Wabash Valley Power Association, Inc.

2020 Integrated Resource Plan

November 1, 2021

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Section 1
OVERVIEW

Membership

Wabash Valley Power Association, Inc. d/b/a Wabash Valley Power Alliance (Wabash Valley or the Company) is a generation and transmission (G&T) cooperative based in Indianapolis, Indiana. Wabash Valley was incorporated December 12, 1963, pursuant to the Indiana Not-For-Profit Corporation Act. The Articles of Incorporation were amended in 1975 and approved by the Secretary of State on September 4, 1975. The Public Service Commission of Indiana (now the Indiana Utility Regulatory Commission (IURC)) granted the Company a Certificate of Convenience and Necessity on January 13, 1978, authorizing us to supply power to our member distribution cooperatives (Members).

Wabash Valley provides wholesale electricity to twenty-three Members: nineteen in the northern half of Indiana, three in Illinois and one in Missouri. In turn, our distribution Members supply electricity to more than 325,000 retail members. Nearly 76 percent of our retail customer base resides in Indiana, with approximately 16 percent in Illinois, and 8 percent in Missouri. Table 1-1 provides a list of Wabash Valley's Members and their office locations.

Table 1-1 Wabash Valley Members

Member	*Location*
Boone REMC	Lebanon, IN
Carroll White REMC	Monticello, IN
Citizens Electric Corporation	Perryville, MO
Corn Belt Energy Corporation	Bloomington, IL
EnerStar Electric Cooperative	Paris, IL
Fulton County REMC	Rochester, IN
Heartland REMC	Markle, IN
Hendricks Power Cooperative	Avon, IN
Jasper County REMC	Rensselaer, IN
Jay County REMC	Portland, IN
Kankakee Valley REMC	Wanatah, IN
Kosciusko REMC	Warsaw, IN
LaGrange County REMC	LaGrange, IN
M.J.M. Electric Cooperative	Carlinville, IL
Marshall County REMC	Plymouth, IN
Miami-Cass REMC	Peru, IN
Newton County REMC	Goodland, IN
NineStar Connect	Greenfield, IN
Noble REMC	Albion, IN
Parke County REMC	Rockville, IN
Steuben County REMC	Angola, IN
Tipmont REMC	Linden, IN
Warren County REMC	Williamsport, IN

Service Territory

Territorial assignments to electric cooperatives in Indiana have been made under the Rural Electric Membership Corporation Act of 1935 as amended. Much of the service territory assigned to our Members is used agriculturally for both crops and livestock. Many of our Members' customers are involved in agriculture, either directly or through related industries. Significant portions of our Members' customers commute to large nearby cities and to many smaller cities that contain a large number of commercial and industrial businesses. Indiana metropolitan areas within or near Member service areas include the cities of Anderson, Elkhart, Fort Wayne, Gary, Indianapolis, Kokomo, Lafayette, Muncie, and South Bend. Major Illinois cities near Member service areas include Chicago, Peoria, Springfield, and Bloomington. The major Missouri city near Member service territory is St. Louis. The major interstate highways serving the area are I-55, I-65, I-69, I-70 and I-74.

Figure1-2 illustrates Wabash Valley's composite service territory. The areas identified on this map are not exclusively served by our Members. Numerous municipal electric utilities, as well as investor-owned utilities, permeate this service area.

Figure 1-2 Wabash Valley Service Territory

Except as outlined in Wabash Valley's distributed generation policy and a recent allowance to permit Members to self-supply up to 5% of the Member's non-coincident peak load, the Company supplies all of our Members' power requirements from owned generating resources or through purchases from other electric utilities or energy marketing companies. We supply electric power into six sub-balancing areas through transmission facilities owned by Wabash Valley or by facilities scheduled through the Midcontinent Independent Transmission System Operator (MISO) or PJM Interconnection (PJM) regional transmission organizations (RTO). Wabash Valley plans requirements holistically to avoid oversupply and manages specific resources to meet reliability needs. Table 1-3 illustrates the percentage of energy delivered into each of the six sub-balancing areas.

TABLE 1-3 Power Delivery by Balancing Area - As of 1/1/2022

Sub-Balancing Area	% Energy Delivered (kWh basis)	Balancing Area
Duke Energy Indiana (DUKE)	32%	MISO
American Electric Power (AEP)	21%	PJM
Northern Indiana Public Service Company (NIPSCO)	19%	MISO
Ameren Missouri (AMMO)	18%	MISO
Ameren Illinois (AMIL)	9%	MISO
AES Indiana (IPL)	1%	MISO

Wabash Valley also supplies power to one non-member Indiana customer under a separate wholesale firm requirements agreement that ends in 2028.

Cooperative Structure

As indicated previously, Wabash Valley is incorporated as a G&T cooperative serving our twenty-three Members. As a cooperative, Wabash Valley adheres to the seven cooperative principles:

- Voluntary and Open Membership
- Democratic Member Control
- Members' Economic Participation
- Autonomy and Independence
- Education, Training, and Information
- Cooperation Among Cooperatives
- Concern for Community

The principle of Democratic Member Control shapes the Company's routine operations. Wabash Valley's business and affairs are governed by a Board of Directors consisting of one Director nominated by each Member (one Member, one vote). Wabash Valley's staff formulates and presents for Board action corporate goals and objectives, work plans, budgets, policies, and rate matters. The staff furnishes the Board with full and complete information on the overall operation of the organization at regularly scheduled board meetings in order that the Board may make informed decisions and be accountable to the Members and regulatory agencies.

In the electric utility industry as a whole and specifically at Wabash Valley, managing enterprise risk is a high priority. Wabash Valley's Board identifies the Company's risk management objectives and provides risk management oversight. Wabash Valley's risk structure consists of the Board, CEO, a Risk Oversight Committee, an Internal Risk Management Committee, a Risk Officer and ACES, a nationwide energy management company. This risk structure utilizes a Risk Matrix to identify and prioritize risks, such as commodity price risk, power and fuel delivery risk, financial risk, environmental and regulatory risk, etc., and then implement strategies to mitigate their effect on our association. The risk structure monitors the resource plan on a quarterly basis by reviewing a dashboard with key indicators and stress cases. This ongoing review process allows Wabash Valley to adjust our power portfolio to better match the inherent risks of providing power to our Members.

Changing Energy Landscape

Since Wabash Valley's 2017 IRP, the electricity markets and energy landscape have started to transform as a result of many factors including changing utility resource portfolios, announcement of utility and corporation sustainability goals, clean energy legislation enacted at the state level, proposed or recently enacted alterations to the MISO and PJM resource adequacy constructs and increasing interest in and accessibility of distributed energy resources (DERs) and electric vehicles (EVs).

Utility resource portfolios have changed, in part, due to historically low natural gas prices, declining wind and solar costs and societal interest in clean energy. These drivers have prompted retirement of coal-fired generation assets and expansion of renewable resources. For this IRP, Wabash Valley has modeled the retirement of our coal-fired resources, Gibson Unit 5 and Prairie State Unit 1, as well as our Wabash River Highland combustion turbine. Additionally, Rockport Units 1 and 2 coal-fired resources that supply part of our power purchase agreement (PPA) with AEP could shut down before the end of 2028 as part of a settlement agreement filed with the IURC in September 2021.

MISO and its stakeholders have engaged in discussions related to resource adequacy construct improvements extensively over the past many months, collectively tracked as the Resource Availability and Need (RAN) projects. Proposed plans deviate from a current summer seasonal focus to an "all hours matter" view which includes seasonal requirements and resource accreditation enhancements. MISO will finalize specific formulaic calculations prior to filing the proposal for FERC approval in 2021 for implementation in the 2023/2024 planning year. The framework is described in the conceptual design document on MISO's website[1]. The Company will address approved requirements in future planning actions and IRPs.

MISO and PJM are actively working with stakeholders to develop FERC Order 2222 compliance plans to enable DERs to participate in their respective wholesale markets. The Company participates in stakeholder meetings to monitor developments.

The Risk & Resource Portfolio Department along with a newly formed Innovation Committee plans to track the status and penetration of DERs, EVs and other new technologies and business models to plan for their potential disruption and to explore ideas and investigate new ways to serve Members through pilot programs. The findings of these efforts will inform future IRPs.

Integrated Resource Plan (IRP) Process

Every electric utility in the State of Indiana that is publicly, municipally or cooperatively owned must prepare an IRP every three years to comply with the IURC's "Rule 7", technically 170 IAC 4-7. As a cooperatively owned electric utility, Wabash Valley is exempt from the public advisory process requirement in Section 8.170 IAC 4-7-2.6 of the IURC's Draft Proposed Rule amending 170 IAC 4-7 Guidelines for Integrated Resource Planning by an Electric Utility.

At Wabash Valley, the Budgets and Forecasting Department is responsible for coordinating the development of the IRP with input from other departments including: Engineering & Operations, Marketing & Communications, Risk & Resource Portfolio and Transmission & Regulatory Affairs.

The Company has developed the IRP using the following six major steps:

1. Power Requirements Forecasting
2. Energy Efficiency Evaluation
3. Demand Response Evaluation
4. Supply-Side Evaluation
5. Integration
6. Financial Review

The following describes the process for each step.

1. Power Requirements Forecasting

The Budgets and Forecasting Department is responsible for developing the power requirements forecast for Wabash Valley. The monthly peak demand and energy requirement of each individual Member and requirements customer is forecasted. These forecasts are then aggregated to arrive at a composite forecast for Wabash Valley. The Company surveys residential customers to determine the saturation

[1] See the MISO RAN Conceptual Design document for more information at this link: https://cdn.misoenergy.org/20210901%20RASC%20Item%2003%20Seasonal%20RA%20Conceptual%20Design585538.pdf

levels of electric appliances and asks each individual Member to review their respective forecast. Demographic and economic data from various sources is considered in the projection of each Member's energy requirements. The forecasted energy requirements are normalized for weather. The forecast is re-estimated every three years or more often as changes and requirements dictate. Section 3 describes the forecasting model in more detail.

2. Demand-Side Management – Energy Efficiency Evaluation

Wabash Valley does not directly serve any retail customers. Those customers are served by the individual Members. Energy Efficiency (EE) programs are evaluated for their benefit to the Company, our Members and their customers by comparing program costs to the expected cost of a market-based resource or option purchase. Primary evaluation, measurement and verification (EM&V) activities are reviews of satisfaction, impact and cost-effectiveness.

The Retail Programs and Services (RP&S) Committee, which is comprised of Wabash Valley staff and Member system CEOs, works with the RP&S Working Group, comprised of Wabash Valley staff and Member systems' personnel, to recommend a series of residential programs and commercial and industrial EE programs for the Wabash Valley portfolio. Programs were selected based on each Member's mix of customers, electric energy end-uses and power supply requirements. The Committee develops programs and measurement and verification protocols to evaluate the technical and economic viability of EE programs. Wabash Valley coordinates centralized marketing and outreach for each EE program.

3. Demand-Side Management – Demand Response Evaluation

The RP&S Committee is responsible for evaluating potential demand response (DR) programs that affect peak demand and capacity requirements. Wabash Valley does not directly serve any retail customers. Those customers are served by the individual Members. DR programs are evaluated for their benefit to the Company, our Members and their retail customers by comparing program costs to the expected cost of a market-based resource or option purchase.

The RP&S Committee works with the RP&S Working Group to develop programs to evaluate the technical and economic viability of DR alternatives. Pilot program results are then used, along with forecasts of power supplies and wholesale market power prices, to determine whether a full-scale program should be initiated.

Analysis of DR programs is ongoing. If a program is considered beneficial, Wabash Valley provides price signals and works with the Members to encourage adoption of the DR program.

4. Supply-Side Evaluation

The Budgets and Forecasting Department is responsible for estimating costs associated with power generation and purchases. The Company surveys the market on a regular basis and routinely makes inquiries to other utilities, power marketers and generating facility construction consultants. Responses to these inquiries have included offers for construction of new generation as well as for power supply contracts. Wabash Valley determines which resources are most likely to be available at the time new capacity is needed and uses estimated costs for these expected units in its cost projection studies.

5. Integration

The integrated production cost is developed with the recommended EE and DR resource programs and the most economic supply-side resources. The PLEXOS® model, developed by Energy Exemplar, is used to evaluate the production costs for the integrated plan. The Risk & Resource Portfolio Department reevaluates the resource plan regularly.

6. Financial Review

The Budgets and Forecasting Department incorporates the production costing results with other corporate costs to develop budget, short-term (3-6 years) and long-term (20 years) financial forecasts. These forecasts are reviewed to ensure that the conditions of the corporate financial policy are met and financing requirements are reasonable. The Budgets and Forecasting Department uses a financial forecasting model to input company capitalization, balance sheet, and similar financial information to develop a comprehensive forecast of cash flows, income statement, and rates. Financial forecasts are updated quarterly or as necessary.

Section 2
RESOURCE ASSESSMENT

Planning Areas

Wabash Valley plans for its power requirements in all balancing areas jointly, in order to provide power to Members at the lowest reasonable cost.

ACES' power dispatch center operates 24 hours a day and is responsible for scheduling power resources into the MISO and PJM systems on behalf of the Company. ACES' dispatchers manage the contracted Wabash Valley resources as well as purchase and sell power in the short-term wholesale power market. In their energy management role, ACES' staff is responsible for the dispatch of the Company's demand response (DR) programs. Wabash Valley DR representatives inform ACES' staff members of current program objectives, program parameters and information management functions. ACES utilizes the DR programs to manage costs, including high wholesale market prices, and respond to capacity shortages.

Planning Criteria

Planning criteria for Wabash Valley is developed by MISO and PJM. These RTOs evaluate the reliability within their respective regions and establish rules to determine how the Company and other load serving entities provide capacity to meet the requirements.

The MISO pool-wide coincident peak Installed Capacity (ICAP) requirement is 17.9% for planning year 2022/2023. This reserve requirement represents installed capacity at the MISO region peak that will limit the loss of load expectation to 0.1 day in a year. MISO adjusts the reserve requirement for load diversity and unit availability. Wabash Valley must meet the 17.9% reserve requirements by identifying specific generation units, adjusted for forced outages. The Company can also purchase capacity credits in the annual planning reserve auction. Starting in 2022, Wabash Valley forecasts approximately 89% of its load in MISO.

PJM has a similar process to determine the reserve requirements; however, PJM does not require each company to provide the capacity. PJM purchases all the capacity necessary in an auction process. PJM then allocates the cost to purchase that capacity based on each load serving entity's contribution to the regional peak. PJM's current capacity allocation is 14.7% installed (ICAP). While the Company is not obligated to supply the capacity to the PJM market, Wabash Valley plans to provide capacity in the long term to meet its capacity allocation in order to hedge the price of the PJM allocated costs.

For the IRP, these reserve requirements of 17.9% in MISO and 14.7% in PJM are used for planning Wabash Valley's resource requirements needed in the future.

Wabash Valley currently owns about 55% of our capacity requirements. The rest of the Company's current resources are provided under various contractual arrangements. Many of the contractual resources are firm supplies that include capacity.

Loads and Load Characteristics

Each Wabash Valley Member serves a variety of residential, commercial and industrial loads. The majority of the load is residential in nature. As the following tables illustrate, the Company's winter peak usually occurs at 8:00 p.m. and the summer peak generally occurs in the evening around 6:00 p.m. These peak times reflect the highly residential nature of Wabash Valley's load. Wabash Valley has two large customers whose summer demand may be interrupted. The peak demand reported in Table 2-1, Graph 2-2, Table 2-3 and Graph 2-4 excludes the interruptible portion of this load.

TABLE 2-1 Wabash Valley Coincident Peak Demands - Winter

Winter						
	Coincident Demand *	Peak			Day of Peak Temp. Range **	
Years	(MW)	Month	Day	Time EPT	Low F	High F
2010-2011	1,490.6	Feb	Thu	8 a.m.	-12	9
2011-2012^	1,317.2	Jan	Thu	8 p.m.	17	40
2012-2013	1,391.5	Jan	Mon	8 p.m.	6	19
2013-2014	1,593.3	Jan	Mon	7 p.m.	-14	20
2014-2015^^	1,527.1	Jan	Wed	8 p.m.	-4	10
2015-2016^^	1,312.1	Jan	Mon	8 p.m.	0	10
2016-2017	1,320.4	Dec	Mon	8 a.m.	-8	11
2017-2018	1,435.6	Jan	Tue	9 a.m.	-13	4
2018-2019	1,497.1	Jan	Wed	8 p.m.	-13	0
2019-2020	1,317.3	Feb	Fri	8 a.m.	3	16
2020-2021	1,523.9	Feb	Mon	7 p.m.	12	15

* Coincident demand includes pass-through load but excludes interruptible load through 2016-2017; Starting in 2017-2018, winter demand is no longer interruptible

** Fort Wayne (AP) Weather Station

^ One Cooperative terminated Membership effective Jan. 2012

^^ One Cooperative terminated Membership effective Jan. 2015 and one cooperative terminated Membership effective July 2015

GRAPH 2-2 Daily Load Shape – Winter Peak

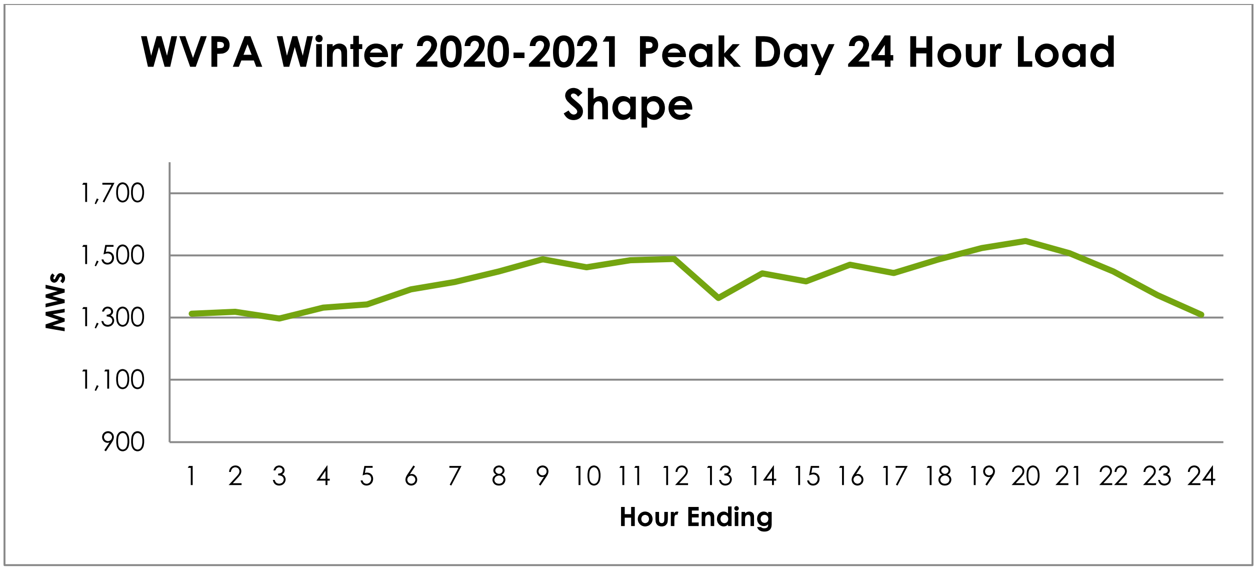
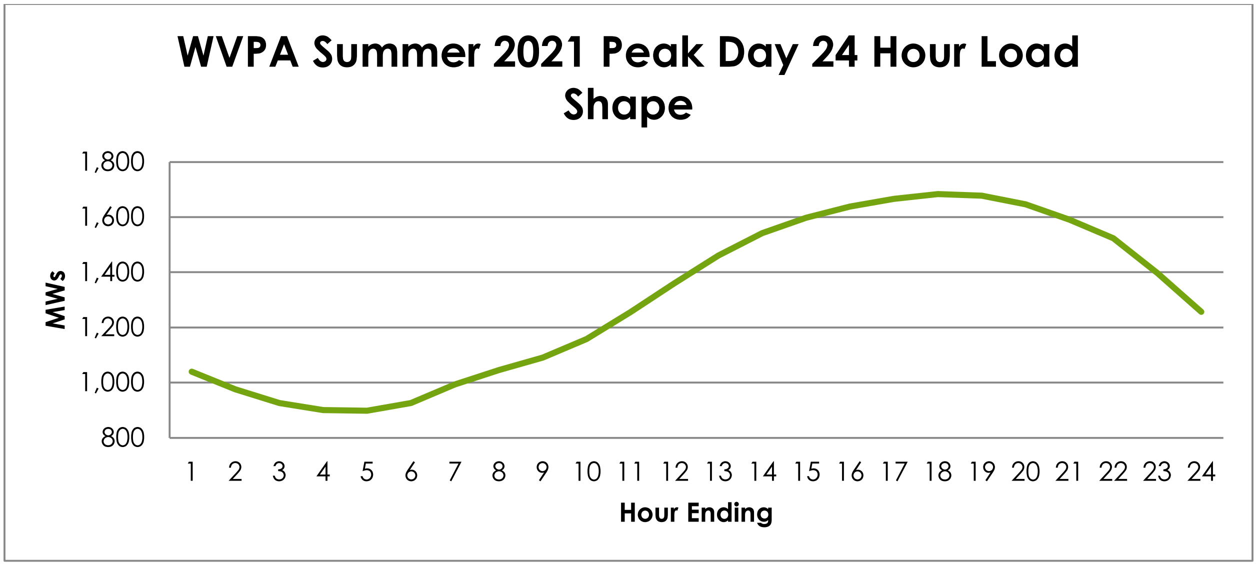


TABLE 2-3 Wabash Valley Coincident Peak Demands – Summer

Summer							
	Coincident Demand*	Peak			Day of Peak Temp. Range **		Consec. Days Over
Year	(MW)	Month	Day	Time EPT	Low F	High F	85°
2011	1,839.1	Jul	Thu	6 p.m.	76	99	7
2012^	1,750.3	Jul	Fri	6 p.m.	73	100	10
2013	1,660.7	Jul	Thu	7 p.m.	73	91	5
2014	1,591.9	Aug	Mon	5 p.m.	68	87	1
2015^^	1,479.3	Jul	Tue	7 p.m.	66	88	3
2016	1,592.3	Aug	Thu	7 p.m.	74	90	11
2017	1,510.3	Jul	Wed	7 p.m.	65	89	2
2018	1,584.5	Jun	Mon	6 p.m.	75	94	4
2019	1,631.0	Jul	Fri	6 p.m.	77	91	7
2020	1,623.4	Jul	Thu	6 p.m.	69	92	12
2021	1,684.1	Aug	Tue	6 p.m.	68	91	4

