026	4,042	5,025	5,337	5,707	5,841	6,022
	Imports-Max	264	427	123	62	66	424	368	540	920	716	1,293	2,441	3,144	4,121	4,381
	Imports-Base	197	324	95	39	45	176	179	398	687	541	1,120	2,441	2,786	3,751	3,834
	Imports-Min	135	237	67	21	25	60	73	238	372	291	607	1,352	2,249	2,967	2,604
	Exports-Max	12,072	10,953	12,691	16,427	15,932	14,541	14,029	11,199	9,930	10,133	7,934	4,527	2,197	1,588	1,616
	Exports-Base	11,496	10,424	12,399	15,875	14,853	12,062	11,718	9,880	8,553	8,793	5,508	2,055	1,695	1,075	1,073
	Exports-Min	10,897	9,984	12,023	15,388	14,324	11,314	11,000	9,477	8,264	8,421	5,202	2,055	1,496	983	965

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 3 0	Nuclear-Base	14,053	13,576	14,013	13,576	12,626	8,188	5,373	4,918	5,388	4,918	5,373	4,918	5,388	4,918	5,373
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	0	-	0	-	-	0	0
	Coal-Max	9,054	6,305	6,496	7,721	6,505	7,814	8,044	5,456	5,624	3,242	-	-	-	-	-
	Coal-Base	8,794	6,040	6,247	7,424	6,220	2,929	2,743	2,415	2,415	2,117	-	-	-	-	-
	Coal-Min	8,565	5,897	5,937	7,136	5,897	2,055	1,822	2,027	2,017	1,723	-	-	-	-	-
	Gas CC-Max	15,269	13,779	12,277	15,072	14,652	16,037	15,182	13,518	12,004	12,038	11,289	11,080	8,837	9,278	9,038
	Gas CC-Base	14,958	13,347	11,762	14,660	14,179	15,841	14,952	13,268	11,467	11,097	9,820	9,574	7,971	8,593	8,348
	Gas CC-Min	14,592	12,873	11,211	14,282	13,691	15,257	14,186	12,999	10,814	10,170	9,099	9,023	7,720	7,449	7,216
	Gas/Oil CT-Max	394	285	280	420	424	1,090	1,437	3,546	2,952	2,703	3,068	3,047	3,039	2,947	3,045
	Gas/Oil CT-Base	358	255	254	373	367	234	558	2,539	2,262	1,607	1,837	1,791	1,985	1,834	1,816
	Gas/Oil CT-Min	327	236	222	330	342	160	466	1,634	1,344	1,013	1,448	1,280	1,277	923	929
	Biomass-Max	777	735	749	654	615	408	409	410	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	613	388	396	398	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	607	370	376	376	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	(35)	(81)	(175)	(182)	(202)
	Wind-Max	11,430	14,244	16,916	16,345	16,322	17,147	17,068	17,031	19,923	20,605	23,842	24,527	24,581	26,119	26,835
	Wind-Base	11,429	14,240	16,868	16,344	16,294	17,146	17,068	17,030	17,200	17,734	22,614	23,345	24,334	22,389	22,348
	Wind-Min	11,428	14,233	16,807	16,341	16,279	17,143	17,067	17,023	17,001	16,568	18,433	19,788	22,264	20,279	20,228
	Solar-Max	1,743	1,861	2,167	2,296	3,763	5,739	5,802	7,169	7,466	8,116	7,908	7,984	8,235	8,629	8,532
	Solar-Base	1,743	1,861	2,162	2,296	3,669	5,097	5,141	6,278	6,761	7,387	7,149	7,162	7,010	7,229	7,454
	Solar-Min	1,743	1,860	2,157	2,295	2,518	3,875	3,899	4,884	5,205	5,691	6,025	6,062	5,921	6,287	6,304
	Imports-Max	264	427	123	62	82	1,022	1,858	1,521	2,257	2,088	2,873	3,290	4,091	5,446	5,434
	Imports-Base	197	324	95	39	55	642	1,223	1,132	1,852	1,766	2,692	2,907	3,674	4,996	4,931
	Imports-Min	135	237	67	21	35	161	437	628	1,114	1,587	2,280	2,605	3,300	3,038	2,699
	Exports-Max	12,072	10,947	12,691	16,436	15,114	12,787	10,551	8,707	7,337	5,629	3,667	3,008	1,669	1,448	1,744
	Exports-Base	11,500	10,416	12,414	15,875	14,266	9,425	7,151	6,608	5,416	4,640	2,326	1,790	1,073	583	626
	Exports-Min	10,912	9,989	12,020	15,385	13,718	8,558	6,377	5,870	4,707	3,887	1,858	1,402	974	566	585