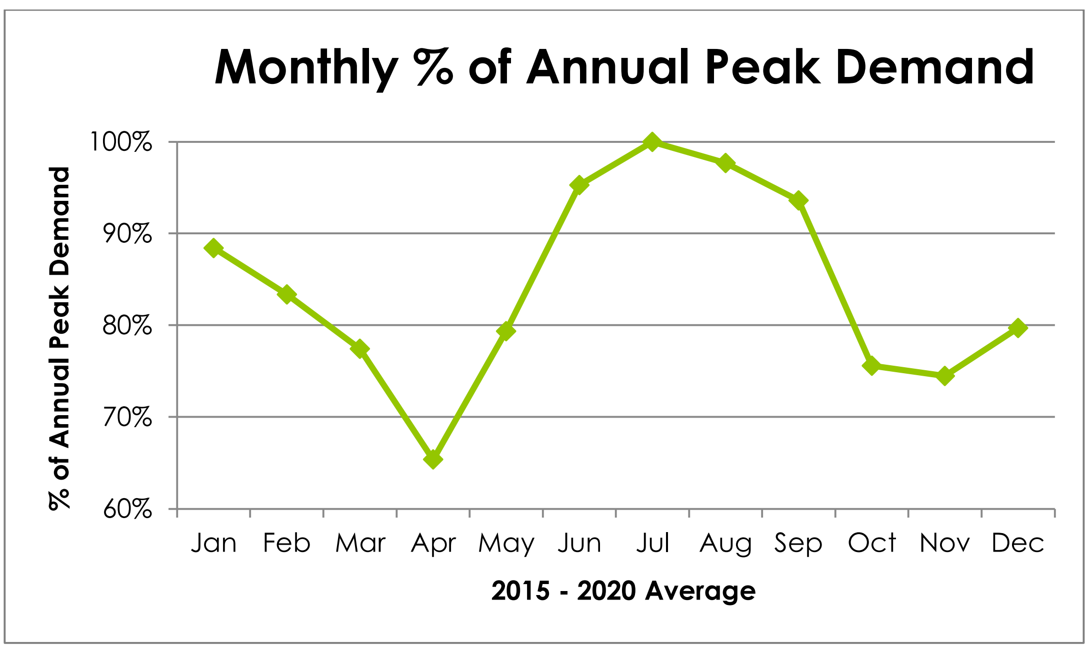
* Coincident demand includes pass-through load but excludes interruptible load
** Fort Wayne (AP) Weather Station
^ One Cooperative terminated Membership effective Jan. 2012
^^ One Cooperative terminated Membership effective Jan. 2015 and one cooperative terminated Membership effective July 2015

GRAPH 2-4 Daily Load Shape – Summer Peak

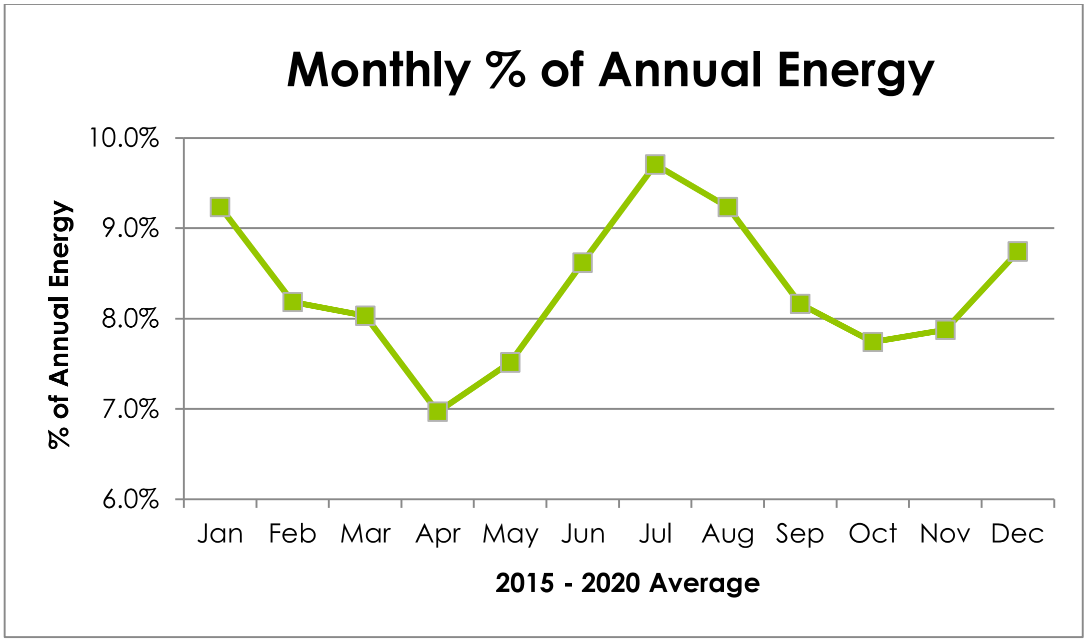


The following graphs illustrate the average monthly system load characteristics.

GRAPH 2-5 Monthly Load Summary - Annual Peak



GRAPH 2-6 Monthly Load Summary – Annual Energy



Residential Survey

Wabash Valley conducts a residential saturation survey on behalf of its Members every two to three years. Approximately 63% of residential customers have central air conditioning and 16% of residential customers use a heat pump to cool their homes. Nearly 30% of residential customers heat their homes with an electric system.

The Company has conducted surveys since the early 1980s. The results are used in the load forecast as an estimate of energy conservation measures and to develop programs that will better serve the residential customers. The last survey was conducted in late 2019 through early 2020.

In general, the results of the 2020 residential survey were comparable to the 2017 survey. Once more for the 2020 survey, participants were asked additional energy-related questions including one designed to gauge the level of awareness and interest in distributed generation. Approximately 1% of survey participants have installed some form of on-site generation and another 9% have seriously considered installing it. This is a slight decrease from the 2017 survey. New to the survey for 2020, respondents were asked their personal fuel source preference for electricity generation. Over 52% had no preference and just wanted the lowest-priced option. However, another 22% strongly preferred renewables and 12% somewhat preferred renewables. Also new to the survey for 2020, respondents were asked about all-electric vehicles (AEV). Only 1% of survey participants currently own or lease an AEV. Among the 99% of survey participants who do not currently own or lease an AEV, only 4% have seriously considered and 12% have somewhat considered leasing or purchasing an AEV.

Non-Member Loads

As described in our system profile, Wabash Valley supplies power to one non-member Indiana customer under a separate wholesale firm requirements agreement that ends in 2028. This non-member Indiana load is forecasted at approximately 198 MW and 1,150 GWh annually and is situated in the AEP sub-balancing area of PJM. This customer's demand above 20 MW may be interrupted.

Existing Resources

Wabash Valley's existing resources include both supply-side and DR resources. Supply-side resources include generation resources owned by the Company or purchased from other utilities. DR resources include a number of programs implemented by Wabash Valley's Members.

1. Supply-Side Resources

Wabash Valley owns several electric generating units within the MISO and PJM footprint. The following table summarizes Wabash Valley's generation ownership.

TABLE 2-7 Generation Ownership

Resource (Wabash Valley Share)	MW (ICAP)	Fuel Type
Gibson Unit 5	156	Coal
Prairie State Units 1 and 2	83	Coal
Holland Energy	313.5	Natural Gas
Wabash River Highland	160	Natural Gas
Vermillion	240	Natural Gas
Lawrence	86	Natural Gas
Landfill Gas	52.8	Landfill or Natural Gas
Solar	6.8	Solar
Total Owned Generation	**1,098.1**	

a. Gibson Unit 5

Owned generation includes a 25% undivided ownership in Gibson Unit 5 which Wabash Valley jointly owns with Duke Energy Indiana (Duke Indiana) and Indiana Municipal Power Agency (IMPA). Gibson Unit 5, located in southwestern Indiana, is a 625 MW coal-fired generating facility operated by Duke Indiana. Operating under the Gibson Unit 5 Joint Ownership, Participation, Operation, and Maintenance Agreement (Gibson 5 Agreement), each party is responsible for paying its proportionate share of operating costs for the plant. In return, the Company is entitled to approximately 156 MW of capacity and related energy output of the plant. Gibson Unit 5 is equipped with "scrubbers" to be in compliance with sulfur dioxide (SO_2) and particulate matter emissions regulations and programs.

Duke Indiana also installed Selective Catalytic Reduction (SCR) equipment on Gibson Unit 5 for compliance with nitrogen oxide (NO_x) emission regulations.

Duke Indiana, the majority owner of Gibson Unit 5 and the other units at Gibson Station, has the responsibility for fuel procurement, fuel inventory, and operation. For 2019 and 2020, Gibson Station burned an average of 5.8 million tons of coal per year. The coal is purchased through various contracts and the spot market. Wabash Valley reviews Duke Indiana's fuel procurement contracts and practices on a regular basis.

Gibson Unit 5 has a 625 MW net dependable capacity. For modeling purposes, Wabash Valley has forecasted that Gibson Unit 5 retires May 31, 2026; however, Wabash Valley and joint owners are in process of determining the plan, timing and cost for retirement of the unit.

b. Prairie State

In May 2016, Wabash Valley acquired a 5.06% interest in the Prairie State Energy Campus (PSEC) located in Marissa, Illinois, which consists of Prairie State Units 1 and 2 and an on-site captive coal mine. Unit 1 and Unit 2 were placed in commercial operation in June 2012 and November 2012, respectively. The total net capacity of the coal-fired generating facility operated by the Prairie State Generating Company (PSGC) is 1,650 MW. The Company's share totals 83 MW (split evenly between Units 1 and 2). Eight other public power utilities own the remaining 1,567 MW in various percentages of ownership. Operating under a Participation Agreement, each party is responsible for paying its proportionate share of operating costs for the plant.

PSEC was designed and constructed with modern environmental control technologies, including low NO_x burners, mercury extraction using calcium bromide, selective catalytic reduction units to further reduce NO_x, dry and wet electrostatic precipitators to limit particulate emissions, SO_2 scrubbers and hydrated lime injection for acid gas removal.

PSEC's on-site captive coal mine produces bituminous coal from the Illinois Basin. Maximum annual production is approximately 7 million tons. It has proven reserves that are expected to provide the power plant with 100% of required fuel through about 2042. As a result, PSEC is not exposed to volatile coal prices or rising railroad transportation costs.

In September 2021, the Illinois governor signed the Illinois clean energy bill that makes Illinois the first state to require 100% carbon-free energy by 2045. To meet the requirements of this legislation, Wabash Valley has assumed for modeling purposes that Unit 1 will retire on June 1, 2038 and Unit 2 will retire on December 31, 2045 (outside the time horizon of this IRP). Wabash Valley and joint owners have already begun to investigate the economics and technical feasibility of any type of carbon capture, operational changes or other mitigating measures to eliminate carbon emissions from these facilities.

c. Holland Energy

Wabash Valley is a 50% owner of Holland Energy. Hoosier Energy is the other 50% owner. Holland Energy is an approximately 627 MW combined cycle generating facility comprised of two GE Frame 7FA combustion turbines, two Nooter-Eriksen Heat Recovery Steam Generators (HRSG) and a single Toshiba steam turbine. Both combustion turbines are equipped with a dry low-NO_x combustion burner system and inlet-air evaporative cooling. The HRSGs are equipped with SCRs and with large natural gas-fired duct burners to supplement steam production. The HRSGs both supply a single 344 MW Toshiba steam turbine. The facility is equipped with Continuous Emission Monitoring Systems (CEMS) to monitor the NO_x emission from both HRSG stacks. Holland Energy is located on a combined 220-acre tract north of Effingham, Illinois.

The Company oversees natural gas procurement for Holland Energy. Holland Energy purchases natural gas from a single national supplier at market based rates. The supplier utilizes both their firm transportation and storage agreement on the Natural Gas Pipeline Company of America (NGPL) pipeline to service Holland Energy.

The Illinois clean energy bill also impacts this facility. To meet the requirements of this legislation, Wabash Valley has assumed for modeling purposes that Holland Energy will retire on December 31, 2044 (outside the time horizon of this IRP). Wabash Valley and joint owner will investigate the economics and technical feasibility of any type of carbon capture, operational changes or other mitigating measures to eliminate carbon emissions from this facility.

d. Wabash River Highland

In early April 2017, Wabash Valley completed the installation of new dry low-NO_x combustion hardware on the Unit 8 combustion turbine, a GE Frame 7FA referred to as Wabash River Highland CT which operates as a simple cycle peaker using natural gas as its only fuel source. After an upgrade to the compressor and installation of advanced gas path turbine parts which is scheduled for spring 2022, Wabash River Highland CT will have a nominal capacity of 176 MW with a summer capability of 147 MW. The combustion turbine is located in Vigo County, Indiana.

The Company procures the natural gas for Wabash River Highland by purchasing from a national supplier at market-based rates.

Wabash Valley has assumed for modeling purposes that Wabash River Highland will retire on December 31, 2037.

e. Vermillion

The Vermillion generating station consists of eight (80 MW) gas-fired GE Frame 7EA generators. Wabash Valley owns a 37.5% undivided ownership interest in Vermillion or 240 MW. The summer capacity rating for each of the Vermillion units is 74 MW.

Duke Indiana, the majority owner of Vermillion, has the responsibility for fuel procurement and operations.

f. Lawrence

Wabash Valley owns one-third of the Lawrence generating station which consists of six GE LM6000 simple cycle generating units. Hoosier Energy owns the other two-thirds of the facility. Each of these gas-fired units has a summer capacity rating of 43 MW. The Lawrence facility was jointly constructed by Hoosier Energy and Wabash Valley and went into commercial operation in May 2005.

Hoosier Energy, the majority owner of Lawrence, has the responsibility for fuel procurement and operations.

g. Landfill Gas

Wabash Valley has installed landfill gas-fired internal combustion (IC) generating units at existing solid waste landfill sites in central and northern Indiana and purchased a site at an existing solid waste landfill site in central Illinois. Currently, the Company operates fifty Caterpillar 3516 engine-generators and eight Caterpillar 3520 engine-generators at seven Waste Management (WM) landfill sites and one GFL Environmental (GFL) landfill site which in aggregate are capable of generating nearly 53 MW. The IC generators at each site are operated and maintained under contracts with Waste Management of Indiana, Inc. and MacAllister Machinery Company, Inc.

2022 marks a year of transition for the landfill gas plant program. Wabash Valley has entered into 20-year agreements with a third party to sell medium BTU (MBtu) landfill gas produced and collected at three WM sites. The third party will purchase the MBtu landfill gas, convert it into pipeline quality Renewable Natural Gas (RNG) and sell the RNG to an industrial customer(s) under a long-term contract and/or to the transportation market. By 2023, Wabash Valley plans to convert the engine-generators at all three sites to be able to run on natural gas as peaking generation.

h. Solar

Wabash Valley owns seven community solar facilities located in Indiana, Illinois and Missouri.

Resource	kW	In-Service Year
Wanatah, IN	105	2017
Peru, IN	540	2017
Ste. Genevieve, MO	540	2017
Paris, IL	540	2017
LaOtto, IN	960	2019
Perryville, MO	650	2019
Wheatfield, IN	3,448	2019
Total	**6,783**	

i. Power Purchases

Any remaining capacity and energy requirements come from power purchases from various sources. Wabash Valley has a mixture of base, intermediate, load following and peaking power purchase contracts. These contracts may be characterized as both long and short-term contracts. The Company purchases blocks and seasonal amounts of power from numerous suppliers. The major long-term resources are purchased from AEP, Duke Indiana, NextEra, Mercuria and Morgan Stanley. Also, Wabash Valley is currently purchasing 218.4 MW of output from wind turbines and 198 MW of output from solar generation. Furthermore, Wabash Valley has contracted to purchase an additional 199 MW of output from solar generation at an Indiana solar project when it begins commercial operation in 2024. The following table describes the Company's existing purchased power resources.

TABLE 2-8 Wabash Valley's Power Purchases Summary

Wabash Valley's Power Purchases Summary				
Supplier	**Type**	**Expires**	**MW**	**Comments**
AEP	Firm	2033	150	Load Following
Duke Indiana	Firm	2032	70	65% Min. Capacity Factor
Duke Indiana	Unit Peaking	2025	50	
Duke Indiana	Firm	2031	160-180	65% Min. Capacity Factor; 6/1/20-5/31/22 = 160MW 6/1/22-5/31/23 = 170MW 6/1/23-12/31/31 = 180MW
Duke Indiana	Firm	2025	55	50% Min. Capacity Factor
Mercuria	Firm	2019-2023	100	Fixed Price
Morgan Stanley	Firm	2018-2025	100	Fixed Price
Morgan Stanley	Firm	2019-2022	100	Fixed Price
NextEra	Firm	2023-2030	25-75	Fixed Price; 2023 25 MW; 2024 40 MW; 2025-2030 75 MW
NextEra	Firm	2024-2032	50	Fixed Price
Morgan Stanley	Firm	2024-2035	50	Fixed Price
Morgan Stanley	Firm	2026-2032	100	Fixed Price
NextEra	Firm	2028-2037	50-100	Fixed Price; 2028-2032 50 MW; 2033-2037 100 MW
Agriwind	Wind Turbine	2038	8.4	
Pioneer Trail Wind Farm	Wind Turbine	2030	10	
Zimmerman Energy	Landfill Gas	2039	5.6	
Meadow Lake Wind V	Wind Turbine	2037	25	
Meadow Lake Wind VI	Wind Turbine	2038	75.4	
Harvest Ridge Wind Farm	Wind Turbine	2040	100	
Prairie State Solar	Solar	2048	99	
Dressor Plains Solar	Solar	2048	99	
Prairie Wolf Solar	Solar	2034	50	Fixed Price; Capacity only
Speedway Solar Project	Solar	2050	199	Expected to begin commercial operation 1/1/2024
Various Suppliers	Short-Term	Various	Various	Usually 1-2 years in duration

j. Market Resources

Wabash Valley has numerous agreements which provide access to economical market energy and the ability to cover periods of extreme temperature or unplanned outages with emergency energy. These purchases are typically priced at the prevailing market price and do not include a significant demand charge. Additionally, the Company operates in the MISO and PJM energy markets. These markets provide energy to Wabash Valley loads at incremental hourly market prices.

k. Environmental Effects

Gibson Unit 5

Wabash Valley owns a minority share of Gibson Unit 5. Duke Indiana, the majority owner of Gibson Unit 5 and Gibson Station, includes the significant environmental effects from this unit in its IRP. Duke Indiana is currently evaluating options for compliance with and monitoring potential changes to carbon-related rule(s) applicable to electric utility generating units, the rule related to the Disposal of CCR from Electric Generating Utilities and other significant environmental regulations.

Prairie State

Wabash Valley owns a 5.06% share of the coal-fired generating facility operated by the PSGC. PSEC is currently regulated by the Acid Rain Program and the Cross-State Air Pollution Rule (CSAPR). PSGC does not receive Acid Rain Program allowances. Because PSEC commenced commercial operation after January 1, 2010, PSEC receives new unit set-aside allowances for both the CSAPR Annual NO_x and SO_2 program – these allowances are determined during each operating year by the United States Environmental Protection Agency (USEPA). Starting with the 2017 NO_x ozone season and further revised in 2020, USEPA promulgated an update to CSAPR that tightened NO_x ozone season allowances and allocated allowances to PSGC; thus, PSEC is not subject to the new unit set-aside allowance program for the NO_x ozone season. If PSEC is short on allowances for any given program, Wabash Valley will elect to transfer the needed allowances from the Company's accounts, purchase allowances and/or request PSGC to purchase allowances on Wabash Valley's behalf.

PSEC has a Title V air operating permit issued by the Illinois Environmental Protection Agency (IEPA). The facility is equipped with the following types of environmental control technologies:

Type	Description
1. Low- NO_x Burners	Impede the formation of NO_x by lowering the temperature of the boiler flame to control the way coal combusts
2. Selective Catalytic Reduction (SCR)	Injects product into the air stream as it passes over a catalyst, causing NO_x to be converted to nitrogen and water
3. Dry Electrostatic Precipitator (Dry ESP)	Uses electrodes to place an electric charge on large particulates then captured by an oppositely charged plate
4. SO_2 Scrubbers (Scrubbers)	Injects a limestone/water mixture into the air stream, where it reacts to capture the SO_2
5. Wet Electrostatic Precipitator (Wet ESP)	Uses multiple high-voltage fields to attract fine particulates to an electrode, which is washed with water to capture the constituents
6. Mercury Control	Uses calcium bromide

The PSEC removes more than 85% of NO_x, 98% of SO_2, 99% of particulate matter and 95% of mercury.

PSEC requires water to run both the power plant and mine. PSEC has an on-site pond that stores enough water for ~30 days' use or ~778M gallons. Water is pumped 15 miles from the Kaskaskia River, which is a tributary of the Mississippi River. PSEC acquired back-up water rights from the State of Illinois; if the flow of the Kaskaskia River is insufficient, then the State will release water from the Carlyle and Shelbyville Lakes into the Kaskaskia River to ensure sufficient flow. Water intake is permitted and monitored by the U.S. Army Corps of Engineers and the IEPA.

Holland Energy

Wabash Valley is a 50% owner of Holland Energy located in Illinois. The facility is a gas-fired combined cycle combustion turbine. It is currently regulated by the Acid Rain Program and CSAPR. It has a Title V air operating permit issued by the IEPA. The facility is equipped with SCR for NO_x removal. SO_2 emissions from a gas-fired facility are de minimis.

In terms of 2020 SO_2 and NO_x annual emissions, Holland Energy is in the neighborhood of:

SO_2 (tons)	**NO_x (tons)**
<5	~113

As finalized, the USEPA's MATS rule does not apply to this facility as it is gas-fired.

Holland is not a significant generator of solid waste. Solids removed from the treatment of raw (incoming) water from the Kaskaskia River are shipped off-site to a non-hazardous landfill. No on-site landfills are present. Holland is not a large generator of hazardous waste. The CCR regulation, discussed for Gibson Unit 5 above, would not affect Holland as it combusts no coal. Water used within the plant processes comes from the Kaskaskia River. The facility has an intake structure to bring in the raw water and pre-treats the water prior to using it within the facility processes. The Holland Energy facility is permitted to discharge process waters and plant drainage to the Kaskaskia River through an outfall. All storm water and other waters from the plant are permitted to be discharged through two outfalls to an unnamed tributary to Brush Creek. Potable water used at the facility originates from potable wells and sanitary wastewaters are now directed to a local treatment plant.

Holland is subject to the §316(b) Rule for Cooling Water Intake Structures at Existing Facilities.

Wabash River Highland

The Wabash River Highland facility is owned by Wabash Valley. The facility is a natural gas-fired simple cycle peaking unit. It is currently regulated by the Acid Rain Program and CSAPR. It has a Tile V air operating permit issued by the Indiana Department of Environmental Management (IDEM). The facility is equipped with dry low-NO_x burners for NO_x removal. SO_2 emissions from a gas-fired facility are de minimis.

SO_2 and NO_x air emissions on an annual basis are estimated as follows, but will vary from year to year:

SO_2 (tons)	**NO_x (tons)**
~0.4	~25

Similar to Holland, USEPA's MATS rule no longer applies to this facility as it was converted from syngas to natural gas-fired.

Additionally, the plant is not a significant generator of solid waste as an operation. The CCR regulation, discussed for Gibson Unit 5 above, does not affect Wabash River Highland as it combusts no coal.

Because the plant does not utilize water for generation, Wabash River Highland neither consumes nor discharges process water. Therefore, Wabash River Highland is permitted to discharge only storm water and metal cleaning waters.

Simple Cycle Gas Turbines

Significant environmental effects from owned generation assets are modeled and accounted for in the budgeting process for unit operations. Vermillion

Generation Station and Lawrence Generating Station consist of natural gas, simple cycle peaking units. Based on the fact that these units utilize natural gas as a fuel source and run relatively few hours on an annual basis, the emissions are negligible compared to other base load units. Other entities have responsibilities for compliance with the Title V air operating permits at these gas-fired peaker combustion turbine sites. These sites do not generate significant amounts of solid waste.

Landfill Gas

Wabash Valley owns several, small landfill gas generator facilities that are located on landfills owned by WM in Indiana and GFL in Illinois. The WM-related generating facilities are subject to air permits issued by IDEM; but because the sites are owned by WM, the air permits are issued to them. The Illinois facility is subject to air permits issued by IEPA to the Company as owner. These generating facilities do not create significant amounts of solid wastes.

SO_2 & NO_x Allowances

The Acid Raid Program and CSAPR are in effect. Wabash Valley maintains an electronic SO_2 & NO_x emissions inventory. The inventory accounts for allowances held in reserve including any USEPA allocations and allowances from market purchases. The allowance inventory is in accounts under the USEPA's Clean Air Markets Division (CAMD) which sets up a number of checks and balances for oversight of allowance transactions. For those facilities in which the Company is a minor owner (Gibson Unit 5, Lawrence Generating Station, PSEC and Vermillion Generating Station), the SO_2 and NO_x allowances are held in accounts by the majority owner. For Holland Energy in Illinois, Wabash Valley maintains the allowance account under CAMD.

The Company routinely checks on the SO_2 & NO_x status under CSAPR and the Acid Rain Program:

- Amount of SO_2 & NO_x allowances present in the account
- Projected SO_2 & NO_x emissions estimates
- Actual SO_2 & NO_x emissions on a quarterly or semi-annual basis
- Current market price of SO_2 & NO_x allowances
- Tracking of volatility of SO_2 & NO_x allowance market

Carbon Emission Pollution Standards

In August 2015, USEPA finalized a suite of carbon emission pollution standards for new, modified, reconstructed and existing electric generating units. This 2015 standard and subsequent revisions applicable to existing units are pending in court. At this time, Wabash Valley is evaluating a compliance strategy with these changing standards for its facilities, routinely communicating with each state to determine each affected state compliance strategy and monitoring the status of these programs in litigation and currently under review by USEPA. In addition, WVPA is reviewing and evaluating state-specific rules that affect the electric utility industry.

2. Demand-Side Management – Demand Response Resources

Wabash Valley and its Members have successfully included DR resources as part of their power supply portfolio since 1981, when the direct-load control (DLC) program for residential water heaters was established. Prior to 1986, each Member performed individual control of the load management devices to reduce their non-coincident peak billing demands. In 1986, the Company began centralized control of the DR program to more effectively manage overall power costs.

Each year Wabash Valley works with its Members to evaluate the power supply environment and to determine how to incorporate DR programs into the overall power supply portfolio. In 1999, due to rising summer wholesale market prices, the Company added two new programs to its DR arsenal: the commercial and industrial-based Customer Payback Plan and the residential air conditioner load management program. In early 2011, it was decided to suspend the Customer Payback Plan mainly due to lack of participation. Also in 2011, Wabash Valley created two rate riders that will allow end use C&I customers the ability to participate in MISO's Emergency Demand Response Initiative and PJM's Emergency Load Response Program.

Since 2012, Wabash Valley has offered the PowerShift® program, an updated DLC program. To date, 19 of the 23 Members have signed agreements to participate in the PowerShift® program. The PowerShift® program includes participants' water heaters (WH), air conditioners (AC), Wi-Fi thermostats (TH), pool pumps (PP), field irrigators (FI), entire homes (EH), ditch pumps (DP) and grain dryers (GD). In 2018, Wabash Valley introduced an updated commercial and industrial (C&I) load control program under the PowerShift® umbrella program. Five Members are currently participating in the C&I PowerShift® program. Eleven retail customers are participating as of June 1, 2021 providing just over 8 MW of load reduction. Please see the tables below for details as of June 1, 2021.

TABLE 2-9 Wabash Valley's PowerShift® Program Summary

Member	Total KW	WH Switches	AC Switches	FI Switches	EH Switches	PP Switches	DP Switches	GD Switches	Other	Total Switches
Boone	1,092.60	1,821								1,821
Carroll White	2,821.60	3,494	589	3		5				4,091
Citizens	109.80	63	72							135
Corn Belt	8,617.90	489	1,713		1,889					4,091
EnerStar	497.80	139	210	3	21	6				379
Fulton	9,039.80	1,283	48	219						1,550
Hendricks	1,802.00	2,520	290							2,810
Jasper	33.00	55								55
Kankakee	7,359.40	442	945	132			18	8		1,545
LaGrange	11,392.46		135	275						410
Marshall	266.00	100	200			6				306
Miami-Cass	569.60	736	128							864
NineStar	100.00	90	46							136
Noble	3,430.70	12		96						108
Parke	4,376.07	2,184	979	8					16	3,187
Steuben	4,146.40	869	740	69		22				1,700
Tipmont	1,332.20	1,072	689							1,761
Total	**56,987.33**	**15,369**	**6,784**	**805**	**1,910**	**39**	**18**	**8**	**16**	**24,949**

TABLE 2-10 Wabash Valley's PowerShift® Program C&I Summary

Member	Total KW	Notification Time (Hours)
Carroll White	314	6
Heartland	4,628	6
Hendricks	1,920	8
MJM	113	6
Newton	1,042	12
Total	**8,017**	

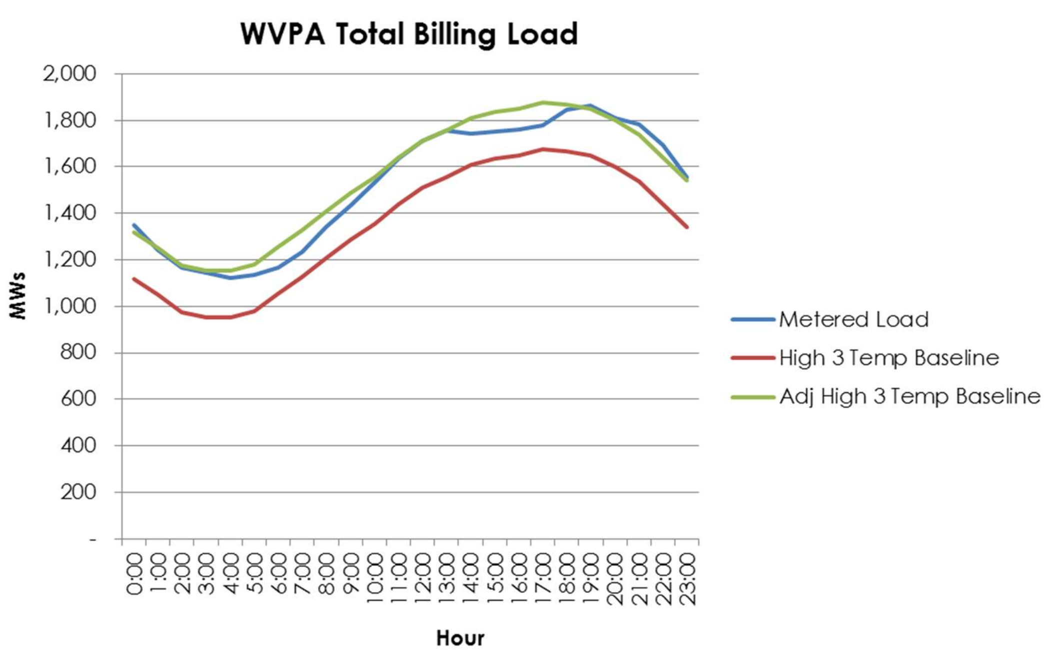
DR programs continue to be an integral part of Wabash Valley's power supply portfolio with the primary purpose to keep power supply costs as low as possible. The Company now approaches DR programs as a resource, just like a peaking plant. The economics, operation, environmental compliance evaluation and planning are all treated similar to a peaking plant. Wabash Valley is engaged with MISO and PJM on matters relating to demand response and the states in which we operate and will provide input on any federal or state plan that impacts Demand-Side Management program design, implementation and compliance with a finalized carbon-related rule affecting electric utility generating units.

a. Goals & Objectives

Wabash Valley and our Members possess a goal of controlling costs and improving efficiency in an effort to supply reliable power at a low and stable cost. In addition, the Company and our Members want to offer the end retail customer the greatest possible value in electric service and to assist them in improving their quality of life.

Marketing at Wabash Valley is a collaborative effort with the Members and is closely tied to the Company's DR efforts. Wabash Valley is working to promote end-use technologies that are beneficial to the retail customer and allow the Company to control operating costs. Wabash Valley currently has approximately 65 MW of peak load reduction enrolled in the PowerShift® program. One of the potential problems with the direct control of customer appliances is the inconvenience to the customer. Wabash Valley is concerned with potential negative impacts on customers and closely monitors this situation. The PowerShift® program has achieved a 75% reduction in total hours of interruption compared to the DLC program that preceded it. The Company collects and analyzes meter data with 5 minute, 15 minute, and 60 minute intervals at the retail and wholesale levels. The measurement and verification of DR events is a significant task since DR is load that has not been consumed and a meter cannot measure the load. Wabash Valley collects all the meter data and performs measurement and verification calculations using historical baseline calculations to provide load reduction values. The graph below is an example of our measurement and verification.

Graph 2-11 PowerShift® Measurement & Verification Example



b. Existing Programs

i. Water Heaters

Electric water heaters that have a two-way communicating advanced metering infrastructure (AMI) network switch installed can participate in the PowerShift® program. Wabash Valley has deemed that each water heater provides 0.6 KW of load reduction. This value was determined using historical analysis, industry best practices and has diversity built in. Under the PowerShift® program, all water heaters are shut off for 100% of the event duration.

ii. Air Conditioners

Air conditioners that have a two-way communicating AMI network switch installed can participate in the PowerShift® program. Wabash Valley has deemed that each air conditioner provides 1.0 KW of load reduction. This value was determined using historical analysis, industry best practices and has diversity built in. Under the PowerShift® program, all air conditioners are cycled off for 50% of the event duration, typically 15 minutes on and 15 minutes off.

iii. Wi-Fi Thermostats

Just launched this year after June 1, 2021, eligible Wi-Fi communicating thermostats can participate in the PowerShift® program. Each thermostat provides an average of 1.0 KW of load reduction. The load reduction is achieved by performing a pre-cool of the home followed by raising the set point temperature by up to 4 degrees during the event window.

iv. Pool Pumps

Pool pumps that have a two-way communicating AMI network switch installed can participate in the PowerShift® program. Wabash Valley has deemed that each pool pump provides 1.0 KW of load reduction. This value was determined using historical analysis, industry best practices and has diversity built in. Under the PowerShift® program, all pool pumps are shut off for 100% of the event duration.

v. Field Irrigation

Field irrigators that have a two-way communicating AMI network switch installed can participate in the PowerShift® program. Wabash Valley has deemed that each field irrigator provides 75% of nameplate (ranging from 3 to 123 KW) pump horse power in KW reductions. Under the PowerShift® program, all field irrigators are shut off for 100% of the event duration. These participants provide 47% of the current PowerShift® load reductions.

vi. Entire Home

Entire home participants currently use an older style switch utilizing one-way VHF communications. Wabash Valley is currently working with the

AMI vendors to develop a two-way switch capable of meeting our needs. The entire home group averages 3.5 KW per participant. Under the PowerShift® program, all participants are shut off for 100% of the event duration; however, each event can only last up to 4 hours per participant.

vii. Ditch Pumps

Ditch pumps that have a two-way communicating AMI network switch installed can participate in the PowerShift® program. Wabash Valley has deemed that each ditch pump provides 75% of nameplate pump horse power in KW reductions. Under the PowerShift® program, all ditch pumps are shut off for 100% of the event duration.

viii. Grain Dryers

Grain dryers that have a two-way communicating AMI network switch installed can participate in the PowerShift® program. Wabash Valley uses the nameplate power rating for each dryer to obtain the KW reduction available. Under the PowerShift® program, all grain dryers are shut off for 100% of the event duration.

ix. C&I Program

The C&I program works with Wabash Valley's Member's larger retail customers to provide a load reduction usually by performing a manual process. Wabash Valley notifies the participant of the PowerShift® event prompting the participant to take the appropriate actions to achieve their load reduction commitment. Wabash Valley measures the event compliance using the participant's hourly meter data.

The PowerShift® program is a registered resource in MISO. This market determines when the program is called and the compensation the Company receives.

3. Demand-Side Management – Energy Efficiency Programs

The goal of Wabash Valley's EE programs is two-fold: deliver cost-effective energy savings and a high level of member satisfaction.

Wabash Valley started offering EE programs to its Member cooperatives in 2008 with a residential new construction program focused on helping builders and homeowners construct a high performance, comfortable, durable and low energy cost home. Since 2008, the Company has worked jointly with our Member cooperatives, retail members and our Power Supply staff to develop attainable savings goals that lessen baseload power supply costs and increase retail member satisfaction throughout the service territory. At Wabash Valley, the POWER MOVES® initiative represents more than wholesale cost savings; it represents a way to help retail members (both residential and commercial/industrial) save on their monthly utility bills.

The POWER MOVES® programs offer many opportunities for participation by members located throughout Wabash Valley territory although none are directly targeted to low-income residential ratepayers. Wabash Valley encourages Member cooperative energy advisors to take weatherization training through the Indiana Community Action Association (INCAA) and to maintain contact with their local Community Action Program (CAP) agencies. Furthermore, Wabash Valley staff maintain relationships at INCCA so that we can educate their trainers and managers about the benefits that electrification of certain equipment can provide their low-income clients. Although not a formal program, Wabash Valley will pay rebates to weatherization agencies for installing qualifying energy efficient equipment in client homes.

Wabash Valley determines the costs, characteristics and other parameters of the residential and C&I energy efficiency programs by conducting research into the technology offered. The Company takes into consideration each technology's purchase cost, operating cost, minimum efficiency, common application in the market, availability in our markets and ease of implementation among other factors. Research is conducted by Wabash Valley staff, Member cooperative staff and sometimes third-party consultants and may include interviews with retail members or contractors.

A brief description of the programs included in the 2021 POWER MOVES® EE program portfolio follows below. Further details of the program can be seen at our PowerMoves.com website.

a. Residential

i. Air Source Heat Pump Rebate

Residential customers are offered a rebate to install a new air source heat pump when they replace an existing electric resistance system, air source heat pump, propane or fuel oil heating system. In certain situations, a rebate is given for heat pumps in new construction homes. New heat pumps must meet minimum efficiency standards. The air source heat pump rebate has been modified to incorporate recent innovations in compressor technology allowing for cold climate heat pumps and ductless heat pumps.

ii. Geothermal Heat Pump Rebate

Residential customers are offered a rebate to install a geothermal heat pump when they build a new home. Additionally, retail customers with existing electric resistance or fossil fuel systems are also eligible for this rebate. New geothermal units must meet minimum efficiency standards.

iii. Dual Fuel Air Source Heat Pump Rebate

Residential customers are offered a rebate to install a new dual fuel air source heat pump when they replace an existing electric resistance system, air source heat pump, propane or fuel oil heating system. In certain situations, a rebate is given for heat pumps in new construction homes. New heat pumps must meet minimum efficiency standards.

iv. Energy Star Variable Speed Pool Pumps

Residential customers are offered a rebate to replace a single speed pool pump with an Energy Star qualified variable speed pool pump.

v. Heat Pump Water Heaters

Residential customers are offered a rebate to install a new heat pump water heater when replacing an existing electric resistance tank water heater. Rebates are also available to install heat pump water heaters in new construction homes.

vi. POWER MOVES® Home Program

Wabash Valley pays the Home Energy Rating System (HERS) fee to encourage residential customers building new homes to follow our specific set of high-performance construction standards. Residential customers and home builders split additional rebates that can be earned based on the home's final HERS rating. Wabash Valley also provides a one-year heating and cooling cost guarantee for homes that qualify for this program. The average size home in this program is 3,000 sq. ft. and has a guaranteed one-year heating cost.

b. Commercial & Industrial (C&I)

i. Lighting Retrofit Incentives

Wabash Valley offers a prescriptive rebate to encourage C&I accounts to replace existing inefficient lighting with new more efficient lighting. Incentive amounts vary based on the type of bulb or fixture being replaced and installed.

ii. HVAC Retrofit Incentives

Wabash Valley offers a prescriptive rebate to encourage C&I accounts to replace existing inefficient heating and cooling systems with new more efficient heating and cooling systems. New equipment must meet minimum efficiency standards.

iii. C&I Custom Retrofit Program

C&I customers who wish to receive incentives for energy efficient equipment that does not fit into any other C&I category are asked to submit energy savings projects for review by an independent third party engineering firm. Incentives are based on the projected amount of energy savings and a set amount per KWh.

iv. Business New Construction Program

The intent of this program is to encourage the construction of energy-efficient commercial/industrial buildings. Incentives are provided to increase building and system efficiency over the base energy code for Indiana, Illinois and Missouri. Wabash Valley has a set list of prescriptive measures, but we will also review projects and offer a custom rebate for items that are not included on the prescriptive list.

Owners/developers who are constructing a new commercial building or a new addition to an existing building, or are conducting a major renovation to an existing building or multi-family dwellings of six or more units are eligible for this program.

c. Estimated Annual and Lifetime Energy Savings

Table 2-12 Energy Efficiency Programs Estimated Energy Savings

Energy Efficiency Program	2020 kWh Savings (Deemed)	Weighted Avg Life of Program (Years)	Life Cycle Savings (MWh)
Existing Homes Mechanical	1,144,677	23.5	26,890
Residential New Construction	57,778	25.0	1,444
C&I Prescriptive	7,540,952	13.6	102,788
C&I Custom	2,178,028	15.0	32,630
Business New Construction	14,347,844	12.7	182,158
Total	**25,269,279**		**345,910**

4. Transmission Resources

Wabash Valley takes service under the PJM tariff for delivery to load in the AEP local balancing area and service under the MISO transmission tariff for Ameren Illinois, Ameren Missouri, AES Indiana, and Duke Indiana local balancing areas. The Company continues receiving grandfathered transmission service under a long-standing interconnection agreement for the NIPSCO area which terminates in January 2025. All ancillary services are coordinated or purchased through these agreements.

In the Duke Indiana transmission pricing zone, along with Duke Indiana and IMPA, Wabash Valley owns a proportionate share of the transmission system referred to as the Joint Transmission System (JTS). The Transmission and Local Facilities Agreement and the Operation and Maintenance Agreement (Transmission Agreement) divides the ownership of the JTS, as well as proportionately divides the operating costs and revenues among the three joint owners. The JTS is under MISO operational control. Duke Indiana, as the majority JTS owner, is directly responsible for planning and operation of the joint system with MISO. The Company coordinates planning with Duke Indiana via committees established within operating contracts between Duke Indiana, IMPA and Wabash Valley. The goal of this arrangement is to plan for an optimal transmission system utilizing a single system design approach.

In the Ameren Missouri planning area, Wabash Valley owns networked transmission assets and has entered into a joint pricing zone agreement with Ameren Missouri. In other local balancing areas, Wabash Valley predominately owns transmission taps that are part of the network integrated transmission system that comprises the balancing area. The Company coordinates with PJM, MISO, and the appropriate transmission owners within both regional transmission organizations (RTOs) regarding both the operation and maintenance of existing transmission lines as well as the planning for new facilities. Furthermore, Wabash Valley provides long-range load forecast information to support coordinated planning within the RTOs.

5. Transmission Impacts on Resource Planning

As described above, Wabash Valley participates within both the MISO and PJM RTOs. The structure of both RTOs inherently incorporates the value of transmission by operating the markets with locational pricing. The locational marginal price (LMP) is influenced by the impact of transmission congestion within the markets. Currently, the Company's load is located primarily in regions with adequate transmission facilities. Congestion is not a major factor in Wabash Valley's overall power portfolio. However, the Company uses financial transmission rights (FTRs) to hedge the cost of the transmission congestion that does exist within the portfolio. Currently, the Company has adequate allocations of FTRs to provide cost hedging for Wabash Valley sources to its load through the existing FTR allocation processes in PJM and MISO. Due to the nature of the FTR processes in the RTOs this may change due to the future availability and configuration of transmission capability.

By utilizing the LMP, the Company does take into account the value of transmission system upgrades. Wabash Valley uses Indiana Hub forecasted market prices as an assumption in the IRP. Wabash Valley allows the market to price the value of expected transmission use and limits in the future relative to the definition of the Indiana Hub. The Company's resources and loads are located generally in or near the Indiana Hub, so the price provides a reasonable estimate of value over the time horizon of the study.

Additionally, both RTOs administer locational capacity markets that incorporate import capability to determine the pricing in the local resource zones. Currently, Wabash Valley's load and the majority of its resources are located in unconstrained zones. MISO and PJM have processes to evaluate and integrate new transmission to improve transmission system reliability and market efficiency.

Wabash Valley provides data and information to MISO and PJM as a part of several processes to support each RTOs overall transmission planning process:

1) Wabash Valley provides load forecasts and planning information to the local balancing/transmission areas and to the RTOs. Both RTOs have

processes to plan for additional facilities in a coordinated manner to meet the reliability needs and improve the value of the transmission system. These planning processes include projects being built for reliability and to improve transmission congestion to reduce cost. As available, the Company uses information from the RTOs to estimate costs and evaluate changes in the system that could impact Wabash Valley's plans.

2) Wabash Valley provides planning information to MISO and PJM for Interconnection Studies as well as to the regional transmission owner/operator for new and/or upgraded facilities required to support load or generation. Wabash Valley informs them of ongoing load growth and generation installations. The result of these interconnection processes is a study which incorporates the Company's proposed facilities. Wabash Valley, in turn, examines the study to extract any information on upgrades or additional costs that should be included in the Company's evaluation of a specific project.

3) Wabash Valley offers or self-schedules its generation to meet the requirements of MISO's and PJM's locational capacity markets. MISO and PJM clear the markets and limit importing capacity between capacity zones. As part of the forecasting process, the Company monitors the price of the capacity auctions and periodically surveys the market to determine locational capacity price.

Distributed Generation

Currently, Wabash Valley has a policy that any customer owned generator greater than 25 kW will sell any excess energy directly to the Company under the net billing concept and not net meter. Any customer owned generator 25 kW or less is managed locally by the Member. Wabash Valley promotes net billing as a way to prevent other Members from subsidizing the customer owned generator due to net metering. Recently, the Company began allowing Members to self-supply up to 5% of the Member's non-coincident peak load. Any Member or customer owned generation is factored into the IRP either through the inclusion of such resource as a generator or utilizing the generator to offset load as a behind the meter resource while being cognizant of any environmental regulations that may impact these generators. If the generator is used to offset load, the amount of peak and energy adjustment depends on the type of generation. If the facility is wind, little adjustment would be made due to the low output and minimal peak reduction impact of intermittent wind. If, on the other hand, the facility is expected to operate at a high capacity factor, the Company would remove the annual energy output and the average kW output of the generator from the load forecast. Wabash Valley will continue to monitor Member self-supply activity and incorporate the effects into future IRPs along with a distributed generation/distributed energy resources forecast.

1. Generation Planning

Wabash Valley's Members' retail customers have completed several distributed generation projects totaling less than 10 MW that are not emergency backup resources. These projects will supply part of the customer's energy requirements, while the local Member will supply the remainder. Wabash Valley's Members are allowed to develop distributed generation projects up to 5% of their non-coincident peak load.