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 3 1	Nuclear-Base	14,053	13,576	14,013	13,576	12,626	8,188	5,373	4,918	5,388	4,918	5,373	4,918	5,388	4,918	5,373
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	0	-	0	-	-	0	0
	Coal-Max	9,054	6,305	6,496	7,721	6,505	7,814	8,044	5,456	5,624	3,242	-	-	-	-	-
	Coal-Base	8,798	6,040	6,247	7,424	6,220	2,929	2,743	2,415	2,415	2,117	-	-	-	-	-
	Coal-Min	8,560	5,897	5,937	7,136	5,897	2,055	1,822	2,027	2,017	1,723	-	-	-	-	-
	Gas CC-Max	15,269	13,779	12,277	15,072	14,652	16,037	15,182	13,518	12,004	12,038	11,289	11,080	8,837	9,278	9,038
	Gas CC-Base	14,952	13,347	11,762	14,660	14,179	15,841	14,952	13,268	11,467	11,097	9,820	9,574	7,971	8,593	8,348
	Gas CC-Min	14,599	12,873	11,211	14,282	13,691	15,257	14,186	12,999	10,814	10,170	9,099	9,023	7,720	7,449	7,216
	Gas/Oil CT-Max	394	285	280	420	424	1,090	1,437	3,546	2,952	2,703	3,068	3,047	3,039	2,947	3,045
	Gas/Oil CT-Base	358	255	254	373	367	234	558	2,539	2,262	1,607	1,837	1,791	1,985	1,834	1,816
	Gas/Oil CT-Min	327	236	222	330	342	160	466	1,634	1,344	1,013	1,448	1,280	1,277	923	929
	Biomass-Max	777	735	749	654	615	408	409	410	232	231	167	166	166	166	166
	Biomass-Base	776	734	747	651	613	388	396	398	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	607	370	376	376	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	(35)	(81)	(175)	(182)	(202)
	Wind-Max	11,430	14,244	16,916	16,345	16,322	17,147	17,068	17,031	19,923	20,605	23,842	24,527	24,581	26,119	26,835
	Wind-Base	11,429	14,240	16,868	16,344	16,294	17,146	17,068	17,030	17,200	17,734	22,614	23,345	24,334	22,389	22,348
	Wind-Min	11,428	14,233	16,807	16,341	16,279	17,143	17,067	17,023	17,001	16,568	18,433	19,788	22,264	20,279	20,228
	Solar-Max	1,743	1,861	2,167	2,296	3,763	5,739	5,802	7,169	7,466	8,116	7,908	7,984	8,235	8,629	8,532
	Solar-Base	1,743	1,861	2,162	2,296	3,669	5,097	5,141	6,278	6,761	7,387	7,149	7,162	7,010	7,229	7,454
	Solar-Min	1,743	1,860	2,157	2,295	2,518	3,875	3,899	4,884	5,205	5,691	6,025	6,062	5,921	6,287	6,304
	Imports-Max	264	427	123	62	82	1,022	1,858	1,521	2,257	2,088	2,873	3,290	4,091	5,446	5,434
	Imports-Base	197	324	95	39	55	642	1,223	1,132	1,852	1,766	2,692	2,907	3,674	4,996	4,931
	Imports-Min	135	237	67	21	35	161	437	628	1,114	1,587	2,280	2,605	3,300	3,038	2,699
	Exports-Max	12,074	10,947	12,691	16,436	15,114	12,787	10,551	8,707	7,337	5,629	3,667	3,008	1,669	1,448	1,744
	Exports-Base	11,497	10,416	12,414	15,875	14,266	9,425	7,151	6,608	5,416	4,640	2,326	1,790	1,073	583	626
	Exports-Min	10,912	9,989	12,020	15,385	13,718	8,558	6,377	5,870	4,707	3,887	1,858	1,402	974	566	585

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 3 2	Nuclear-Base	14,053	13,576	14,013	13,576	12,626	8,188	5,373	4,918	5,388	4,918	5,373	4,918	5,388	4,918	5,373
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	0	-	0	-	-	0	0
	Coal-Max	9,054	6,305	6,496	7,721	6,502	7,475	7,974	5,400	5,507	5,138	2,189	2,267	1,943	1,948	2,080
	Coal-Base	8,798	6,036	6,246	7,426	6,219	2,910	2,726	2,417	2,443	2,135	225	176	174	98	301
	Coal-Min	8,565	5,897	5,937	7,136	5,886	2,055	1,822	2,027	2,016	1,732	-	-	-	-	-
	Gas CC-Max	15,269	13,779	12,277	15,072	14,661	16,036	15,177	13,517	11,824	11,959	11,479	11,054	8,976	9,435	9,191
	Gas CC-Base	14,952	13,343	11,763	14,658	14,181	15,600	14,723	13,048	11,214	11,363	9,725	9,621	7,952	8,462	8,314
	Gas CC-Min	14,592	12,873	11,211	14,282	13,691	14,949	13,867	12,695	10,807	10,905	9,365	9,131	7,638	7,903	7,597
	Gas/Oil CT-Max	394	285	280	420	424	340	654	2,727	2,412	1,987	2,553	2,052	1,983	1,941	1,958
	Gas/Oil CT-Base	358	264	254	373	367	228	549	1,792	1,644	1,303	1,417	1,216	1,411	1,566	1,488
	Gas/Oil CT-Min	327	236	222	330	342	160	466	1,634	1,397	1,162	1,279	1,101	1,231	1,015	988
	Biomass-Max	777	735	749	654	615	407	409	410	232	231	167	166	166	166	166
	Biomass-Base	776	734	747	651	613	387	395	397	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	608	370	376	376	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	(62)	(86)	(94)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,147	17,069	17,032	19,737	20,068	23,010	23,569	24,407	24,800	25,746
	Wind-Base	11,429	14,239	16,868	16,344	16,294	17,146	17,068	17,027	17,198	16,773	21,873	22,446	23,681	21,717	21,673
	Wind-Min	11,428	14,233	16,807	16,341	16,279	17,143	17,067	17,023	17,001	16,577	16,496	18,815	22,310	20,307	20,264
	Solar-Max	1,743	1,861	2,167	2,296	3,847	5,738	5,802	7,078	7,463	7,512	7,998	7,955	7,730	7,922	7,840
	Solar-Base	1,743	1,861	2,162	2,296	3,669	5,647	5,709	6,907	7,287	7,330	7,746	7,764	7,570	7,824	7,804
	Solar-Min	1,743	1,860	2,157	2,295	2,518	4,491	4,522	5,541	5,648	5,672	6,334	6,326	6,199	6,326	6,337
	Imports-Max	264	427	123	62	82	1,025	1,831	1,492	2,372	2,112	2,910	3,325	4,115	5,394	5,397
	Imports-Base	197	323	95	39	55	581	1,151	1,256	2,017	1,780	2,691	3,006	3,731	4,886	4,822
	Imports-Min	135	237	67	21	35	200	505	651	1,158	1,100	1,683	1,944	3,054	3,224	2,820
	Exports-Max	12,072	10,947	12,691	16,436	15,120	12,193	10,115	8,108	6,945	6,834	5,051	3,917	1,629	1,255	1,557
	Exports-Base	11,497	10,416	12,413	15,875	14,268	9,648	7,393	6,300	5,271	5,241	2,552	2,027	1,180	681	705
	Exports-Min	10,912	9,989	12,020	15,385	13,718	8,570	6,400	5,978	4,831	4,719	2,336	1,766	981	563	563