2. Transmission Planning

Wabash Valley coordinates the interconnection of distributed generation with the area transmission owners and the appropriate RTO. The Company provides information as required by their transmission system planning staffs so that appropriate studies can be carried out. This includes information to these operators about the location and operation of customer generation resources. Wabash Valley will provide assistance to its Members on an as-required basis, particularly for those distributed generation facilities requiring interconnection with transmission facilities.

3. Distribution Planning

The Distributed Generation policy calls for the Company to coordinate, as necessary, with the Member serving the distributed generation customer. Wabash Valley facilitates discussions as requested between distributed generation end-use customers and Members to develop a formal Interconnection Agreement.

The Interconnection Agreement generally includes provisions that address:

- Certification, from a qualified electrical engineer, of the reliability and safety of the proposed distributed generation project or facility and interconnection equipment;
- Transmission of power from the distributed generation project or facility to any load utilizing a Member distribution system;
- Reimbursement to Wabash Valley and the Member for the costs of interconnection facilities installed, constructed, or maintained for a distributed generation project or facility;
- Installation of necessary safety and system protection equipment and implementation of operating protocol to assure the safety of Wabash Valley, Member, and other personnel as may be affected by the operation or existence of a distributed generation facility;
- Indemnification of Wabash Valley and a Member by a Customer which owns the distributed generation project or facility against liability for any injuries or damages to person or property which might result from the operation or existence of the distributed generation facility and, upon request, proof of the Customer's ability to financially guarantee the indemnification;
- Responsibility and requirements for the control, operation, and maintenance of the distributed generation project or facility and any related equipment;

- Metering requirements and payment for any net energy exported to the grid from the distributed generation project or facility;
- Wabash Valley and the Member inspection rights of the project; and
- Proof of insurance held by the owner of the distributed generation, both prior to and during commercial operation of the distributed generation, in an amount equaling that which is identified within the Interconnection Agreement.

4. Load Forecasting

As further described in Section 3, the forecast uses regression modeling to project peak demand and energy requirements, but this projection is adjusted as required to reflect the impact of customer owned distributed generation. To date, customer distributed generation projects have had minimal impact on Wabash Valley's load requirements. The Company continues to monitor technology developments in distributed products to determine if future load will be impacted by customer generation or storage.

Section 3
LOAD FORECAST AND FORECASTING METHODOLOGY

Introduction

Since 2016, Wabash Valley has been working to improve our system load forecast. The process improvement is based on constructing member-specific forecast models that account for long-term structural changes as well as expected population and economic growth. To this end, Wabash Valley has adopted an end-use modeling framework developed by Itron, Inc. (Itron) which utilizes Itron's MetrixND® regression modeling software and Forecast Manager™ database. The general approach is to estimate monthly linear regression models that relate system energy and peak demand to constructed end-use model variables for heating, cooling, and other use. The constructed model variables reflect increase in population and economic growth, end-use saturation and efficiency change, and weather conditions.

Wabash Valley presented load forecasts to each of our cooperative Members. The Company's Board approved the final 2021 Power Requirements Study (PRS) for use in the 2022 Budget and 2020 IRP as our Base Case Load Forecast.

Overview

Wabash Valley's membership is comprised of twenty-three Member systems spread throughout three states, two RTOs and six sub-balancing areas. Given wide geographic spread and differences in underlying economies, we recognize the need to analyze and forecast loads at the Member cooperative level. We estimate separate monthly energy (MWh) and coincident peak demand (MW) models for each Member using linear regression; the models incorporate end-use intensity trends as well as county-level economic and weather data specific to the Member service area. We derive Member retail sales by applying distribution loss factors to Member total energy requirement forecasts.

While the forecast is developed at the system delivered energy level, we disaggregate the forecast into residential, commercial and industrial (C&I), and other (primarily street lighting) for presentation to our Members. This disaggregation allows us and our Members to better understand the factors driving local load growth and provides a basis for Member feedback as to the reasonableness of the forecast results.

Monthly residential billing data is used in constructing residential average use and customer regression models for each Member. The average use models incorporate residential end-use intensities for the East North Central Census (ENC) Division derived from the Energy Information Administration's (EIA) Annual Energy Outlook (AEO). Other use sales models are estimated with simple linear trend specification.

We continue to derive C&I sales as the difference between total Member sales and residential and other use sales forecasts. C&I sales data still proves to be a challenge for modeling as C&I sales are only available on an annual basis for many of our Members.

One of the factors that significantly improved our forecast accuracy is capturing end-use efficiency improvements in both the residential and commercial sectors through Member-weighted intensity indices. As we develop our forecast models at the individual Member level, forecasts capture the unique customer mix, economics, and weather conditions associated with the Member service area.

Although the COVID-19 pandemic disrupted electricity consumption in 2020, especially from March to May 2020, Wabash Valley has assumed that the impact will be minimal in the long-term. Therefore, we have not made any specific adjustments for COVID-19 for the 2021 PRS. Figure 3-1 depicts Wabash Valley's load forecast development process.

Figure 3-1 Load Forecast Development Process

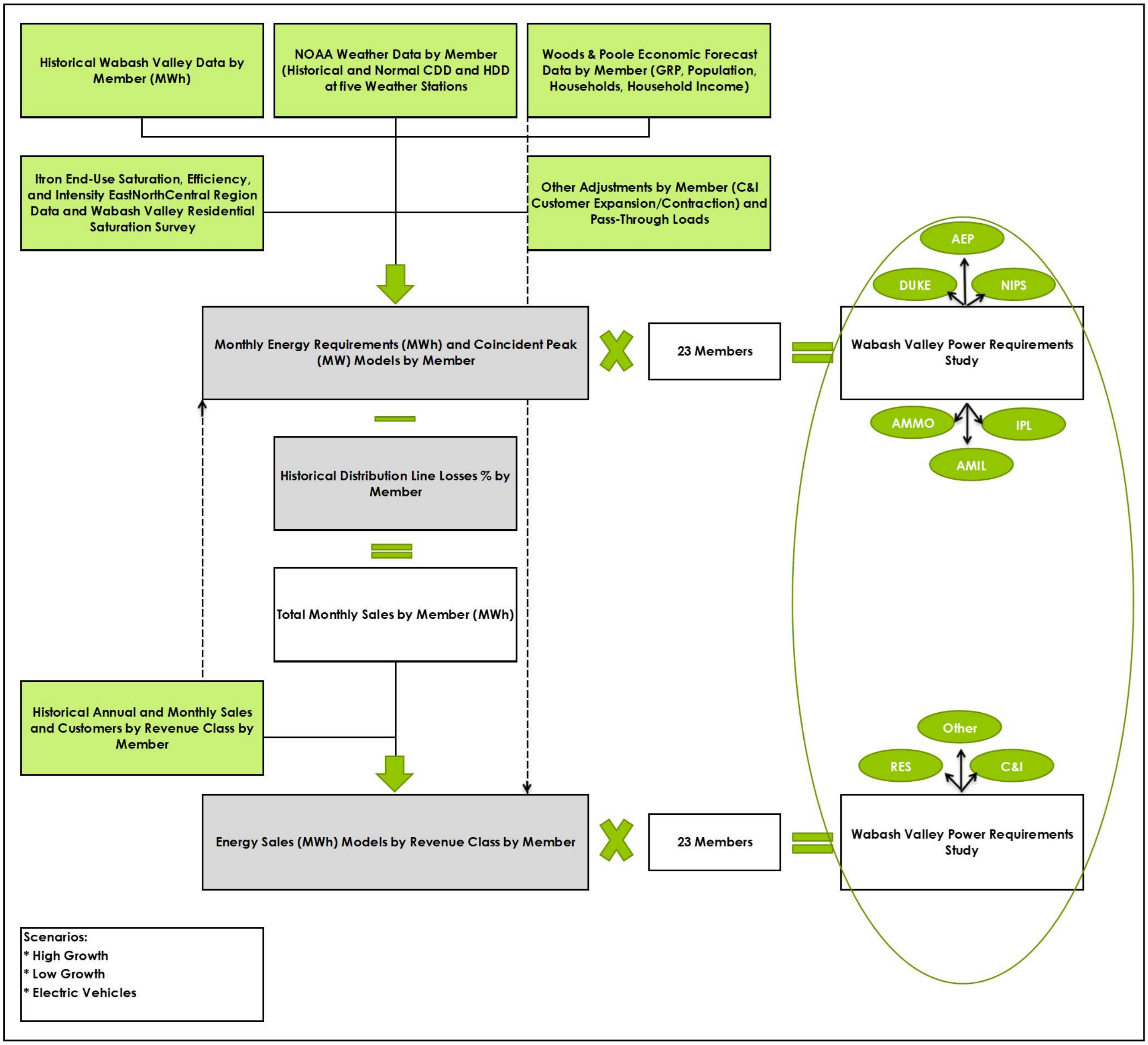
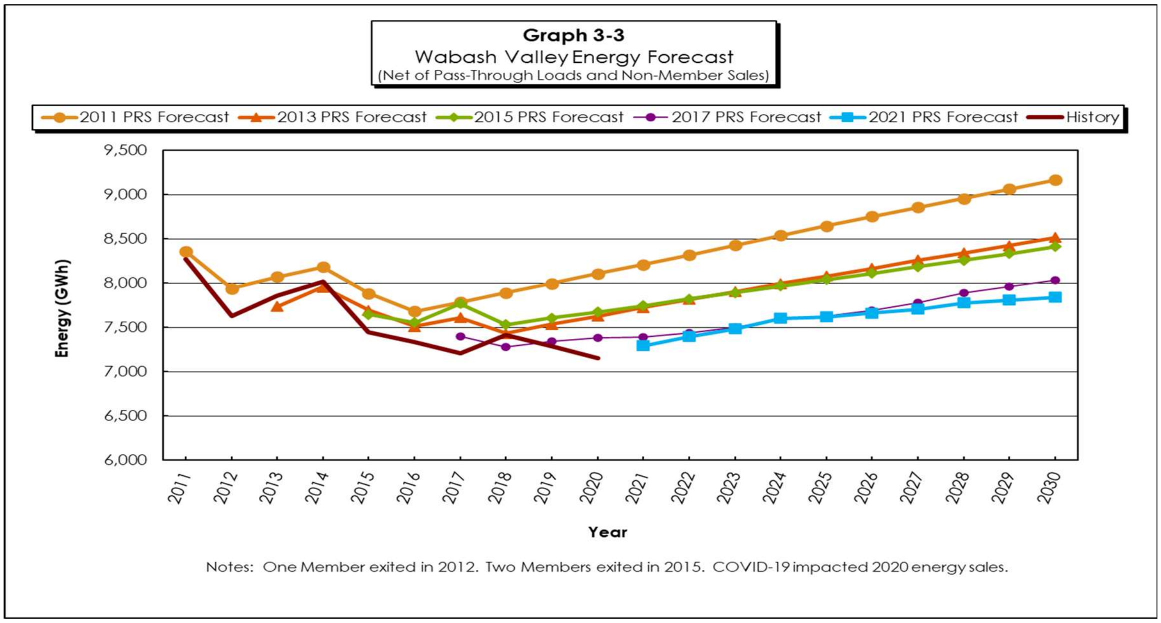


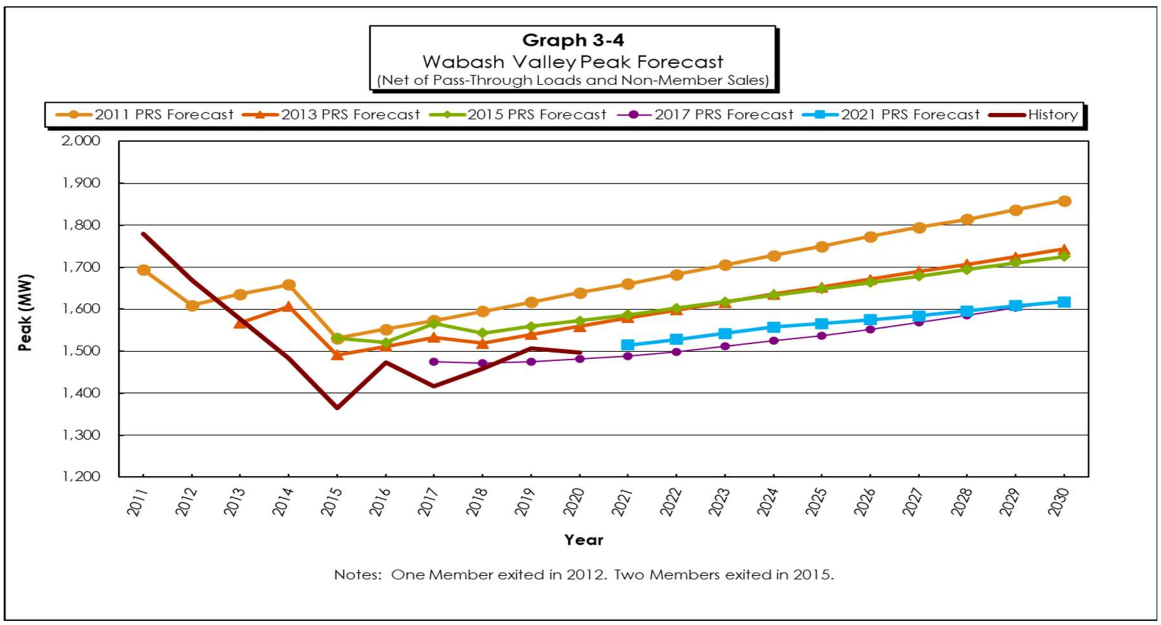
Table 3-2 summarizes annual energy sales and summer coincident peak net of Pass-Through Loads which is referred to as our "Motherload". Pass-Through Loads customers are large power customers with non-conforming load that require separate forecasts. Over the planning horizon, Motherload energy requirements are expected to average 0.8% per year with similar annual growth in system coincident peak demand.

Table 3-2
Base Case Load Forecast Energy Sales and Summer Coincident Peak Forecast (Net of Pass-Through Loads)

Year	Energy Sales (GWh)	% Change	Summer Coincident Peak (MW)	% Change
2021	7,296		1,515	
2022	7,398	1.4%	1,528	0.9%
2023	7,484	1.2%	1,542	0.9%
2024	7,602	1.6%	1,557	1.0%
2025	7,621	0.2%	1,566	0.6%
2026	7,661	0.5%	1,575	0.6%
2027	7,705	0.6%	1,585	0.6%
2028	7,779	1.0%	1,596	0.7%
2029	7,810	0.4%	1,608	0.8%
2030	7,842	0.4%	1,618	0.6%
2031	7,883	0.5%	1,628	0.6%
2032	7,955	0.9%	1,640	0.7%
2033	7,986	0.4%	1,653	0.8%
2034	8,046	0.8%	1,668	0.9%
2035	8,111	0.8%	1,683	0.9%
2036	8,204	1.1%	1,699	1.0%
2037	8,251	0.6%	1,717	1.1%
2038	8,324	0.9%	1,734	1.0%
2039	8,398	0.9%	1,752	1.0%
2040	8,488	1.1%	1,769	1.0%
22-40		0.8%		0.8%

Graphs 3-3 and 3-4 compare the current and prior-year forecasts. The exit of three Members have had a significant impact on the load forecasts. The 2011, 2013, and 2015 PRS Forecasts were each more conservative but still displayed elevated growth. The 2017 PRS Forecast, developed with our new modeling framework, trends more closely to history excluding 2020 energy which carries the impact of COVID-19 driven C&I business closures most strongly felt from March to May 2020. As we move forward, the Company will seek to gauge the performance of the 2021 PRS forecast against actual results and adjust our modeling framework and key inputs and assumptions accordingly.





Key Inputs and Assumptions

Regression analysis is a statistical process for estimating the relationships between a dependent variable and the factors that impact that variable over time. The load forecast is based on regression models that relate monthly energy, demand, customers, and average use (in the residential sector) to changes in weather conditions, household growth, economic activity, and end-use energy intensity. Forecast model drivers are described below:

1. Historical Wabash Valley Data

Historical monthly energy and peak demand are derived from 2007-2020 wholesale hourly load data (MWh) by Member.

2. Weather Data

Historical and normal monthly heating degree days (HDD) and cooling degree days (CDD) are calculated from daily temperature data measured by the National Oceanic and Atmospheric Administration (NOAA) at five weather stations: Fort Wayne IN, Indianapolis IN, Peoria IL, South Bend IN and St. Louis MO.

For energy, Itron selected the base temperature by analyzing the sales/weather relationship and determining the temperature at which heating and cooling loads begin. A temperature base of 55 degrees is used in calculating HDD and a temperature base of 65 degrees is used in calculating CDD. Normal degree-days are calculated by averaging monthly degree-days over a 20-year period (2001 to 2020).

For peak demand, Itron selected the base temperature by analyzing the coincident peak/weather relationship and determining the temperature at which heating and cooling peak demand occurred. A temperature base of 50 degrees is used in calculating peak HDD and a temperature base of 70 degrees is used in calculating peak CDD. Normal peak-day degree-days are calculated over a 10-year period (2011 to 2020) using a *rank and average* approach. Rank and average entails *ranking* monthly peak-day HDD and CDD within each year from the highest to the lowest value and then *averaging* across the ten-year period. The resulting peak-day degree-days are then mapped to specific months based on the likelihood of where they will occur (e.g., the highest peak-day CDD is mapped to July and the highest peak-day HDD is mapped to January.)

3. Economic Data

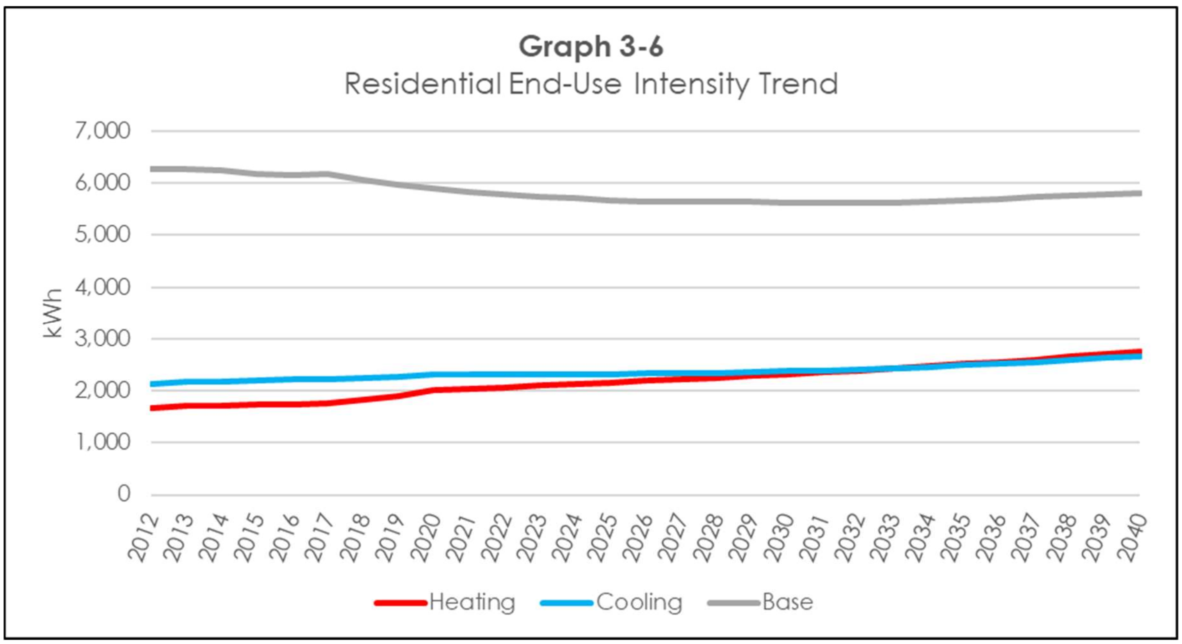
The base load forecast incorporates Woods & Poole 2020 county forecasts of Gross Regional Product (GRP), population, number of households and household income. We derive Member-level, economic data by weighting economic data across counties based on the number of customers in each county. Woods & Poole project population growth on par with historical growth across the counties served by our Members. Projected household growth slows from the historical growth as household formation slows. GRP and household income growth are strong tracking U.S. economic growth. Table 3-5 shows forecasted economic compounded annual growth rates (CAGR) for the Company as a whole.

Table 3-5 Key Composite Economic Variables – CAGR

Variable	2022-2040 %	2014-2020 %
GRP	1.7%	2.2%
Population	0.5%	0.5%
Households	0.4%	0.9%
Household Income	2.1%	2.7%

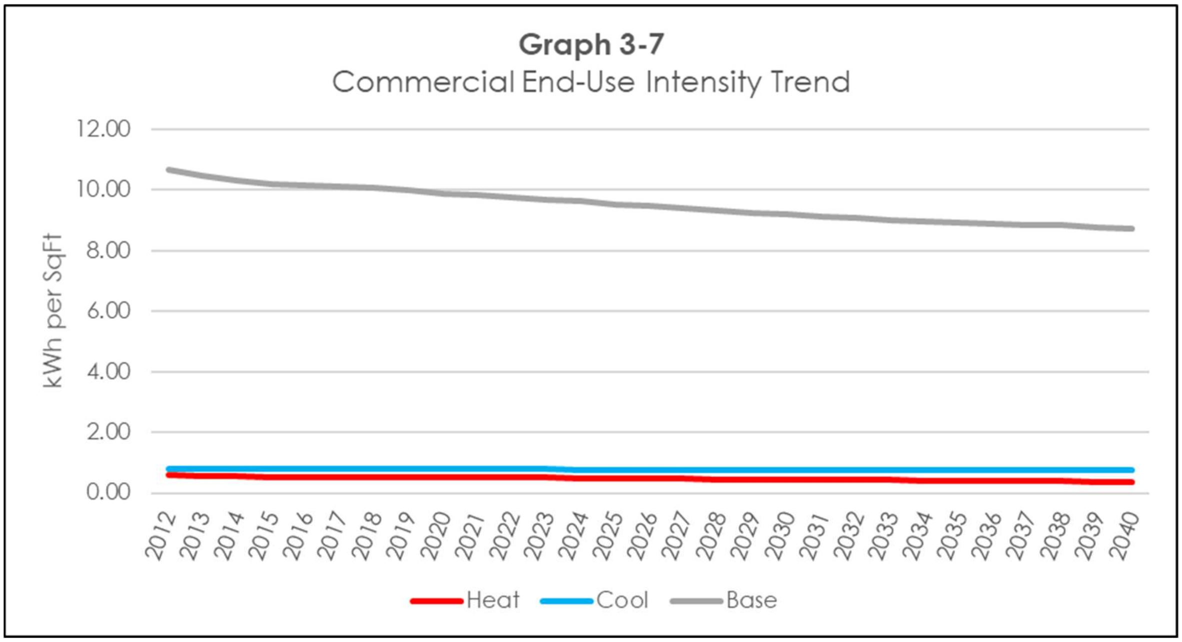
4. End-Use Appliance Saturation and Efficiency Trends Data

End-use energy intensity projections start with EIA 2020 appliance saturation and efficiency projections for the ENC U.S. Census Division (this includes Illinois, Indiana, Ohio, Michigan and Wisconsin). End-use energy intensities are derived by combining end-use saturation and efficiency projections. Itron has developed and maintains historical and projected end-use data for Itron's Energy Forecasting Group (EFG) members. Residential end-use saturation estimates are adjusted to reflect results from Wabash Valley's 2020 residential saturation survey. Graph 3-6 shows residential heating, cooling and base-use intensity trends.



EIA's end-use efficiency projections reflect both new standards and regional energy efficiency program activity. In total, residential intensities are expected to increase 0.5% over the long-term. Base-use (non-weather sensitive end-uses) declines as a result of improving end-use efficiency (e.g., refrigerators, freezers, dryers, water heaters) but is countered by increasing miscellaneous loads (plug loads). Heating and cooling intensities increase largely driven by expected growth in heat pumps.

Graph 3-7 shows commercial end-use intensity trends for the ENC Census Division. Commercial intensities are measured in kWh per square foot. Commercial intensities decline 0.6% per year with ventilation and lighting efficiency improvements having the largest impact. We assume end-use intensities in Wabash Valley's service area track that of the ENC Census Division.



5. Large Customer Load Adjustments

Large changes in load due to customer activity will not necessarily be captured in regression models based on historical load data. Limited energy and demand adjustments (spot load adjustments) are made to account for specific customer business activity that may be the result of business expansion/contraction or the addition or loss of a major customer. Spot load adjustments are provided by Member cooperative staff or developed through internal insights and discussions.

Table 3-8
Spot Load Adjustments

Year	Energy Sales (GWh)	Summer Coincident Peak (MW)
2022	14.8	2.4
2023	61.7	9.4
2024 - 2040	114.3	15.2

Wabash Valley also forecasts Pass-Through Loads. Pass-Through Loads customers are large power customers with non-conforming load who have the ability to customize their power supply portfolio based on their respective risk tolerances. A separate forecast is developed for each Pass-Through Loads customer utilizing regression models and information provided by each customer meshed with internal insights and discussions. Pass Through Loads are not included in the total energy or peak load managed by Wabash Valley. However, the large power customers are included in Wabash Valley's total planning load because the Company has the ultimate responsibility to meet the large power customers' energy requirements and make purchases at market to meet the minimum reliability requirements. Wabash Valley and our Members have minimal risk related to these Pass Through Loads. Wabash Valley works closely with each of the large power customers to purchase defined products for energy from bilateral counterparties and/or to purchase additional energy, capacity and transmission requirements from the applicable RTO energy, capacity and transmission markets. These costs are "passed-through" directly to each customer.

The Pass-Through Loads' energy sales and summer coincident peak demand are reflected in a separate column in Table 3-15 Total Member System Requirements and Table 3-18 Member Summer Coincident Peak Demand, respectively.

6. Historical Member Sales Data

Historical retail sales (kWh), customers and revenue are provided by each Member. Residential data is available on a monthly basis, and C&I and Other are available on an annual basis.

Many of Wabash Valley's Members have implemented advanced metering infrastructure (AMI) but we do not have access to this granular level detail. In Wabash Valley's next load forecast survey, we plan to ask our Members about current and planned AMI activity and potential applications associated with load analysis.

7. Demand-Side Management

Potential Demand Response (DR) and future program-related energy efficiency (EE) savings are treated as a resource rather than a reduction to load.

8. Electric Vehicles (EV)

Wabash Valley's 2021 PRS does not project the impact of EVs in our base case load forecast as EV adoption in the Company's service territory has been modest to date[2]. The technology is still gaining momentum; and, adoption in rural areas will lag until infrastructure and testing has occurred in urban areas. Although a transition of the American economy to EVs would also transform electricity consumption magnitude and patterns, the Company does not expect such a transition at a meaningful level to occur in our service territory within the next few years. For this IRP, Wabash Valley has projected the impact of EVs as an alternative forecast. The Innovation Committee plans to research potential EV impacts in the coming months.

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[2] Desai, J., Mathew, J.K., Li, H. and Bull-ock, D.M. (2021) Analysis of Electric and Hybrid Vehicle Usage in Proximity to Charging Infrastructure in Indiana. *Journal of Transportation Technologies*, **11**, 577-596. doi: 10.4236/jtts.2021.114036.

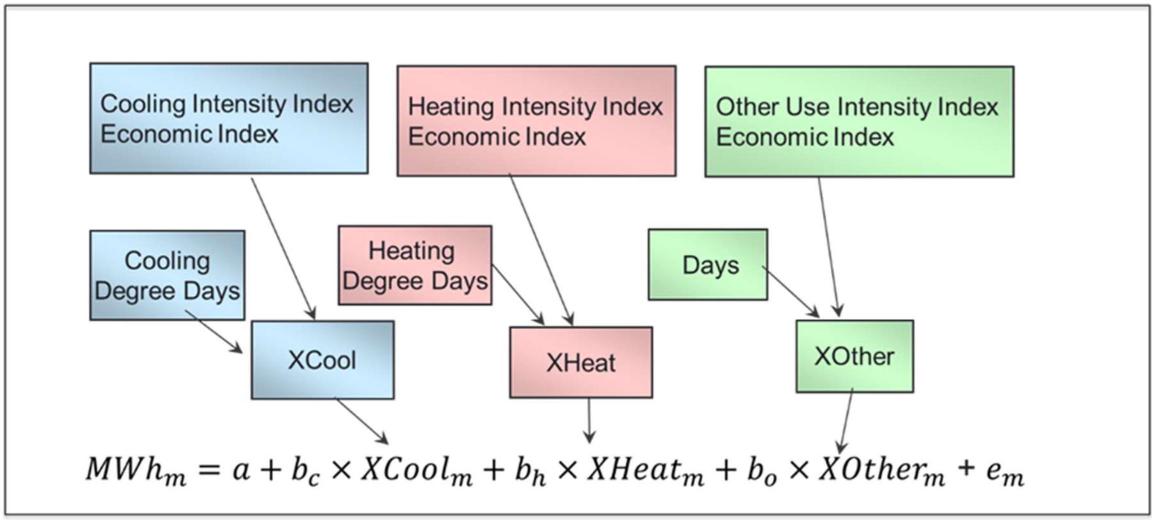
Methodology

1. Energy Requirements Model

Delivered energy (MWh) and coincident peak demand (MW) forecasts are derived for each Member using an end-use model structure initially implemented by Itron.

The model structure is to define delivered monthly energy (m) in terms of Member heating (XHeat), cooling (XCool), and non-weather sensitive (XOther) energy requirements. Figure 3-9 shows the model structure.

Figure 3-9 Delivered Energy Model Structure



Model coefficients (bc, bh, and bo) are estimated using linear regression. XCool and XHeat interact with end-use intensity trends, economic drivers and weather conditions. XOther interacts with Other Use intensity trends, economic drivers and number of days. The estimated model coefficients essentially calibrate system level heating, cooling and base-use energy requirements to total delivered Member energy. A description of the model variables is summarized below:

Economic Index. The economic index weights service area number of households (*HH_IDX*) and gross regional product (*GDP_IDX*). The index is designed to capture long-term customer growth and economic activity as reflected in gross regional product. For example, the economic index for one Member is calculated as:

- EconIdx = HH_IDX$^{\wedge 0.8}$ * GDP_IDX$^{\wedge 0.2}$

Households (HH_IDX) and Gross Regional Product (GDP_IDX) are indexed to a common year (2009) and combined such that the weights equal 1.0. For many Members, number of households has a much stronger weight. The weights are determined by evaluating out-of-sample model statistics for different sets of weights.

The economic data is provided by county. An economic data series is derived for each Member based on their location. For Members that span more than one county, the economic data series is weighted to reflect the number of customers served in each county.

End-Use Intensity Index. End-Use Intensity Indexes are developed for heating, cooling, and other use based on EIA's end-use saturation, efficiency, and intensity forecasts for the ENC Census Division. Residential intensities are adjusted to reflect the Company's residential appliance saturation survey. Residential and commercial intensities are weighted to reflect the mix of residential and commercial sales within the Member service area. For example, the cooling intensity index for one Member is calculated as:

- Cool_IDX = ResCool_IDX$^{\wedge 0..60}$ * ComCool_Idx$^{\wedge 0.40}$

Similar weighted indices are constructed for Heating and Other Use.

Model Variables. Cooling (XCool), Heating (XHeat), and Other Use (XOther) model variables are constructed by combining the economic and intensity indices with Member service area CDD, HDD, and number of calendar days. Model variables are calculated as:

- XCool = CDD65_Idx * Econ_Idx * Cool_Idx
- XHeat = HDD55_Idx * Econ_Idx * Heat_Idx
- XOther = Days_Idx * Econ_Idx * Other_Idx

The variables are interactive as the impact of one variable on energy requirements depends on the other. The impact of CDD for example can be expected to increase with customer growth and economic activity and decrease with improvements in cooling efficiency.

The cooling index (Cool_Idx) incorporates information about residential and commercial cooling equipment saturation, efficiency trends, residential thermal shell integrity and size of homes. The economic index variable (Econ_Idx) reflects customer growth and regional economic activity. The CDD Index (CDD65_Idx) captures monthly variation due to summer weather conditions.

The heating index (Heat_Idx) incorporates information about residential and commercial heating equipment saturations, efficiency trends, residential thermal shell integrity and size of homes. The economic index variable (Econ_Idx) reflects customer growth and regional economic activity. The HDD Index (HDD55_Idx) captures monthly variation due to winter weather conditions.

XOther incorporates information about residential and commercial base load appliance and equipment saturation and efficiency trends (Other_Idx). The economic index variable (Econ_Idx) reflects customer growth and regional economic activity. The Days Index (Days_Idx) captures monthly variation due to the number of days in the month.

Binary Variables. Monthly binary variables are used to account for large monthly energy variations that are not captured by the model variables – XHeat, XCool and XOther. Other than number of days and the weather variables, the model variables reflect long-term economic and end-use energy intensity trends that are constructed from annual data series. Binary variables allow us to isolate short-term monthly variations that are not weather-related or captured in the number of days. Binary variables are also used to capture seasonal variation and shifts in load resulting from loss or gain of major customers. Accounting for variations that are not directly related to model variables strengthens the model's ability to capture long-term usage trends.

Capturing Efficiency Improvements. The constructed end-use model variables and estimation process captures both end-use standards and regional efficiency program activity. EIA estimates end-use specific efficiency program savings within the Census Division. The information is used to help calibrate the end-use choice models such that a greater proportion of high efficient technology options are selected. In turn average stock efficiency increases at a slightly higher rate.

The model estimation process also contributes to capturing efficiency activity by calibrating the end-use model variables to actual delivered energy.

2. Coincident Peak Model

The coincident peak demand models are based on a model specification similar to that of the energy models. The difference is that the model variables are constructed using monthly coincident peak-day CDD and HDD. Peak-day CDD and HDD are determined by finding the average daily temperature for each weather station that occurred on the day of the system peak. For modeling, each Member is assigned to one of five regional weather stations based on that Member's geographic location. Model variables are constructed as:

- PkXCool = PkCDD70_Idx * Econ_Idx * Cool_Idx
- PkXHeat = PkHDD50_Idx * Econ_Idx * Heat_Idx
- PkXOther = Econ_Idx * Other_Idx

Seasonal variation in base-use is captured with monthly binaries.

3. Sales to System Model

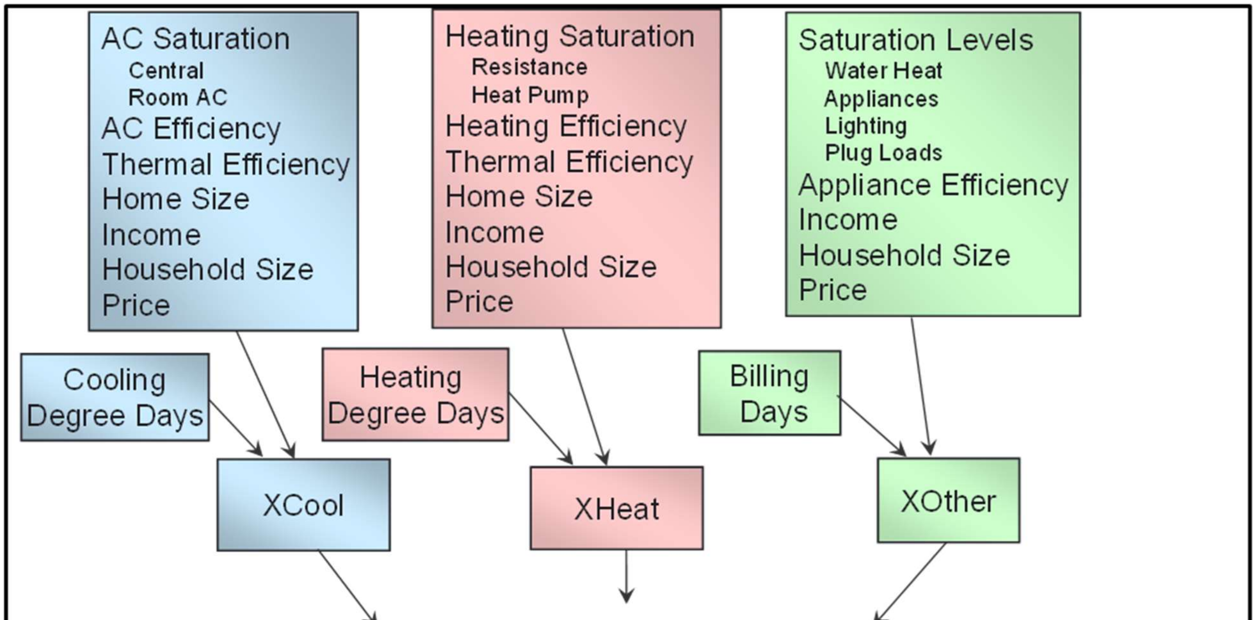
Member sales are based on the Member system energy requirements forecast. Historical *sales to energy ratios* are calculated for each Member. A simple regression model is used to project the ratio through the forecast period. Member sales forecasts are then derived by multiplying the Member energy forecast by the *sales to energy ratio* forecast. On average, the *sales to energy ratio* is 0.958 implying a system average distribution loss factor of 4.2%.

Customer class sales (residential, commercial, and other use) are derived for each Member. Monthly regression models are estimated for residential and other use sales are projected with exponential smoothing models. We calculate monthly commercial sales as total retail sales minus residential and other use; historical data does not support directly estimating monthly commercial sales models.

4. Residential Customers and Average Use Models

The residential sales forecast is derived as the product of customer and average use forecasts. Customer forecast models are simple regression models that relate monthly customers to number of households in the counties served by the Member. Residential average use forecast is derived from a monthly Statistically Adjusted End-Use (SAE) model. Similar to the system model, monthly average use is expressed in terms of heating requirements (XHeat), cooling requirements (XCool) and other use (XOther). The constructed model variables incorporate household income, household size, weather conditions, and end-use energy intensities. Models also include monthly binaries to account for monthly variation not captured by the model variables and binaries for large residuals that cannot be explained with available data. Figure 3-10 shows the residential average use model.

Figure 3-10 Residential Average Use Model Structure



$$AvgUse_m = a + b_c \times XCool_m + b_h \times XHeat_m + b_o \times XOther_m + e$$

5. Other Classifications Models

Simple linear regression with a trend variable or exponential smoothing models are used to forecast Member sales classified as *Other*. Other sales include: Seasonal, Irrigation, Public Street & Highway Lighting, Other Sales to Public Authority and Sales for Resale.

6. Non-coincident Peak to Coincident Peak Model

Member's non-coincident peak demand forecast is based on the historical relationship between the Member's own peak (non-coincident demand) and

Member's system coincident peak. We used historical Member load data to construct a monthly demand ratio of own peak to coincident peak demand. A simple regression model is used to project the demand ratio over the forecast horizon. We then derived a non-coincident peak demand forecast by multiplying the coincident peak demand forecast with the demand ratio forecast.

7. Energy and MW Ratio Models

Fifteen of Wabash Valley's twenty-three Members serve load within a single sub-balancing area. The other eight Members serve load within two or more sub-balancing areas. For these eight Members, we allocated load to the sub-balancing areas based on historical sub-balancing area load ratios.

Forecast Model Assessment

We evaluated model in-sample statistics to assess the models' explanation of historical load variation. Key model statistics include the R-squared, Adjusted R-squared, Mean Absolute Percent Error (MAPE) and Durbin-Watson statistic. Overall, statistics indicated strong model fit. Member energy requirements models' Adjusted R-Squared ranges from 0.914 to 0.985 with an average Adjusted R-Squared of 0.949. Average Member energy model MAPE is 2.3%. Monthly coincident peak demand variation tends to be a bit higher than energy as coincident peak demand is determined partly by simultaneous demand of other Members. Coincident peak models' Adjusted R-Squared ranges from 0.802 to 0.954; the average across all models is 0.894. The average coincident peak model MAPE is 4.3%. Table 3-11 summarizes the model statistics.

Table 3-11 Model Statistics

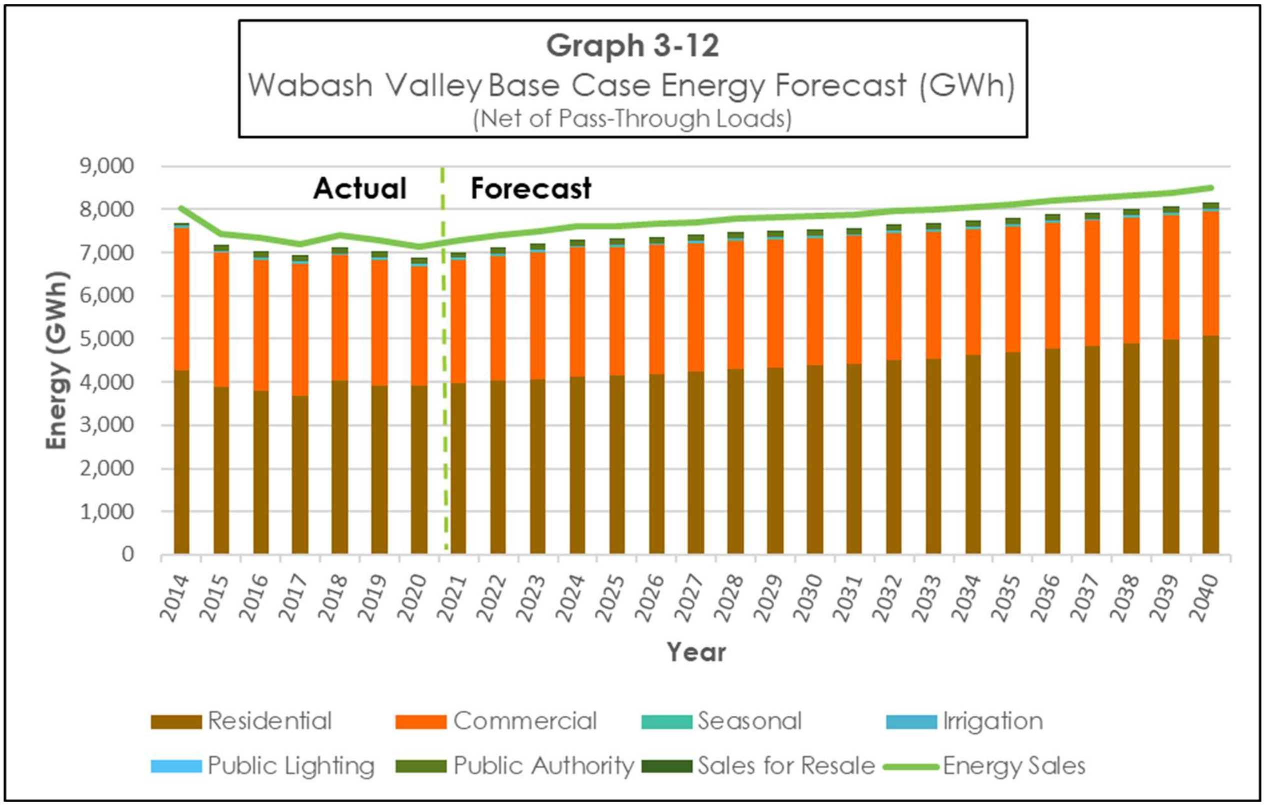
Model	Statistic	Range	Average	Median
Energy Requirements	R-squared	92.3% - 98.7%	95.3%	95.3%
	Adj R-squared	91.4% - 98.5%	94.9%	94.9%
	MAPE	1.4% - 3.3%	2.3%	2.2%
	Durbin-Watson	1.8 – 2.2	2.0	2.0
Coincident Peak	R-squared	82.1% - 96.0%	90.5%	91.7%
	Adj R-squared	80.2% - 95.4%	89.4%	90.4%
	MAPE	3.3% - 6.3%	4.3%	4.1%
	Durbin-Watson	1.8 – 2.2	2.0	2.0

We also examined model predicted values and residuals as part of the model assessment task. This includes looking for residual patterns (ideally we would not find any pattern) and identifying and correcting for large outliers.

Furthermore, we assessed forecasted energy, peak, and sales growth rates for consistency against household, gross regional product, energy intensity trends and combination of these variables. Given strong historical and projected efficiency gains, long-term energy requirements track lower than regional economic growth projections. At the individual Member level, annual energy requirements for 2022 to 2040 average between 0.2% to 2.2% growth; coincident peak demand growth averages between 0.2% and 1.8%. The range of these average growth rates reflects the diversity of our Member systems.

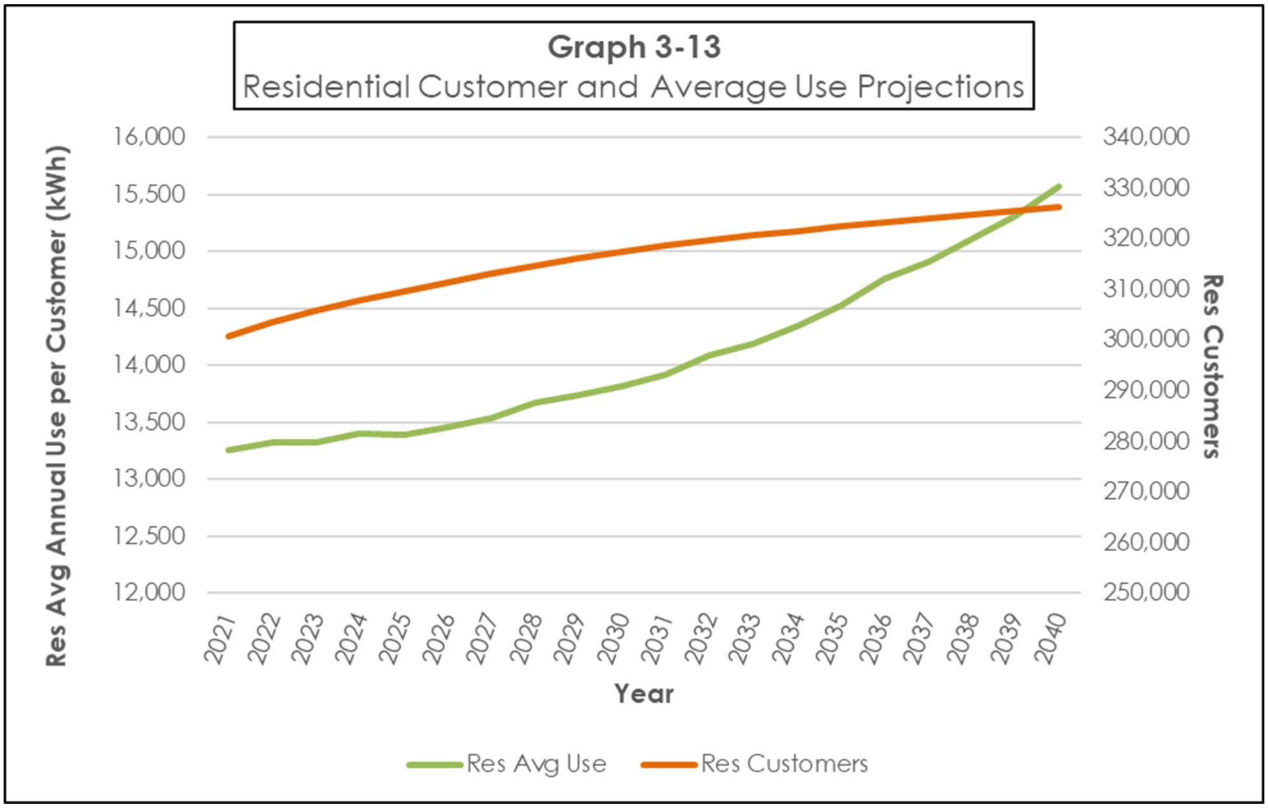
Base Case Forecast Result

We develop total system energy requirements, peak demand, and class sales by aggregating Member-level forecasts. Graph 3-12 illustrates Wabash Valley's base case wholesale energy sales and Members' retail sales by revenue class.