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 3 3	Nuclear-Base	14,053	13,576	14,013	13,576	12,626	8,188	5,373	4,918	5,388	4,918	5,373	4,918	5,388	4,918	5,373
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	0	-	-	-	-	0	-
	Coal-Max	9,054	6,305	6,496	7,721	6,502	7,669	8,001	5,439	5,509	5,142	5,940	6,087	5,062	5,629	5,821
	Coal-Base	8,798	6,036	6,246	7,426	6,230	2,909	2,685	2,417	2,444	2,136	2,740	2,782	2,437	2,675	2,751
	Coal-Min	8,565	5,897	5,937	7,136	5,886	2,055	1,822	2,027	2,016	1,732	2,051	2,041	1,761	1,992	2,003
	Gas CC-Max	15,269	13,779	12,277	15,072	14,661	16,037	15,183	13,518	11,832	11,964	11,602	11,106	8,737	9,072	8,843
	Gas CC-Base	14,952	13,343	11,763	14,658	14,239	15,597	14,726	13,046	11,201	11,346	10,012	9,834	7,770	8,053	8,087
	Gas CC-Min	14,592	12,873	11,211	14,282	13,691	14,996	13,949	12,873	10,965	11,085	9,381	8,907	7,407	7,821	7,852
	Gas/Oil CT-Max	394	285	280	420	424	496	664	2,806	2,427	2,029	2,191	1,948	1,565	1,412	1,498
	Gas/Oil CT-Base	358	264	254	373	384	228	549	1,791	1,650	1,299	1,349	1,140	1,027	905	913
	Gas/Oil CT-Min	327	236	222	330	342	161	467	1,634	1,369	1,155	1,174	987	906	789	764
	Biomass-Max	777	735	749	654	615	407	409	410	232	231	167	166	166	166	166
	Biomass-Base	776	734	747	651	613	387	395	397	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	608	370	377	376	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,147	17,068	17,031	19,345	19,679	22,000	22,749	24,139	22,224	22,165
	Wind-Base	11,429	14,239	16,868	16,344	16,298	17,146	17,068	17,030	17,009	16,581	20,529	20,929	23,632	21,721	21,672
	Wind-Min	11,428	14,233	16,807	16,341	16,279	17,142	17,067	17,023	17,000	16,577	16,491	16,884	22,061	20,090	20,041
	Solar-Max	1,743	1,861	2,167	2,296	3,763	5,739	5,802	6,928	7,380	7,422	8,003	7,958	7,525	7,761	7,725
	Solar-Base	1,743	1,861	2,162	2,296	3,573	5,657	5,720	6,904	7,376	7,422	7,440	7,473	7,183	7,406	7,383
	Solar-Min	1,743	1,860	2,157	2,295	2,518	4,396	4,427	5,541	5,523	5,504	6,439	6,437	6,264	6,391	6,400
	Imports-Max	264	427	123	62	82	943	1,858	1,521	2,406	2,148	2,011	2,317	3,304	4,412	4,559
	Imports-Base	197	323	95	39	55	572	1,146	1,242	2,002	1,763	1,548	1,776	2,627	3,709	3,592
	Imports-Min	135	237	67	21	35	180	519	651	1,191	1,121	813	926	1,900	2,528	2,320
	Exports-Max	12,072	10,947	12,691	16,436	15,120	12,383	10,057	8,253	6,842	6,743	7,193	6,580	2,684	1,899	2,000
3	Exports-Base	11,497	10,416	12,413	15,875	14,359	9,730	7,447	6,392	5,357	5,309	4,288	3,663	1,774	1,066	1,139
	Exports-Min	10,912	9,989	12,020	15,385	13,718	8,630	6,379	5,873	4,765	4,614	3,317	2,521	1,259	676	757