Through 2040, system energy requirements are expected to average 0.8% annual growth. From 2022 to 2040, residential sales increase by 1.3% annually and commercial sales and the other revenue classes are essentially flat.

Forecasted residential sales are driven by a combination of slow customer growth and an increase in average use. On a system-wide basis, residential customers are expected to grow by an average 0.4%. Residential customer growth is mostly concentrated in the more suburban service territory directly surrounding Indianapolis. Average use growth is slight in the front half of the forecast but is projected to accelerate in the back half growing by 0.9% over the entire forecast horizon. Graph 3-13 depicts Wabash Valley's residential customer and average use projections.

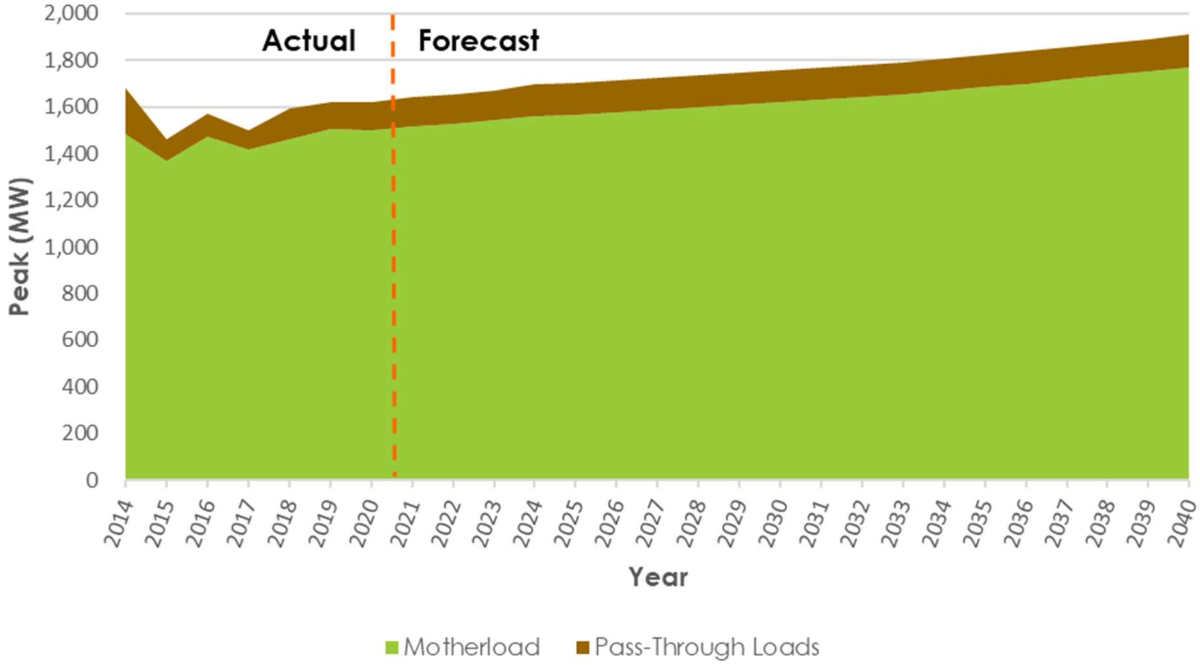


We derive the commercial sales forecast by subtracting residential and other customer classes from total retail sales. Although the small and large commercial revenue classes are not specifically modeled, Member commercial sales forecasts are consistent with forecast assumptions. On an aggregate basis, commercial sales are projected to increase through 2024, flatten for the remainder of the decade and then gradually decline. By 2040, commercial sales projections are essentially flat to 2022. The commercial sales forecast is justifiably lower as commercial sector end-use intensity projections are expected to decline as a result of federal energy efficiency standards and technological improvements particularly in ventilation and lighting. Additionally, both GRP and household projections are lower than in the 2014 to 2020 period.

In the last few years, Wabash Valley has more consistently started obtaining historical monthly C&I sales data from the majority of our Members. We will continue to perform analysis to evaluate how well each Member's forecast by class compares to actual results and consider implementing a bottom-up C&I model for those Members whose individual load forecast may need improvement and for which monthly C&I data is available.

Summer coincident peak demand is projected to increase 0.8% per year, reaching 1,769 MW in 2040 for our Motherload and 1,908 MW including Pass-Through Loads. Graph 3-14 shows historical and forecasted summer peak demand for our Motherload and additional Pass-Through Loads. Wabash Valley historical load peak demand by customer class is not readily available and the Company does not forecast peak demand by customer class.

Graph 3-14
Wabash Valley Base Case System Peak Demand Forecast (MW)



Tables 3-15 through 3-18 provide system forecast details.

Model inputs, results and statistics are included in Appendix G in electronic format.

Table 3-15

WABASH VALLEY POWER ASSOCIATION 2021 Base Case Load Forecast Total Member System Requirements							
Year	Notes	Sales Net Pass-Through (GWh)	% Growth	Pass-Through (GWh)	% Growth	Total System Sales (GWh)	% Growth
2014		8,018		1,628		9,646	
2015	[1]	7,443	-7.2%	1,088	-33.2%	8,531	-11.6%
2016		7,332	-1.5%	618	-43.2%	7,950	-6.8%
2017		7,207	-1.7%	706	14.2%	7,913	-0.5%
2018	[2]	7,411	2.8%	980	38.8%	8,391	6.0%
2019		7,291	-1.6%	969	-1.1%	8,260	-1.6%
2020		7,149	-1.9%	1,029	6.2%	8,178	-1.0%
2021	[3]	7,296	2.1%	983	-4.5%	8,279	1.2%
2022		7,398	1.4%	1,015	3.3%	8,413	1.6%
2023		7,484	1.2%	1,023	0.8%	8,507	1.1%
2024		7,602	1.6%	1,066	4.2%	8,668	1.9%
2025		7,621	0.2%	1,104	3.6%	8,725	0.7%
2026		7,661	0.5%	1,107	0.3%	8,768	0.5%
2027		7,705	0.6%	1,107	0.0%	8,812	0.5%
2028		7,779	1.0%	1,107	0.0%	8,886	0.8%
2029		7,810	0.4%	1,107	0.0%	8,917	0.3%
2030		7,842	0.4%	1,107	0.0%	8,949	0.4%
2031		7,883	0.5%	1,107	0.0%	8,990	0.5%
2032		7,955	0.9%	1,107	0.0%	9,062	0.8%
2033		7,986	0.4%	1,107	0.0%	9,093	0.3%
2034		8,046	0.8%	1,107	0.0%	9,153	0.7%
2035		8,111	0.8%	1,107	0.0%	9,218	0.7%
2036		8,204	1.1%	1,107	0.0%	9,311	1.0%
2037		8,251	0.6%	1,107	0.0%	9,358	0.5%
2038		8,324	0.9%	1,107	0.0%	9,431	0.8%
2039		8,398	0.9%	1,107	0.0%	9,505	0.8%
2040		8,488	1.1%	1,107	0.0%	9,595	0.9%
AVERAGE GROWTH RATES							
20-25		94	1.3%	15	1.4%	109	1.3%
25-30		44	0.6%	1	0.1%	45	0.5%
30-35		54	0.7%	-	0.0%	54	0.6%
35-40		75	0.9%	-	0.0%	75	0.8%
20-40		67	0.9%	4	0.4%	71	0.8%
22-40		61	0.8%	5	0.5%	66	0.7%

[1] Two member cooperatives left Wabash Valley in 2015. This forecast reflects the departure of one member on 1/1/2015 and one member on 7/1/2015.

[2] Two accounts moved onto the Pass-Through rate on 1/1/2018.

[3] One account forecasted to move onto the Pass-Through rate in 2021.

Table 3-16

WABASH VALLEY POWER ASSOCIATION

2021 Base Case Load Forecast
Member System Requirements Net of Pass-Through Loads

Year	Notes	Energy Net Distr. Losses (GWh)	% Growth	Distribution Line Losses	Energy Sales (GWh)	% Growth
2014		7,676			8,018	
2015	[1]	7,142	-7.0%	4.0%	7,443	-7.2%
2016		7,013	-1.8%	4.4%	7,332	-1.5%
2017		6,915	-1.4%	4.1%	7,207	-1.7%
2018	[2]	7,111	2.8%	4.0%	7,411	2.8%
2019		7,002	-1.5%	4.0%	7,291	-1.6%
2020		6,846	-2.2%	4.2%	7,149	-1.9%
2021	[3]	6,992	2.1%	4.2%	7,296	2.1%
2022		7,090	1.4%	4.2%	7,398	1.4%
2023		7,172	1.2%	4.2%	7,484	1.2%
2024		7,285	1.6%	4.2%	7,602	1.6%
2025		7,303	0.2%	4.2%	7,621	0.2%
2026		7,341	0.5%	4.2%	7,661	0.5%
2027		7,384	0.6%	4.2%	7,705	0.6%
2028		7,454	0.9%	4.2%	7,779	1.0%
2029		7,484	0.4%	4.2%	7,810	0.4%
2030		7,515	0.4%	4.2%	7,842	0.4%
2031		7,554	0.5%	4.2%	7,883	0.5%
2032		7,623	0.9%	4.2%	7,955	0.9%
2033		7,653	0.4%	4.2%	7,986	0.4%
2034		7,711	0.8%	4.2%	8,046	0.8%
2035		7,773	0.8%	4.2%	8,111	0.8%
2036		7,861	1.1%	4.2%	8,204	1.1%
2037		7,907	0.6%	4.2%	8,251	0.6%
2038		7,976	0.9%	4.2%	8,324	0.9%
2039		8,048	0.9%	4.2%	8,398	0.9%
2040		8,133	1.1%	4.2%	8,488	1.1%
AVERAGE GROWTH RATES						
20-25		91	1.3%		94	1.3%
25-30		42	0.6%		44	0.6%
30-35		52	0.7%		54	0.7%
35-40		72	0.9%		75	0.9%
20-40		64	0.9%		67	0.9%
22-40		58	0.8%		61	0.8%

[1] Two member cooperatives left Wabash Valley in 2015. This forecast reflects the departure of one member on 1/1/2015 and one member on 7/1/2015.

[2] Two accounts moved onto the Pass-Through rate on 1/1/2018.

[3] One account forecasted to move onto the Pass-Through rate in 2021.

Table 3-17

WABASH VALLEY POWER ASSOCIATION 2021 Base Case Load Forecast Total Member Energy by Class, Net of Distribution Losses (GWh)										
Year	Notes	Residential	Commercial	Seasonal	Irrigation	Public Lighting	Public Authority	Sales for Resale	Total Energy	% Growth
2014		4,287	3,292	18	17	11	46	5	7,676	
2015	[1]	3,897	3,092	16	10	12	110	5	7,142	-7.0%
2016		3,799	3,037	17	19	11	121	9	7,013	-1.8%
2017		3,666	3,080	17	14	10	120	8	6,915	-1.4%
2018	[2]	4,026	2,911	19	16	9	123	7	7,111	2.8%
2019		3,928	2,898	18	20	9	121	8	7,002	-1.5%
2020		3,914	2,760	20	27	7	113	5	6,846	-2.2%
2021	[3]	3,987	2,834	20	22	7	117	5	6,992	2.1%
2022		4,044	2,875	20	22	7	117	5	7,090	1.4%
2023		4,074	2,927	19	22	8	117	5	7,172	1.2%
2024		4,125	2,990	19	22	7	117	5	7,285	1.6%
2025		4,149	2,984	19	22	7	117	5	7,303	0.2%
2026		4,192	2,979	19	22	7	117	5	7,341	0.5%
2027		4,239	2,975	19	22	7	117	5	7,384	0.6%
2028		4,304	2,980	19	22	7	117	5	7,454	0.9%
2029		4,343	2,971	19	22	7	117	5	7,484	0.4%
2030		4,385	2,959	20	22	7	117	5	7,515	0.4%
2031		4,434	2,950	19	22	7	117	5	7,554	0.5%
2032		4,504	2,948	19	22	7	118	5	7,623	0.9%
2033		4,549	2,933	19	22	7	118	5	7,653	0.4%
2034		4,615	2,925	19	22	7	118	5	7,711	0.8%
2035		4,684	2,918	19	22	7	118	5	7,773	0.8%
2036		4,773	2,917	19	22	7	118	5	7,861	1.1%
2037		4,832	2,904	19	22	7	118	5	7,907	0.6%
2038		4,909	2,896	19	22	7	118	5	7,976	0.9%
2039		4,988	2,889	19	22	7	118	5	8,048	0.9%
2040		5,084	2,878	19	22	7	118	5	8,133	1.1%
AVERAGE GROWTH RATES										
20-25		1.2%	1.6%	-1.0%	-4.0%	0.0%	0.7%	0.0%		1.3%
25-30		1.1%	-0.2%	1.0%	0.0%	0.0%	0.0%	0.0%		0.6%
30-35		1.3%	-0.3%	-1.0%	0.0%	0.0%	0.2%	0.0%		0.7%
35-40		1.7%	-0.3%	0.0%	0.0%	0.0%	0.0%	0.0%		0.9%
20-40		1.3%	0.2%	-0.3%	-1.0%	0.0%	0.2%	0.0%		0.9%
22-40		1.3%	0.0%	-0.3%	0.0%	0.0%	0.0%	0.0%		0.8%

[1] Two member cooperatives left Wabash Valley in 2015. This forecast reflects the departure of one member on 1/1/2015 and one member on 7/1/2015.

[2] Two accounts moved onto the Pass-Through rate on 1/1/2018.

[3] One account forecasted to move onto the Pass-Through rate in 2021.

Table 3-18

WABASH VALLEY POWER ASSOCIATION 2021 Base Case Load Forecast Member Summer Coincident Peak Demand							
Year	Notes	Load Net of Pass-Through MW	% Growth	Pass-Through CP MW	% Growth	Total System CP MW	% Growth
2014		1,484		198		1,682	
2015	[1]	1,365	-8.0%	94	-52.5%	1,459	-13.3%
2016		1,473	7.9%	99	5.3%	1,572	7.7%
2017		1,416	-3.9%	84	-15.2%	1,500	-4.6%
2018	[2]	1,459	3.0%	131	56.0%	1,590	6.0%
2019		1,507	3.3%	115	-12.2%	1,622	2.0%
2020		1,497	-0.7%	125	8.7%	1,622	0.0%
2021	[3]	1,515	1.2%	126	0.8%	1,641	1.2%
2022		1,528	0.9%	127	0.8%	1,655	0.9%
2023		1,542	0.9%	128	0.8%	1,670	0.9%
2024		1,557	1.0%	137	7.0%	1,694	1.4%
2025		1,566	0.6%	138	0.7%	1,704	0.6%
2026		1,575	0.6%	139	0.7%	1,714	0.6%
2027		1,585	0.6%	139	0.0%	1,724	0.6%
2028		1,596	0.7%	139	0.0%	1,735	0.6%
2029		1,608	0.8%	139	0.0%	1,747	0.7%
2030		1,618	0.6%	139	0.0%	1,757	0.6%
2031		1,628	0.6%	139	0.0%	1,767	0.6%
2032		1,640	0.7%	139	0.0%	1,779	0.7%
2033		1,653	0.8%	139	0.0%	1,792	0.7%
2034		1,668	0.9%	139	0.0%	1,807	0.8%
2035		1,683	0.9%	139	0.0%	1,822	0.8%
2036		1,699	1.0%	139	0.0%	1,838	0.9%
2037		1,717	1.1%	139	0.0%	1,856	1.0%
2038		1,734	1.0%	139	0.0%	1,873	0.9%
2039		1,752	1.0%	139	0.0%	1,891	1.0%
2040		1,769	1.0%	139	0.0%	1,908	0.9%
AVERAGE GROWTH RATES							
20-25		14	0.9%	3	2.0%	16	1.0%
25-30		10	0.7%	0	0.1%	11	0.6%
30-35		13	0.8%	-	0.0%	13	0.7%
35-40		17	1.0%	-	0.0%	17	0.9%
20-40		14	0.8%	1	0.5%	14	0.8%
22-40		13	0.8%	1	0.5%	14	0.8%

[1] Two member cooperatives left Wabash Valley in 2015. This forecast reflects the departure of one member on 1/1/2015 and one member on 7/1/2015.

[2] Two accounts moved onto the Pass-Through rate on 1/1/2018.

[3] One account forecasted to move onto the Pass-Through rate in 2021.

Alternative Forecasts

In addition to modeling the base case load forecast, Wabash Valley also developed two alternative forecasts for high and low population growth projections with the objective of capturing reasonable high and low long-term energy and demand outcomes.

Over the long-term, electric sales are driven by population growth, increase in productivity (reflected in GDP), and end-use efficiency improvements. Recognizing that some Members are experiencing faster growth than others, high and low scenarios are based on member-specific population growth projections. For the high case, we assume that the population growth rate increases 50% faster than the base-case population growth. If the base case population growth rate is 0.3% per year, then the high case population growth rate is 0.45% (50% higher). We assume that the relationship between population and the economic drivers (number of households and GDP) remains the same - faster population growth results in stronger economic growth. The low case assumes that long-term population growth rate is 50% lower than the base case. If the base-case population growth is 0.3%, the low case population growth rate projection is 0.2% (50% lower). Lower population growth translates into lower household and GDP growth.

After adjusting the key input economic data, Wabash Valley created a high growth set and low growth set of models for each Member and then summed up the results for the Company. Comparisons of the high and low growth forecasts to the base case load forecast are provided below and in Table 3-19 through Graph 3-21.

1. High Growth

In the high growth case, energy requirements will grow by 1.0% per year, reaching 8,937 GWh by 2040. The high growth energy forecast is 5.3% higher than the base case forecast in 2040.

Under this scenario, summer coincident peak demand grows by 1.1% per year, reaching 1,860 MW in 2040. The high growth demand forecast is 5.1% higher than the base case forecast in 2040.

2. Low Growth

In the low growth case, energy requirements will grow by 0.6% per year, reaching 8,077 GWh by 2040. The low growth energy forecast is 4.8% lower than the base case forecast in 2040.

Under this scenario, summer coincident peak demand also grows by 0.6% per year, reaching 1,686 MW in 2040. The low growth demand forecast is 4.7% lower than the base case forecast in 2040.

Table 3-19

WABASH VALLEY POWER ASSOCIATION 2021Alternative Forecasts Member Energy Requirements Net of Pass-Through Loads (GWh)				
Year	Notes	Base Case	High Growth	Low Growth
2014		8,018		
2015	[1]	7,443		
2016		7,332		
2017		7,207		
2018	[2]	7,411		
2019		7,291		
2020		7,149		
2021	[3]	7,296	7,311	7,280
2022		7,398	7,437	7,359
2023		7,484	7,543	7,425
2024		7,602	7,682	7,523
2025		7,621	7,722	7,522
2026		7,661	7,784	7,542
2027		7,705	7,849	7,565
2028		7,779	7,945	7,618
2029		7,810	7,999	7,629
2030		7,842	8,052	7,641
2031		7,883	8,116	7,661
2032		7,955	8,211	7,713
2033		7,986	8,264	7,723
2034		8,046	8,348	7,763
2035		8,111	8,436	7,807
2036		8,204	8,554	7,877
2037		8,251	8,625	7,905
2038		8,324	8,722	7,956
2039		8,398	8,821	8,009
2040		8,488	8,937	8,077
AVERAGE GROWTH RATES				
20-25		1.3%	1.6%	1.0%
25-30		0.6%	0.8%	0.3%
30-35		0.7%	0.9%	0.4%
35-40		0.9%	1.2%	0.7%
20-40		0.9%	1.1%	0.6%
22-40		0.8%	1.0%	0.5%

[1] Two member cooperatives left Wabash Valley in 2015. This forecast reflects the departure of one member on 1/1/2015 and one member on 7/1/2015.

[2] Two accounts moved onto the Pass-Through rate on 1/1/2018.

[3] One account forecasted to move onto the Pass-Through rate in 2021.