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 3 4	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	11,757	9,017
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	0	-
	Coal-Max	9,054	6,305	6,496	7,721	6,310	6,663	6,826	4,807	5,032	4,843	1,984	2,230	1,416	1,646	1,938
	Coal-Base	8,798	6,036	6,246	7,426	5,919	2,848	2,590	2,404	2,434	2,119	231	179	194	99	169
	Coal-Min	8,565	5,897	5,937	7,136	5,564	2,057	1,755	2,033	2,023	1,737	-	-	-	-	-
	Gas CC-Max	15,269	13,779	12,277	15,072	14,268	15,233	13,757	12,510	10,934	11,024	10,776	10,928	6,926	8,000	8,613
	Gas CC-Base	14,952	13,343	11,763	14,658	13,677	14,845	13,368	12,133	10,537	10,561	9,951	9,402	6,264	7,422	7,869
	Gas CC-Min	14,592	12,873	11,211	14,282	13,180	13,570	11,514	11,683	10,110	10,031	9,279	8,698	5,914	7,072	6,878
	Gas/Oil CT-Max	394	285	280	420	404	317	541	1,231	1,030	908	1,407	1,239	1,038	1,395	1,945
	Gas/Oil CT-Base	358	264	254	373	349	233	510	1,071	912	776	1,146	904	725	1,133	1,418
	Gas/Oil CT-Min	327	236	222	330	319	162	443	399	314	255	983	780	661	638	586
	Biomass-Max	777	735	748	654	614	405	408	408	232	231	167	166	166	166	166
	Biomass-Base	776	734	747	651	612	383	388	392	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	606	367	371	373	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	(120)	(110)	(205)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,132	17,050	17,004	18,064	17,682	18,828	20,145	23,389	22,051	24,895
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,123	17,041	16,966	16,909	16,523	17,710	19,039	23,043	21,663	21,776
	Wind-Min	11,428	14,233	16,807	16,341	16,271	17,111	17,029	16,930	16,868	16,492	16,455	16,285	21,586	19,960	20,015
	Solar-Max	1,743	1,861	2,167	2,296	3,845	4,007	4,031	5,199	5,592	5,608	6,334	6,388	6,100	7,001	8,036
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,780	3,803	4,822	5,137	5,154	5,944	5,956	5,618	5,824	6,603
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,496	3,516	3,805	4,024	4,041	4,933	4,978	5,221	5,416	5,526
	Imports-Max	264	427	123	62	65	454	393	555	905	680	930	1,127	1,669	2,910	3,952
	Imports-Base	197	323	95	39	45	184	185	274	494	408	647	809	1,481	2,523	3,442
	Imports-Min	135	237	67	21	25	60	73	150	256	213	351	385	1,118	1,891	1,906
	Exports-Max	12,072	10,947	12,691	16,436	15,928	14,538	14,032	12,533	11,243	11,517	9,521	9,374	3,693	2,565	2,333
	Exports-Base	11,497	10,416	12,413	15,875	14,855	12,018	11,683	10,480	9,145	9,341	7,378	6,173	2,788	1,705	1,278
	Exports-Min	10,912	9,989	12,020	15,385	14,413	11,313	10,987	9,648	8,259	8,408	6,307	5,265	2,505	1,514	1,136