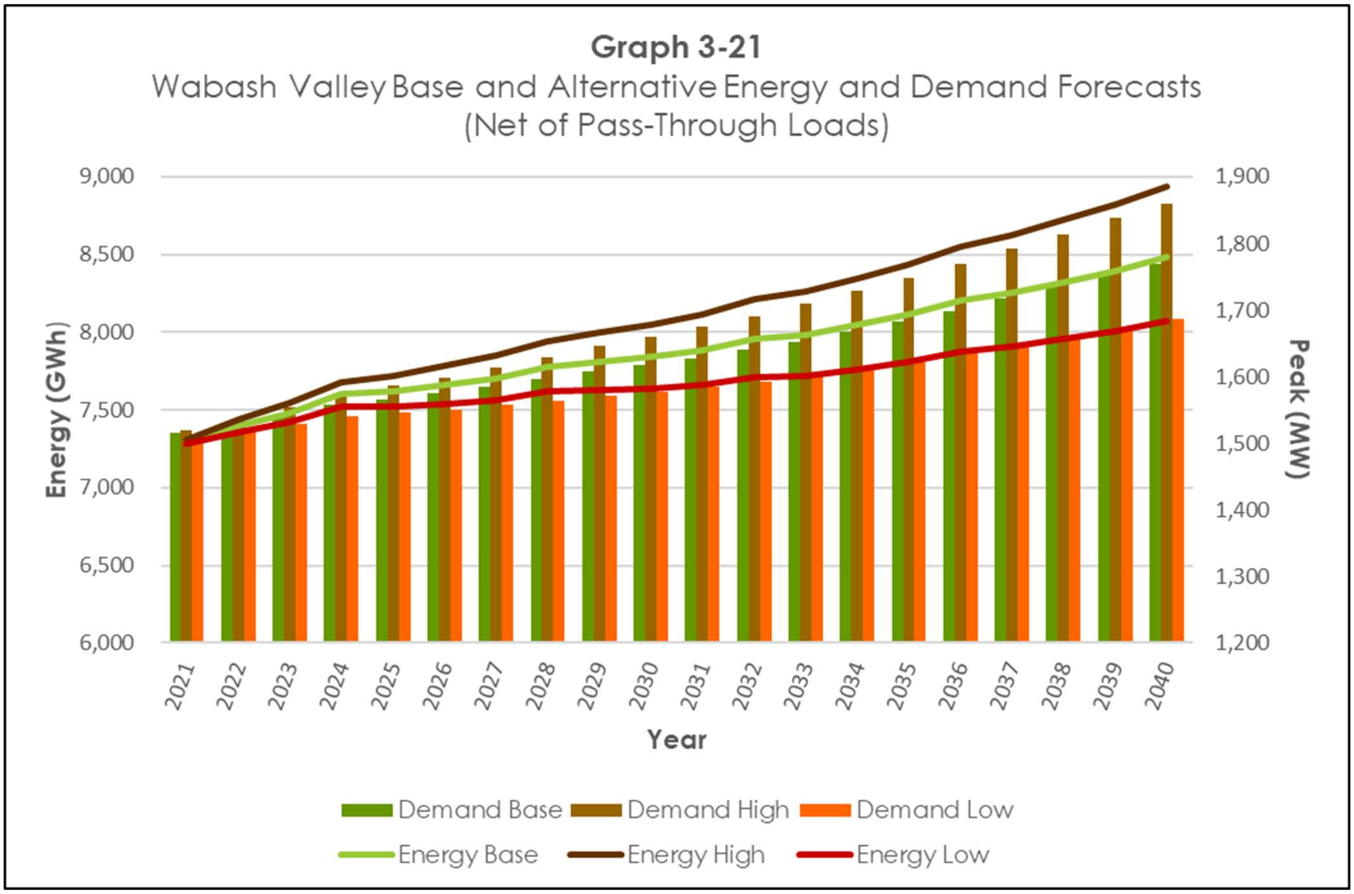
Table 3-20

WABASH VALLEY POWER ASSOCIATION 2021Alternative Forecasts Member Summer CP Demand Net of Pass-Through Loads (MW)				
Year	Notes	Base Case	High Growth	Low Growth
2014		1,484		
2015	[1]	1,365		
2016		1,473		
2017		1,416		
2018	[2]	1,459		
2019		1,507		
2020		1,497		
2021	[3]	1,515	1,519	1,511
2022		1,528	1,536	1,520
2023		1,542	1,554	1,530
2024		1,557	1,573	1,541
2025		1,566	1,586	1,546
2026		1,575	1,599	1,551
2027		1,585	1,613	1,557
2028		1,596	1,629	1,564
2029		1,608	1,646	1,572
2030		1,618	1,660	1,578
2031		1,628	1,675	1,584
2032		1,640	1,691	1,592
2033		1,653	1,709	1,601
2034		1,668	1,728	1,611
2035		1,683	1,748	1,622
2036		1,699	1,770	1,634
2037		1,717	1,792	1,647
2038		1,734	1,814	1,660
2039		1,752	1,838	1,674
2040		1,769	1,860	1,686
AVERAGE GROWTH RATES				
20-25		0.9%	1.2%	0.6%
25-30		0.7%	0.9%	0.4%
30-35		0.8%	1.0%	0.6%
35-40		1.0%	1.2%	0.8%
20-40		0.8%	1.1%	0.6%
22-40		0.8%	1.1%	0.6%

[1] Two member cooperatives left Wabash Valley in 2015. This forecast reflects the departure of one member on 1/1/2015 and one member on 7/1/2015.

[2] Two accounts moved onto the Pass-Through rate on 1/1/2018.

[3] One account forecasted to move onto the Pass-Through rate in 2021.



3. EV Growth

Wabash Valley has also developed a projection of EV growth within our service territory. To develop this projection, Wabash Valley utilized U.S. Census Bureau *2018 American Community Survey Tenure by Vehicles Available* data. We extrapolated the vehicles available within each occupied housing unit to estimate the number of total vehicles by county. We then estimated how many of the total vehicles in each county are served by our Members by applying a ratio of customers to total occupied housing units.

After estimating how many of the total vehicles in each county are served by our Members, Wabash Valley had to project how many of those vehicles are EVs. We referenced an April 2019 presentation titled "Projecting light-duty electric vehicle sales in the National Energy Modeling System (NEMS)[3]" given by the EIA at Itron's Energy Forecasting Meeting. The EIA AEO 2019 reference case projected that total plug-in electric vehicle sales approach 17% of new sales in light-duty vehicles by 2050. Using that as a base, Wabash Valley theorized that adoption in rural areas will lag until infrastructure and testing has occurred in urban areas. We categorized each Member system by anticipated speed of adoption (i.e. high, medium, low) to calculate the number of EVs served by each Member. We then multiplied the number of EVs by an assumed annual energy per vehicle of 4,459 kWh obtained from the National

[3] http://capabilities.itron.com/efg/2019/05_DavidStone.pdf

Renewable Energy Laboratory's (NREL) Electric Vehicle Infrastructure Projection Tool (EVI-Pro) Lite. The resulting forecast is shown in Table 3-22.

Table 3-22
EV Peak Load and Annual Energy

Year	# EVs	Peak Load (MW)	Annual Energy (MWh)	Year	# EVs	Peak Load (MW)	Annual Energy (MWh)
2021	669	0.25	2,983	**2031**	31,835	11.89	141,963
2022	2,681	1.00	11,955	**2032**	35,187	13.14	156,910
2023	6,702	2.50	29,886	**2033**	36,861	13.77	164,375
2024	8,374	3.13	37,342	**2034**	38,538	14.39	171,853
2025	11,728	4.38	52,299	**2035**	40,213	15.02	179,323
2026	13,405	5.01	59,777	**2036**	41,887	15.64	186,788
2027	15,079	5.63	67,242	**2037**	43,563	16.27	194,261
2028	23,459	8.76	104,611	**2038**	45,240	16.90	201,740
2029	28,486	10.64	127,028	**2039**	46,913	17.52	209,200
2030	30,162	11.26	134,502	**2040**	48,589	18.15	216,674

Weather Normalization

The impact of weather was explicitly accounted for in the load forecast development. The energy requirements, coincident peak and residential average use models all incorporated heating and cooling degree days and applied projected normal weather to the forecasts. The historical actual versus weather normalized energy requirements are presented in Table 3-23.

Table 3-23

WABASH VALLEY POWER ASSOCIATION Actual versus Normalized Energy Requirements (GWh)		
Year	Actual	Weather Normalized
2014	8,018	7,939
2015	7,443	7,424
2016	7,332	7,283
2017	7,207	7,300
2018	7,411	7,212
2019	7,291	7,226
2020	7,149	7,189

Section 4
SELECTION OF RESOURCE OPTIONS

Wabash Valley continuously reviews and analyzes potential future resource options to meet its projected peak and energy requirements. The Company's goal is to develop and maintain a diverse portfolio of power supply resources, both supply-side and demand-side, with contract terms, fuel types, counterparties and ownership options that promote reliable, low-cost service to its Members. Wabash Valley plans requirements for the system in MISO and PJM markets holistically to avoid over supply and manages specific resources to meet reliability needs.

Supply-Side Resource Options

Wabash Valley regularly determines the amount of capacity we will need to meet our load requirements (including reserves) over the next one to two years, as well as a twenty-year planning horizon. Wabash Valley's resource portfolio shows that the Company needs additional capacity to meet projected demand requirements starting in 2022. Once our power supply requirements are determined, Wabash Valley evaluates several types of power supply alternatives, including long-term and short-term power supply agreements, RTO capacity auctions, new generating capacity and wholesale energy market purchases. We evaluate each of these resources using the Company's production cost and financial analysis models to determine which supplies, or combinations of supplies, meet expected requirements at the least cost. Additionally, Wabash Valley analyzes the resources with stochastic risk modeling to evaluate the impact of uncertainty with the proposed resource.

Wabash Valley continues to examine potential new and existing peaking, intermediate, baseload and renewable[i] generating resources (both independently and jointly owned) in anticipation of capacity and energy needs in 2022 and beyond. Estimated costs for new capacity are compared to expected long-range wholesale electric market prices. Wabash Valley utilizes cost and performance parameters from the National Renewable Energy Lab's (NREL) Annual Technology Baseline (ATB)[1] for resource comparison.

For this IRP, Wabash Valley did not include coal-fired generation as a baseload resource alternative to align with our carbon reduction goals as well as it is becoming increasingly uneconomic.

1. Peaking Power Expansion Alternatives

The installed capital cost, including Allowance for Funds Used During Construction (AFUDC), for a new build simple cycle F-class 233 MW natural gas combustion turbine (NGCT) is approximately $969/kW (stated in 2021 dollars). This technology option includes environmental emission controls for criteria pollutants; mercury and hydrochloric acid meet or exceed the 2013 updates to applicable New Source Performance Standards (NSPS); and utility Mercury and Air Toxics Standards meet or exceed new source performance standards and achieve an assumed best available control technology. Plant designs include treatment technologies for liquid waste streams meant to be compliant with the 2015 update to U.S.

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[1] NREL (National Renewable Energy Laboratory). 2021. "2021 Annual Technology Baseline." Golden, CO: National Renewable Energy Laboratory. https://atb.nrel.gov/electricity/2021/data

Environmental Protection Agency's Effluent Guidelines for the steam electric power plant source categories. All plants use mechanical draft evaporative cooling for waste heat rejection. For modeling purposes, we also obtained fixed O&M (FOM) and variable O&M (VOM) costs from the NREL's ATB. FOM includes all labor (operations, maintenance, supervision, and administrative labor) as well as annual property taxes and insurance costs. VOM includes all non-fuel consumables, waste disposal costs (ash, spent catalyst materials, other liquid waste streams), and maintenance materials. The NGCT's projected capacity and operating costs are presented in Table 4-1 Expansion Plan Alternatives.

2. Intermediate and/or Baseload Power Combined Cycle Expansion Alternatives

The installed capital cost, including AFUDC, for a new build combined cycle (NGCC) is approximately $1,100/kW (stated in 2021 dollars). The NGCC power plant is configured in a 2x1 configuration using two F-class combustion turbine/heat recovery steam generator (HRSG) trains. Steam generated in the HRSG is combined to feed a common steam turbine. The NGCC power plant without carbon capture can provide full-load power output of approximately 727 MW-net. This technology option includes the same environmental emission controls as described above. For modeling purposes, we also obtained FOM and VOM costs from the NREL's ATB. The NGCC's projected capacity and operating costs are presented in Table 4-1 Expansion Plan Alternatives.

TABLE 4-1 Expansion Plan Alternatives – Peaking, Intermediate and Baseload (Stated in 2021 dollars)

Unit	50-MW NGCT	50-MW NGCC
Typical Capacity Factor	7%	70%
Capacity Cost ($/kW-month)	$5.02	$5.70
Fixed Cost ($/kW-month)	$1.83	$2.39
Variable O&M Cost ($/MWh)	$5.19	$1.83
Fuel Cost ($/MWh)	$38.17	$25.29
Avg. Total Cost ($/MWh)	$177.42	$42.96
Avg. Cost at different Capacity Factors		
5% Capacity Factor	$231.05	$248.86
10% Capacity Factor	$137.21	$137.99
20% Capacity Factor	$90.28	$82.55
30% Capacity Factor	$74.64	$64.08
40% Capacity Factor	$66.82	$54.84
50% Capacity Factor	$62.13	$49.29
60% Capacity Factor	$59.00	$45.60
70% Capacity Factor	$56.77	$42.96
80% Capacity Factor	$55.09	$40.98
90% Capacity Factor	$53.79	$39.44

3. Renewable[i] Power Expansion Alternatives

For Wabash Valley's 2020 IRP, we are evaluating several renewable[i] power expansion alternatives, including land-based wind, utility-scale photovoltaic (PV) solar and utility-scale 4-hour battery storage. We utilized wind, solar and battery storage cost estimates from the NREL's ATB. We have modeled wind and solar as PPAs based on the levelized cost of energy (LCOE). These renewable[i] alternatives' projected capacity and operating costs are presented in Table 4-2 Renewable[i] Expansion Plan Alternatives.

TABLE 4-2 Renewable[i] Expansion Plan Alternatives – Wind, Solar and Battery (Stated in 2021 dollars)

Unit	50-MW Wind PPA	50-MW Solar PPA	1-MW Battery
Installed Capital Cost ($/kW)	$1,357	$1,354	$1,282
Typical Capacity Factor	45%	25%	19%
Capacity Cost ($/kW-month)	$5.65	$4.85	$6.64
Fixed Cost ($/kW-month)	$3.70	$1.99	$2.81
Variable O&M Cost ($/MWh)	$0.00	$0.00	$2.15
Fuel Cost ($/MWh)	$0.00	$0.00	$29.75
Avg. Total Cost ($/MWh)	N/A	N/A	$100.03
LCOE ($/MWh)	$35.36	$36.64	N/A

4. Joint Project Participation

Wabash Valley evaluates the potential cost benefits in participating as an equity partner in the construction or purchase of generating capacity versus sole ownership. This type of project involves joining with other electric utilities or developers in evaluating and developing generating facilities. The Company continues to monitor projects for possible participation as they develop.

In certain scenarios, where capacity estimates of the expansion plan alternatives exceed Wabash Valley's needs, it is assumed the Company will partner with another entity in building or purchasing additional generation.

5. Environmental Effects

Wabash Valley's evaluation of all supply-side resources includes assessment of each alternative's environmental impact. The Company currently owns generating units and purchases power through contracted supplies.

For peaking and intermediate capacity expansion, Wabash Valley evaluated resources that represent both construction of new facilities and power purchase agreements from existing resources. New peaking and intermediate unit construction alternatives consisted entirely of natural gas units. These units are regulated for nitrogen oxides (NO_x), along with minor amounts of other air emissions. These units will eventually be regulated for emissions of carbon dioxide (CO_2). Solid and hazardous waste generated by these units is expected to be negligible. The Company's evaluation of these units includes potential NO_x control equipment, adjustments to combustion temperature, and permit limitations. Our final assessment concludes that these units could operate as peaking resources with limited operating hours and not exceed the limits set in the air emissions control operating permits.

Wabash Valley also evaluated purchasing peaking power capacity from wholesale power marketers. These purchases are typically made from existing generating resources with a proven record of environmental compliance. Contract provisions in the Company's purchase power agreements stipulate that the resource will be operated in compliance with applicable environmental regulations and operating permit conditions.

Baseload power agreements are purchased from other electric utilities or from wholesale power marketers. The power supply offered may be from an existing resource able to demonstrate compliance with applicable environmental regulations. The supply may also be offered from a proposed but as-yet nonexistent facility. As with new generating units, Wabash Valley determines that the proposed resource has appropriate control technology and operating processes included in the cost of power supply. Again, the Company's purchase power contract provisions require that the supplying facility will be operated in compliance with applicable environmental regulations and operating permit conditions.

Due to the lack of clarity of any carbon pollution regulation at this time, Wabash Valley did not attempt to estimate the cost of complying with carbon regulation for purposes of this IRP. However, the Company acknowledges that carbon pollution standards and other probable future regulations are factors when assessing new resources.

In September 2021, Wabash Valley announced a plan to target net-zero carbon dioxide emissions in our power generation portfolio by 2050. In comparison to 2005 emissions, the Company plans to attain a 50% reduction in carbon output by 2031 and 70% by 2040. Wabash Valley and our Members value sustainability which guides our pursuit of sustainable, affordable and reliable energy that increasingly features more renewable[i] energy resources. Due to the recent timing of this announcement, this specific goal was not included in the current IRP expansion plan but will be built into future planning and IRP processes.

6. Seasonal Power Supply Alternatives

Wabash Valley works closely with ACES to identify and quantify market prices, trends and short-term market positions. ACES was established by Wabash Valley and other REMC utilities to optimize short-term market transactions and provide risk assessment services.

The Company typically purchases short-term market power and options to meet transient peak demands caused by extreme weather or seasonal maintenance outages. Through the MISO and PJM markets, Wabash Valley also optimizes its energy portfolio by purchasing energy from the market when that energy has a lower cost than dispatching additional power resources. Wabash Valley uses ACES risk assessments of expected future market prices in making decisions regarding additional market energy or option purchases to hedge the cost of power.

7. Supply-Side Resource Selection Factors

Wabash Valley employs several decision making factors in selecting new power supply resources. While price is clearly important, Wabash Valley also considers the technical viability of a proposed project. This includes an analysis of the long-term reliability of the resource, assessing any fuel supply, environmental compliance and transmission interconnection constraints. The Company also evaluates the credit-worthiness of any proposal's counterparty, especially when considering the likelihood of proposed (but uninitiated) projects meeting targeted completion dates. Some of the additional factors that Wabash Valley considers are operational flexibility, resource deliverability and location, impact on diversification of the Company's power portfolio, overall price risk exposure, equity requirements and contract term.

Demand-Side Resource Options

Wabash Valley's planning and evaluation of DR and EE programs is highly dependent upon a collaborative process with its Members. Input from the Members is invaluable for the process of evaluating existing programs, collecting information on program implementation, gaining information on the program's technical and economic potential and customer acceptance of new programs. The Company has both a Retail Programs and Services Committee (RP&S) and Working Group that are comprised of Members' personnel.

For Wabash Valley's 2020 IRP, we are evaluating our demand-side resource options on a comparable basis to our supply-side resources. For DR, we utilized current internal cost estimates based on recent program experience. For EE, we obtained high-level program cost estimates from a condensed study of achievable efficiency potential. These demand-side alternatives' projected capacity and operating costs are presented in Table 4-3 Demand-Side Expansion Plan Alternatives.

TABLE 4-3 Demand-Side Expansion Plan Alternatives – DR and EE (Stated in 2021 dollars)

Unit	1-MW DR	1-MW Residential EE	1-MW Small Comm EE	1-MW Large Comm EE
Installed Capital Cost ($/kW)	$206	$1,457	$468	$468
Typical Capacity Factor	1%	56%	56%	56%
Capacity Cost ($/kW-month)	$1.07	$7.55	$2.43	$2.43
Fixed Cost ($/kW-month)	$4.56	$0.00	$0.00	$0.00
Avg. Total Cost ($/MWh)	$770.23	$18.47	$5.94	$5.94

1. DR Planning Process

The RP&S Committee and Working Group are responsible for the continuing DR planning process. The screening process consists of the following steps:

- Identifying DR measures and technologies
- Determining if measures are consistent with overall goals
- Determining if there is adequate market potential
- Conducting economic evaluation
- Securing approval from executive level and Board of Directors
- Implementing programs

a. Identify DR Technologies

Wabash Valley uses several sources of information to identify potential DR technologies. A major source of program possibilities is the Members' knowledge and experience with various technologies that allows the Company to compile options that have some degree of viability before conducting a formal analysis. Wabash Valley also identifies potential programs through association with the National Rural Electric Cooperative Association's research, various trade journals, conferences and seminars.

b. Determine if Measures are Consistent with Overall Goals

The primary objective of DR at Wabash Valley is the reduction of wholesale power costs to the association. Wabash Valley and our Members possess a goal of controlling costs and improving efficiency in an effort to supply reliable power at a low and stable cost. In addition, Wabash Valley and our Members want to offer the end retail customer the greatest possible value in electric service and to assist them in improving their quality of life.

c. Assess Market Potential

This step involves assessing the potential application of the technology in the Company's service territory. This step eliminates the measures that would not prove successful because of an economic or technical inability to utilize the technology. Wabash Valley gauges customer interest and identifies potential pilot areas. The Company does not currently utilize standard tools for determining market potential but is investigating future options.

d. Conduct an Economic Evaluation

While all of the DR programs are reviewed on an annual basis, Wabash Valley incorporates a five-year forward look at the wholesale market to conduct its overall economic evaluation process. With the volatility of the wholesale power markets, program economics change frequently. Wabash Valley and the RP&S Committee work diligently to keep economics current and programs flexible.

The Company has developed a screening process for each program concept that is under consideration. An initial evaluation is required for determination of individual program benefits and costs. This evaluation is also required to maintain efficient program design of existing programs. The evaluation requires sufficient and reliable data to provide accurate screening. The screening is then used to ensure efficient and equitable program design for the participant, the Member and Wabash Valley. The screening broadly determines how the program will ultimately affect the participant and non-participant, and the rates paid by all customers. Many internal tests are designed to quantify the impacts of a DR program for a particular group.

e. Securing Approval and Implementation

If all the screenings and evaluations prove positive, the Company seeks approval of the DR program from executive management and Board of Directors. Once approved, the DR program is rolled out to all Members. Wabash Valley supports the programs as long as they continue to meet the Company's goals.

2. Control Strategies for DR Programs

The current control strategies incorporated in the plan are designed to minimize system costs while maintaining customer satisfaction. Wabash Valley has registered our DR programs with MISO who may call on our programs as a resource to maintain grid reliability. Because of our market participation, the Company receives planning and/or capacity credits for our DR programs in the wholesale market.

3. EE Planning Process

The RP&S Committee is responsible for the continuing EE planning process. The committee recommended a series of residential programs and commercial and industrial programs for the Wabash Valley portfolio. Programs were selected based on each Member's mix of customers, electric energy end-uses and power supply requirements. The Committee develops programs and EM&V protocols to assess the technical and economic viability of EE programs. Feedback from retail customers and our Member cooperatives on both design and on-going EM&V priorities is encouraged. This allows all parties to shape the structure of the efficiency programs both initially and in an on-going manner.

Avoided Costs

The mix of transmission and power supply resource assets, along with transmission congestion in the region, impacts short-term avoided costs for Wabash Valley. The long-term avoided cost for capacity approaches the incremental cost of a new peaking unit and the cost of network transmission to deliver the capacity to the distribution points of the Company's Members.

The avoided energy costs are based upon the economic dispatch order of all production resources. It should be noted that Wabash Valley prepares our IRP with minimal use of the RTO markets to meet future power supply needs. Wabash Valley selects resources that we believe can reasonably be relied upon to meet our long-term resource requirements. The Company believes that too much reliance on future incremental capacity market purchases produces substantial price volatility risk that goes against the essential purpose of the IRP. However, if we did allow the model to select a greater amount of incremental capacity market purchases, the modeling results would be considerably different due to the current, much lower, market prices. For example, prices from the most recent MISO planning resource auctions (PRA), as reflected in Table 4-4, are much lower than Wabash Valley's forecasted avoided capacity cost of $5.52/kW-month which is based on the cost of a peaking unit and is described in Table 4-5 and Appendix D. Furthermore, forecasted bilateral capacity prices for the entire time horizon as provided in Appendix C are also lower than Wabash Valley's forecasted avoided capacity cost.

TABLE 4-4 MISO Historical Auction Clearing Price ($/kW-month)

Zone	Planning Year				
	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022
Zone 6	$.046	$.304	$.091	$.152	$.152

Estimated annual avoided costs for 2021 through 2040, excluding transmission service fees, are shown in Table 4-5. Note that this table gives avoided costs for both capacity and energy components.