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	14,013
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
	Coal-Max	9,055	6,311	6,495	7,720	6,313	6,593	6,813	4,804	5,019	3,147	3,724	3,769	3,099	3,670	3,689
	Coal-Base	8,793	6,039	6,248	7,425	5,921	2,845	2,588	2,407	2,430	2,114	2,560	2,578	2,206	2,477	2,506
	Coal-Min	8,564	5,877	5,938	7,139	5,545	2,058	1,756	2,033	2,023	1,734	2,062	2,051	1,751	1,984	1,998
	Gas CC-Max	15,266	13,772	12,288	15,080	14,260	15,193	13,717	12,512	10,928	10,979	10,412	10,661	6,993	7,534	7,540
	Gas CC-Base	14,959	13,351	11,751	14,659	13,682	14,814	13,336	11,933	10,276	10,309	9,739	9,372	6,052	6,706	6,759
	Gas CC-Min	14,593	12,897	11,212	14,225	13,202	13,534	11,367	11,647	10,009	9,803	9,212	8,486	6,006	6,539	6,677
	Gas/Oil CT-Max	394	285	280	420	405	312	541	1,216	1,007	1,263	1,339	1,197	819	964	1,040
	Gas/Oil CT-Base	358	263	254	373	351	232	503	454	358	489	1,012	812	633	561	588
	Gas/Oil CT-Min	327	238	222	330	318	162	446	399	314	394	925	746	589	508	481
	Biomass-Max	777	735	748	654	615	405	408	408	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	612	383	388	391	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	607	367	371	373	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(17)
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	(42)	(47)	(52)
	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,130	17,047	17,004	18,112	18,041	18,105	19,583	22,626	21,187	21,076
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,121	17,038	16,925	16,861	16,484	16,324	17,292	21,738	20,235	20,128
	Wind-Min	11,428	14,233	16,807	16,341	16,271	17,112	17,029	16,925	16,861	16,445	16,324	16,182	19,714	17,962	17,864
	Solar-Max	1,743	1,861	2,167	2,296	3,845	3,942	3,963	5,283	5,673	6,307	6,366	6,382	6,375	6,523	6,506
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,864	3,887	5,283	5,673	5,690	6,366	6,382	6,038	6,189	6,168
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,776	3,797	3,805	3,832	4,229	4,742	4,763	5,412	5,553	5,542
	Imports-Max	264	427	123	62	66	454	393	555	905	692	469	561	1,191	1,399	1,353
	Imports-Base	197	324	95	39	44	184	185	410	706	558	335	388	960	1,235	1,179
	Imports-Min	135	237	67	21	25	60	73	150	258	340	191	231	680	843	793
	Exports-Max	12,072	10,953	12,691	16,427	15,925	14,421	13,859	12,476	11,107	10,196	10,566	10,096	5,091	4,370	4,554
	Exports-Base	11,499	10,427	12,404	15,874	14,861	11,980	11,640	9,747	8,475	8,706	9,023	8,060	3,958	3,170	3,212
	Exports-Min	10,909	9,988	12,030	15,391	14,326	11,269	10,943	9,649	8,330	8,152	8,186	6,982	3,401	2,758	2,791

Department Attachment 5
Annual Energy by Type (GWh)

	Fuel Type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
S c e n a r i o 3 6	Nuclear-Base	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	14,013	13,576	14,053	13,576	14,013
	Hydro-Base	2,321	2,628	2,740	2,741	2,753	1,459	993	993	995	993	993	993	946	932	924
	Energy Effic.-Base	7,418	7,937	8,239	8,771	9,202	9,471	9,849	10,165	10,461	11,104	11,477	11,973	12,323	12,701	12,929
	Landfill-Base	12	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Distrib. Gen.-Base	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-
	Coal-Max	9,055	6,311	6,495	7,720	6,312	6,666	6,828	4,806	5,021	4,842	1,984	2,231	1,556	1,720	1,793
	Coal-Base	8,793	6,039	6,248	7,425	5,921	2,848	2,590	2,410	2,433	2,116	185	177	194	137	153
	Coal-Min	8,563	5,897	5,940	7,136	5,580	2,057	1,756	2,033	2,023	1,737	-	-	-	-	-
	Gas CC-Max	15,266	13,772	12,288	15,080	14,261	15,231	13,755	12,444	10,945	11,049	10,700	10,744	7,389	7,967	7,957
	Gas CC-Base	14,959	13,351	11,751	14,659	13,682	14,849	13,364	11,962	10,318	10,327	9,868	9,311	6,760	7,401	7,535
	Gas CC-Min	14,594	12,874	11,208	14,279	13,211	13,573	11,511	11,685	10,075	9,935	9,302	8,704	6,480	7,141	7,189
	Gas/Oil CT-Max	394	285	280	420	406	317	541	1,231	1,023	898	1,407	1,238	1,062	1,085	1,146
	Gas/Oil CT-Base	358	263	254	373	351	233	509	456	359	303	1,123	857	731	626	644
	Gas/Oil CT-Min	327	236	222	330	316	162	443	399	314	255	998	795	674	546	549
	Biomass-Max	777	735	749	654	614	405	408	408	232	231	167	166	166	166	166
	Biomass-Base	775	734	747	651	612	383	388	391	232	231	166	166	166	166	166
	Biomass-Min	775	733	746	648	607	367	371	372	232	231	166	166	166	166	166
	Battery-Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Battery-Base	-	-	-	-	-	-	-	-	-	-	-	-	(19)	(15)	(31)
	Battery-Min	-	-	-	-	-	-	-	-	-	-	-	-	(39)	(31)	(48)
6	Wind-Max	11,430	14,244	16,916	16,345	16,321	17,132	17,048	17,002	17,879	17,493	19,005	20,321	23,172	21,693	21,604
	Wind-Base	11,429	14,239	16,868	16,344	16,288	17,123	17,041	16,931	16,869	16,492	17,495	18,823	21,991	20,400	20,317
	Wind-Min	11,428	14,233	16,807	16,341	16,271	17,112	17,029	16,930	16,868	16,492	16,387	16,218	20,392	18,621	18,540
	Solar-Max	1,743	1,861	2,167	2,296	3,762	3,939	3,963	5,199	5,592	5,608	6,333	6,395	6,478	6,649	6,632
	Solar-Base	1,743	1,861	2,162	2,296	3,668	3,780	3,803	5,198	5,591	5,607	6,300	6,308	6,036	6,206	6,190
	Solar-Min	1,743	1,860	2,157	2,295	2,328	3,776	3,798	3,898	4,209	4,228	5,079	5,116	5,399	5,566	5,546
	Imports-Max	264	427	123	62	65	454	393	555	905	680	910	1,115	1,526	2,291	2,188
	Imports-Base	197	324	95	39	44	184	185	409	702	557	678	848	1,378	1,982	1,895
	Imports-Min	135	237	67	21	25	60	73	150	256	219	351	385	965	1,264	1,144
	Exports-Max	12,072	10,948	12,690	16,442	15,926	14,544	14,030	12,534	11,187	11,413	9,517	9,373	4,581	3,738	3,860
	Exports-Base	11,499	10,427	12,404	15,874	14,861	12,021	11,679	9,787	8,528	8,739	7,227	6,050	3,382	2,483	2,602
	Exports-Min	10,909	9,988	12,030	15,391	14,415	11,311	10,986	9,649	8,337	8,491	6,602	5,497	2,958	2,124	2,212

CERTIFICATE OF SERVICE

I, Sharon Ferguson, hereby certify that I have this day, served copies of the following document on the attached list of persons by electronic filing, certified mail, e-mail, or by depositing a true and correct copy thereof properly enveloped with postage paid in the United States Mail at St. Paul, Minnesota.

**Minnesota Department of Commerce
Supplemental Comments**

Docket No. E002/RP-19-368

Dated this 15th day of October 2021

/s/Sharon Ferguson

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
Ross	Abbey	ross.abbey@us-solar.com	United States Solar Corp.	100 North 6th St Ste 222C Minneapolis, MN 55403	Electronic Service	No	OFF_SL_19-368_19- 368_Official
Gary	Ambach	Gambach@slipstreaminc.org	Slipstream, Inc.	8973 SW Village Loop Chanhassen, MN 55317	Electronic Service	No	OFF_SL_19-368_19- 368_Official
Ellen	Anderson	eanderson@mncenter.org	Minnesota Center for Environmental Advocacy	1919 University Ave W Ste 515 Saint Paul, MN 55104	Electronic Service	No	OFF_SL_19-368_19- 368_Official
Alison C	Archer	aarcher@misoenergy.org	MISO	2985 Ames Crossing Rd Eagan, MN 55121	Electronic Service	No	OFF_SL_19-368_19- 368_Official
Susan	Arntz	sarntz@mankatomn.gov	City Of Mankato	P.O. Box 3368 Mankato, MN 560023368	Electronic Service	No	OFF_SL_19-368_19- 368_Official
Mara	Ascheman	mara.k.ascheman@xcelenery.com	Xcel Energy	414 Nicollet Mall Fl 5 Minneapolis, MN 55401	Electronic Service	No	OFF_SL_19-368_19- 368_Official
Jessica L	Bayles	Jessica.Bayles@stoel.com	Stoel Rives LLP	1150 18th St NW Ste 325 Washington, DC 20036	Electronic Service	No	OFF_SL_19-368_19- 368_Official
David	Bender	dbender@earthjustice.org	Earthjustice	1001 G Street NW Suite 1000 Washington, District of Columbia 20001	Electronic Service	No	OFF_SL_19-368_19- 368_Official
Tracy	Bertram	tbertram@ci.becker.mn.us		12060 Sherburne Ave Becker City Hall Becker, MN 55308-4694	Electronic Service	No	OFF_SL_19-368_19- 368_Official
James J.	Bertrand	james.bertrand@stinson.com	STINSON LLP	50 S 6th St Ste 2600 Minneapolis, MN 55402	Electronic Service	No	OFF_SL_19-368_19- 368_Official

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
Jessica	Beyer	jbeyer@greatermankato.com	Greater Mankato Growth	1961 Premier Dr Ste 100 Mankato, MN 56001	Electronic Service	No	OFF_SL_19-368_19-368_Official
James	Canaday	james.canaday@ag.state.mn.us	Office of the Attorney General-RUD	Suite 1400 445 Minnesota St. St. Paul, MN 55101	Electronic Service	Yes	OFF_SL_19-368_19-368_Official
Thomas	Carlson	thomas.carlson@edf-re.com	EDF Renewable Energy	10 2nd St NE Ste. 400 Minneapolis, Minnesota 55413	Electronic Service	No	OFF_SL_19-368_19-368_Official
John	Coffman	john@johncoffman.net	AARP	871 Tuxedo Blvd. St. Louis, MO 63119-2044	Electronic Service	No	OFF_SL_19-368_19-368_Official
Generic Notice	Commerce Attorneys	commerce.attorneys@ag.state.mn.us	Office of the Attorney General-DOC	445 Minnesota Street Suite 1400 St. Paul, MN 55101	Electronic Service	Yes	OFF_SL_19-368_19-368_Official
Jean	Comstock	jean.comstock.dbcc@gmail.com	St. Paul 350	729 6th St E St. Paul, MN 55106	Electronic Service	No	OFF_SL_19-368_19-368_Official
Riley	Conlin	riley.conlin@stoel.com	Stoel Rives LLP	33 S. 6th Street Suite 4200 Minneapolis, MN 55402	Electronic Service	No	OFF_SL_19-368_19-368_Official
Brooke	Cooper	bcooper@allete.com	Minnesota Power	30 W Superior St Duluth, MN 558022191	Electronic Service	No	OFF_SL_19-368_19-368_Official
George	Crocker	gwillc@nawo.org	North American Water Office	PO Box 174 Lake Elmo, MN 55042	Electronic Service	No	OFF_SL_19-368_19-368_Official
James	Denniston	james.r.denniston@xcenergy.com	Xcel Energy Services, Inc.	414 Nicollet Mall, 401-8 Minneapolis, MN 55401	Electronic Service	No	OFF_SL_19-368_19-368_Official

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
Scott F	Dunbar	sdunbar@keyesfox.com	Keyes & Fox LLP	1580 Lincoln St Ste 880 Denver, CO 80203	Electronic Service	No	OFF_SL_19-368_19-368_Official
Brian	Edstrom	briane@cubminnesota.org	Citizens Utility Board of Minnesota	332 Minnesota St Ste W1360 Saint Paul, MN 55101	Electronic Service	No	OFF_SL_19-368_19-368_Official
John	Farrell	jfarrell@ilsr.org	Institute for Local Self-Reliance	2720 E. 22nd St Institute for Local Self-Reliance Minneapolis, MN 55406	Electronic Service	No	OFF_SL_19-368_19-368_Official
Sharon	Ferguson	sharon.ferguson@state.mn.us	Department of Commerce	85 7th Place E Ste 280 Saint Paul, MN 551012198	Electronic Service	No	OFF_SL_19-368_19-368_Official
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Generic Notice	Residential Utilities Division	residential.utilities@ag.state.mn.us	Office of the Attorney General-RUD	1400 BRM Tower 445 Minnesota St St. Paul, MN 551012131	Electronic Service	Yes	OFF_SL_19-368_19-368_Official
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