TABLE 4-5 Wabash Valley Avoided Cost Forecast (Stated in nominal dollars)[(1)]

Year	Capacity ($/kW-month)	Peak Energy ($/MWh)	Off-Peak Energy ($/MWh)	Around the Clock Energy ($/MWh)
2021	$5.520	$34.66	$30.53	$32.50
2022	$5.658	$35.38	$31.41	$33.27
2023	$5.799	$33.36	$29.69	$31.44
2024	$5.944	$30.59	$27.36	$28.92
2025	$6.093	$30.47	$27.95	$29.17
2026	$6.245	$32.86	$29.44	$31.07
2027	$6.401	$33.96	$29.88	$31.81
2028	$6.561	$31.74	$28.66	$30.19
2029	$6.725	$30.95	$28.41	$29.59
2030	$6.893	$31.54	$29.05	$30.22
2031	$7.066	$32.29	$29.61	$30.85
2032	$7.242	$33.75	$30.86	$32.23
2033	$7.423	$34.92	$32.12	$33.43
2034	$7.609	$35.18	$32.62	$33.81
2035	$7.799	$35.51	$32.91	$34.12
2036	$7.994	$35.87	$33.42	$34.56
2037	$8.194	$36.16	$33.64	$34.82

Year	Capacity ($/kW-month)	Peak Energy ($/MWh)	Off-Peak Energy ($/MWh)	Around the Clock Energy ($/MWh)
2038	$8.399	$36.50	$34.07	$35.21
2039	$8.609	$37.23	$34.75	$35.91
2040	$8.824	$37.98	$35.44	$36.63

(1) Additional detail and data regarding the calculation of Wabash Valley's avoided cost forecast are included in Appendix D of this report.

System Reliability

Wabash Valley's system planning goal is to assure a highly reliable supply of electric power to its Members at the lowest reasonable cost. Market price uncertainties and risks associated with power delivery and contract counterparty creditworthiness have resulted in a shift in the Company's power supply strategy toward more resource ownership. While ownership decreases certain risks, it increases the risk of unavailable supply due to unit outage. As participants in the MISO and PJM RTOs, Wabash Valley is able to share in the reserves of the region. MISO analyzes the required reserves for the region. The Company provides an accounting of resources to MISO or purchases capacity through bilateral transactions or its auction to comply with the reserve requirements under the process outlined in the MISO tariff. Wabash Valley is also a member of the PJM reserve sharing group. As such, PJM determines the reliability criteria for Wabash Valley load served in that region. PJM acquires resources to meet the reserve requirements in the region and the Company pays its share of the capacity purchased through the PJM tariff requirements.

As noted in Section 2 of this report, Wabash Valley is not a Local Balancing Authority (formerly known as transmission control areas). As discussed in Section 2 Transmission Resources, Wabash Valley works with Duke Indiana regarding facility planning within the JTS, with the goal of maintaining transmission system reliability. The Company is also a member of MISO and PJM. These groups are the Reliability Coordinators and monitor the bulk electric system in order to maintain reliable interconnected operations. Wabash Valley actively participates in RTO stakeholder groups addressing transmission planning, equipment capacity, availability, scheduling and reliability.

Resource Portfolio Modeling

1. Scenarios

The goal of Wabash Valley's IRP is to identify a mix of new resources that, when considered with our existing portfolio, provides the best combination of expected costs and associated risks and uncertainties for Wabash Valley and our Members. To achieve that goal, we examine two scenarios. These scenarios center on whether to consider all the resource alternatives previously described or to disallow the new combined cycle alternative to minimize carbon output.

Table 4-6 Scenarios Evaluated in IRP Analysis

Scenario	Description	Objective
Open Technology Options	Allows all technologies: NGCC, NGCT, Solar, Wind, Battery, DR and EE to compete in optimization of future resource mix	Find the least-cost resource plan to serve forecasted Member load requirements
Minimize Carbon Options	Allows no new NGCC technology. Only allows NGCT, Solar, Wind, Battery, DR and EE to compete in optimization of future resource mix	Assess ability to serve forecasted Member load requirements while minimizing carbon output

Open Technology Options

The Open Technology Options scenario is structured to meet Wabash Valley's forecasted Member load requirements at least cost to our Members. The plan resulting from this scenario optimizes our portfolio considering all potential options that we currently anticipate could function to meet our needs. Although other technology options exist (e.g. nuclear, hydropower, geothermal, etc.), we did not consider them due to being uneconomic or unavailable in our geographic location at this time.

Minimize Carbon Options

In the Minimize Carbon Options scenario, we create a plan that excludes investment in ***new*** NGCC technology to minimize carbon output. We allow investment in NGCT technology to meet peaking needs. As a result of this limitation, all future needs are met by a combination of NGCT, solar, wind, battery and demand-side resources. This scenario serves as a bookend to inform future IRPs when we specifically incorporate Wabash Valley's recently announced plan regarding carbon reduction goals.

2. Potential Futures

Potential futures are comprised of a set of forecasts that describe the conditions in that future. In this IRP, Wabash Valley considers these four futures:

- Existing Policy
- High Growth
- Low Growth
- Major Environmental Policy

The different forecast elements that define a potential future can be found in the first column of Table 4-7. These elements include a range of load forecasts, a range of market price forecasts for energy, coal, gas and capacity and a carbon price forecast.

Wabash Valley cannot predict which, if any, of these potential futures will develop. The Existing Policy future is comprised of those forecasts which the Company believes is most probable. Alternate futures utilize reasonable forecast mixtures that could result from shifts in assumed economic variables or more intensive environmental policy.

Table 4-7 Key Elements of Each Potential Future

	Potential Futures			
Elements	**Existing Policy**	**High Growth**	**Low Growth**	**Major Environmental Policy**
Load Forecast	Mid	High	Low	Mid
EV Adoption Load Forecast	None	Mid	None	Mid
Energy Price Forecast	Mid	High	Low	High with Carbon
Coal Price Forecast	Mid	High	Low	High
Gas Price Forecast	Mid	High	Low	High with Carbon
Capacity Price Forecast	Mid	High	Low	High
Carbon Price Forecast	None	None	None	High

Existing Policy

The "Existing Policy" future reflects Wabash Valley's view of the world based on the policies in place at the time of the IRP's development. We assume:

- Continued population and economic growth within our service territory consistent with trends as forecast by Woods and Poole;
- EV adoption that is still gaining momentum which does not yet impact overall load growth and shape;
- Future commodity pricing assumptions based on projections provided by Horizons Energy LLC (Horizons) that are intended to represent a probable outcome in energy, coal, gas and capacity markets;
- No carbon price assumptions due to the lack of clarity at this time;
- Expiration of federal tax credits for wind generation based on current sunset date at the end of 2025.

High Growth

Our "High Growth" future assumes stronger development within our service territory driven by higher population and economic growth. In addition to strengthening our electric demands, we would expect a faster growing economy to support higher commodity pricing and greater adoption of EVs.

Low Growth

Our "Low Growth" future assumes weaker development within our service territory driven by lower population and economic growth. Compared to the High Growth future, we would expect weakening electric demands and the current modest level of EV adoption which does not yet impact overall load growth and shape. Furthermore, we assume that a slower growing economy would substantiate lower commodity pricing.

Major Environmental Policy

Our "Major Environmental Policy" future assumes increased state and federal commitments towards environmental regulation. Regarding future commodity pricing, this future incorporates higher energy, coal, gas and capacity price forecasts intended to reflect a future which could restrict natural gas fracking production leading to increased pressure on the historically low prices in current markets. This future also incorporates a high carbon price forecast based on the prospect of national or regional carbon tax policies.

3. Sensitivities

A sensitivity describes a variant of an uncertain input assumption. These assumptions are uncertain because they are difficult to predict and likely to change in the future, affecting economics, electricity demand, commodity prices, etc. Variability will result due to disruptions in supply and demand (e.g. COVID-19 pandemic), weather (e.g. polar vortex), market conditions, improvements in technology, economic cycles (e.g. Great Recession) and political change (e.g. changing tax and environmental policies). By adjusting these assumptions, we strive to identify the inherent risk factors of the portfolio. In Table 4-8, we list the key assumptions examined in our sensitivity analysis and the set assumptions for each under the Existing Policy Future.

Table 4-8 Assumptions Varied in Sensitivity Analysis

Assumption	Description	Existing Policy	Sensitivity Options		
Electricity Demand	Member energy requirements, representing the load to be served by Wabash Valley	Mid	High		Low
EV Adoption	Additional Member energy requirements to be served by Wabash Valley	None	Mid		
Energy Prices	The hourly price of energy ($/MWh) at the IN Hub	Mid	High	High with Carbon	Low
Coal Prices	The price of coal ($/Mmbtu) for the Illinois Basin	Mid	High		Low
Gas Prices	The price of natural gas ($/Mmbtu)	Mid	High	High with Carbon	Low
Capacity Prices	The price of capacity ($/kW-mo)	Mid	High		Low
Carbon Prices	The cost of compliance with possible carbon regulation represented as a $/ton value	None	High		

4. Existing Resource Forecasted Retirements/Expirations

The Company assumes that existing power purchase agreements expire at the end of the current contract term and existing owned generation retires per the timing outlined in Section 2. These assumptions are summarized in Table 4-9 and are the same for both scenarios and all four potential futures.

TABLE 4-9 Existing Resource Forecasted Retirements/Expirations(1)

Year	MW (ICAP)
2022	
2023	
2024	
2025	Duke Indiana PPA (55 MW) Duke Indiana Unit Peaking PPA (50 MW)
2026	Gibson 5 (156 MW)
2027	
2028	
2029	
2030	Pioneer Trail Wind PPA (10 MW)
2031	Duke Indiana PPA (180 MW)
2032	Duke Indiana PPA (70 MW)
2033	AEP PPA (150 MW)
2034	Prairie Wolf Solar Capacity Purchase (50 MW)
2035	
2036	
2037	WR Highland (160 MW) Meadow Lake Wind V PPA (25 MW)
2038	Prairie State 1 (41.5 MW) AgriWind PPA (8.4 MW) Meadow Lake Wind VI PPA (75.4 MW)
2039	Zimmerman Energy LFG PPA (7.6 MW)
2040	Harvest Ridge Wind PPA (100 MW)

(1) Additionally, 19 MW of landfill gas resources are forecasted to retire and various energy only fixed price contracts are forecasted to expire over the forecast horizon.

Wabash Valley utilized the PLEXOS® model to evaluate supply-side and demand-side resource options on an equivalent basis. Plexos® selects resources in order to reduce the overall portfolio cost, regardless of whether the resource is on the supply or demand-side. Specifically, we ran the Plexos® LP long-term optimization model, also known as "LT Plan®," and the Plexos® medium-term simulation model, also known as "MT Schedule®," to find the optimal portfolio of future capacity and energy resources that minimizes the Company's variable and fixed costs over the twenty-year plan horizon for each scenario.

Base Resource Plan

Wabash Valley's base resource plan is built on the expected, or most likely, assumptions represented in the Open Technology Options scenario under the Existing Policy future. Table 4-10 Base Existing Policy Power Supply Expansion Plan summarizes Wabash Valley's existing generating resources and anticipated capacity needs through 2040. Power Supply Requirements include expected Member demand, losses, contractual firm sales, and estimated reserves. Planned additions reflect that we will purchase the output from the Speedway Solar project when it begins commercial operation in 2024.

We calculate Capacity Needs by starting with our Power Supply Requirements and subtracting Existing Owned & Contracted Power Resources and Planned Additions. The last five columns of Table 4-10 present the optimal incremental additions to the portfolio of supply-side and demand-side resources that meets Wabash Valley's future capacity needs under this base resource plan.

Table 4-10 Base Existing Policy Power Supply Expansion Plan

Year	Power Supply Req. MW (1)	Existing Owned & Contracted Power Resources (MW) (2)	Planned Additions (MW) (2)	Capacity Needs (MW) (2)	Capacity Market (2)	NGCC (2)	NGCT (2)	Solar and Wind PPAs (2)	EE (2)
2022	2,146	1,675	0	471	496	0	0	0	5
2023	1,825	1,713	0	112	103	0	0	0	10
2024	1,851	1,713	100	38	25	0	0	0	15
2025	1,862	1,662	100	100	80	0	0	0	20
2026	1,872	1,489	100	283	108	150	0	0	25
2027	1,883	1,490	100	293	114	150	0	0	30
2028	1,858	1,486	100	272	87	150	0	0	35
2029	1,871	1,480	100	291	102	150	0	0	40
2030	1,881	1,479	100	302	33	150	0	75	45
2031	1,893	1,402	100	391	41	150	0	150	50
2032	1,906	1,270	100	536	12	150	0	325	50
2033	1,920	1,230	100	590	8	200	0	333	50
2034	1,948	1,028	100	820	64	200	0	508	50
2035	1,965	1,028	100	837	15	200	50	523	50
2036	1,983	1,028	100	855	0	200	50	583	49
2037	2,002	1,028	100	874	0	200	50	583	49
2038	2,021	857	100	1,064	69	200	150	598	48
2039	2,040	848	100	1,092	0	200	200	673	47
2040	2,058	825	100	1,133	15	200	200	673	46

(1) Power supply requirements include PJM and MISO reserves; 2022 requirements impacted by forward capacity sales.
(2) Resources are reported at their unforced capacity (UCAP) value.

From 2022 to 2025, Wabash Valley plans to make incremental capacity market purchases. During this same time frame, Wabash Valley will also meet needs through our EE programs and by purchasing 199 MW (ICAP) of power from the Speedway Solar project starting in 2024.

From 2026 to 2029, Wabash Valley's base resource plan capacity needs are largely met by 150 MW (ICAP) of baseload combined cycle resources along with EE programs and incremental capacity market purchases. From 2030 to 2040, our capacity needs are met by a more diverse mix of resources, including additional baseload combined cycle, significant wind and solar PPA purchases, combustion turbine, EE programs and incremental capacity market purchases. While our optimization model did not choose DR programs during our 20-year plan horizon, at the request of our Members Wabash Valley will continue to deliver and enhance our DR program offerings with variable annual participation levels.

Some of Wabash Valley's near term capacity needs are driven by our Pass-Through Loads. The Pass-Through Loads customers have the ability to customize their power supply portfolio based on their respective risk tolerances. Traditionally, our Pass-Through Loads customers desire to meet these needs through purchases from the PJM and MISO capacity markets.

Appendix A contains a more detailed schedule of Wabash Valley's Base Existing Policy Expansion Capacity Plan (UCAP Capacity). The schedule displays the expected load requirements for Wabash Valley's Members and for firm non-member sales each year, including losses and reserve requirements. The load forecast is compared to the current expected capacity supply-side and demand-side resources. Any remaining resource requirements to meet load for a specific year are divided between the capacity market and future NGCC, NGCT, renewable[i] and EE resources.

Appendix B Production Statistics identifies the Company's power production resources and presents the unit capacity and power costs, e.g. forecasted fixed O&M costs, variable O&M costs and fuel costs, for each resource over the next twenty years for Wabash Valley's Base Existing Policy Expansion Plan. Some of the power purchase agreements have only an energy price component, while others have fixed, fuel and O&M costs based on capacity. Some of the resources are fixed-price for the term of the contract. We have escalated our variable-priced contracts with increases consistent with industry natural gas and coal price forecasts. Other costs have been escalated at an assumed general inflation rate of 2.5%[2].

Appendix C Market Price Assumptions displays forward energy market prices for Indiana Hub, forward natural gas market prices for Henry Hub, forward coal market prices for the Illinois Basin and a forecast of bilateral capacity prices.

[2] NREL (National Renewable Energy Laboratory). 2021. "2021 Annual Technology Baseline." Golden, CO: National Renewable Energy Laboratory. https://atb.nrel.gov/electricity/2021/equations_&_variables

Wabash Valley's Risk & Resource Portfolio Department analyzes all opportunities to improve the Company's power supply portfolio while being cognizant of any regulation that may affect these sources. These opportunities may include the purchase/sale of generating assets, purchase/sale of cost-based power agreements and purchase/sale of fixed priced forward contracts. We analyze these opportunities to evaluate risk, reliability, and cost impact to our Members. While Wabash Valley has developed and maintains a detailed resource plan to serve forecasted Member load requirements, we may adjust that plan if we are able to take advantage of economic opportunities that arise.

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[i] Wabash Valley supports renewable energy by owning landfill gas and solar generation and purchasing the output from wind, solar and biogas facilities. Wabash Valley sells, separately, the environmental attributes associated with this generation to third parties, and therefore does not claim the generation as renewable within our own supply portfolio.

Section 5
SCENARIO ANALYSIS

Financial Forecast

The financial forecast is developed using a custom built financial forecasting model (developed by MCR). Production cost estimates are generated by PLEXOS®, and those costs are input into the MCR model. The financial analysis logic calculates the Company's expected revenue requirement based on production costs, capital recovery costs and financial performance targets such as TIER (Times Interest Earned Ratio), DSC (Debt Service Coverage Ratio), Fixed-Charge Ratio and Equity Percentage.

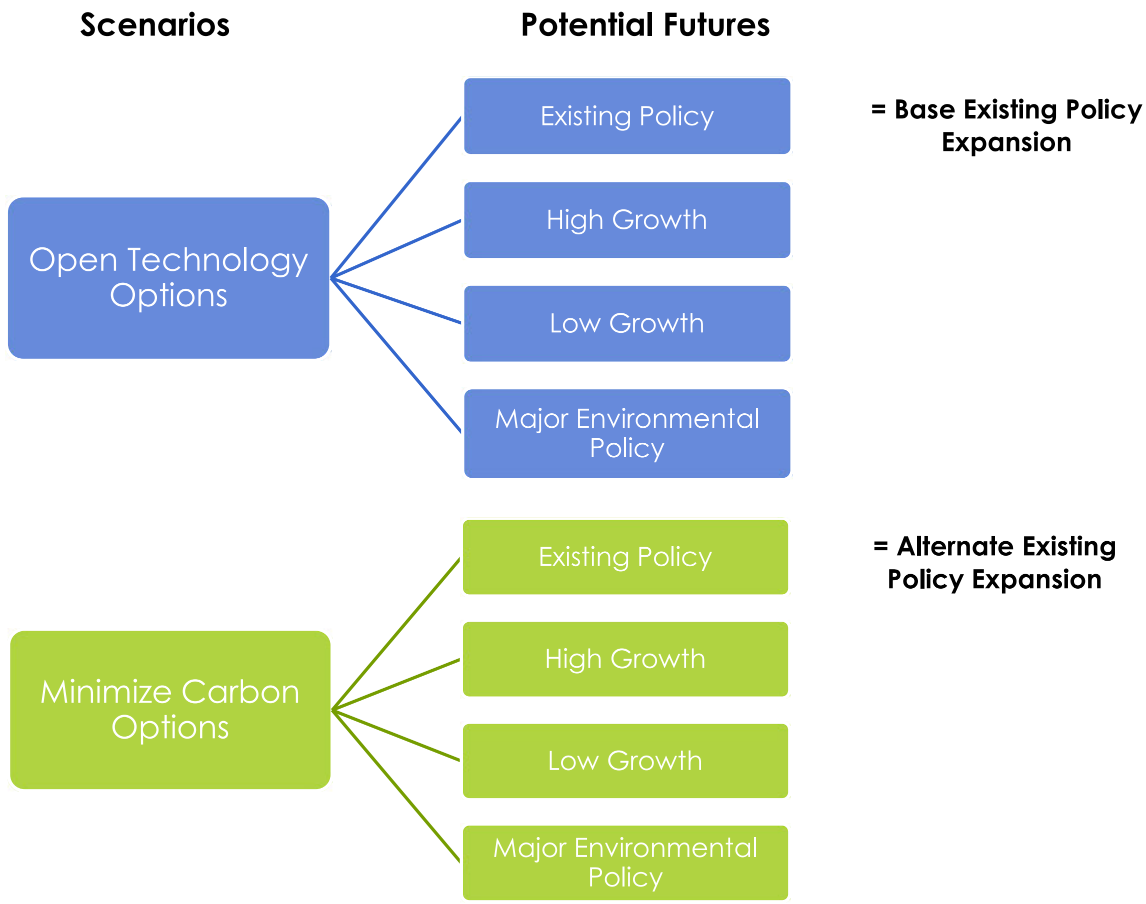
While Wabash Valley may consider sole or joint ownership of generating facilities, each project would first be measured against a comparable power purchase agreement. Wabash Valley is continuing to work to maintain its financial health through adherence to a prudent financial policy. The following is a summary of major objectives of the Company's financial policy:

1. Minimize the long-run cost of providing service to the Members with recognition that the quality of such service will be maintained at levels consistent with prudent utility practice and acceptable risk levels.
2. Preserve Wabash Valley as a going concern entity by maintaining and replacing its assets in accordance with industry standards and ensuring that adequate amounts of funds are available from internal and external sources to accommodate these needs.
3. Maintain the ability to access capital markets in order to finance facilities required to accommodate the Members' demand for electricity by maintaining the financial standards required of these markets for credit worthiness.

Scenario Modeling

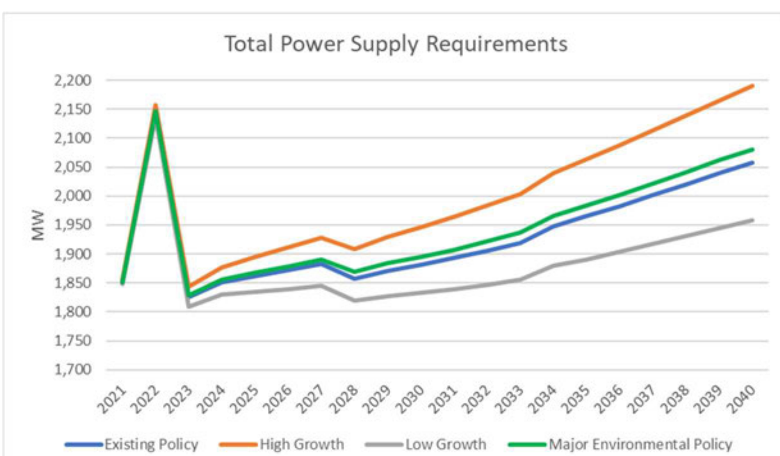
In Section 4, we described the scenarios evaluated in this IRP. Wabash Valley executed the Plexos® LT Plan® and the Plexos® MT Schedule® models deterministically under both scenarios for each of the four potential futures. As we discussed previously, Wabash Valley's base resource plan is built on the expected, or most likely, assumptions represented in the Open Technology Options scenario under the Existing Policy future. The other resource plans serve to provide awareness of how the Company may need to adapt if these alternate assumptions are realized. Figure 5-1 depicts this scenario analysis structure.

FIGURE 5-1 Scenario Analysis Structure



Graph 5-2 shows how total power supply requirements differ in each potential future. These differences are driven by alternative load forecasts as explained in Section 3. These requirements are the same under both scenarios. Both the High Growth and Major Environmental Policy potential futures include an EV adoption load forecast.

GRAPH 5-2 Total Power Supply Requirements



The increase in total power supply requirements in 2022 is driven by forward capacity sales. The decrease in 2028 is driven by the forecasted end of Wabash Valley's wholesale firm requirements sale to one non-member Indiana customer. Table 5-3 shows how much higher or lower each alternate future's total power supply requirements are compared to the Existing Policy future at various points in the time horizon.

TABLE 5-3 Requirements % Variance

Alternate Futures	2025	2030	2035	2040
High Growth	1.8%	3.4%	5.0%	6.4%
Low Growth	-1.4%	-2.6%	-3.8%	-4.9%
Major Environmental Policy	0.3%	0.7%	0.9%	1.1%

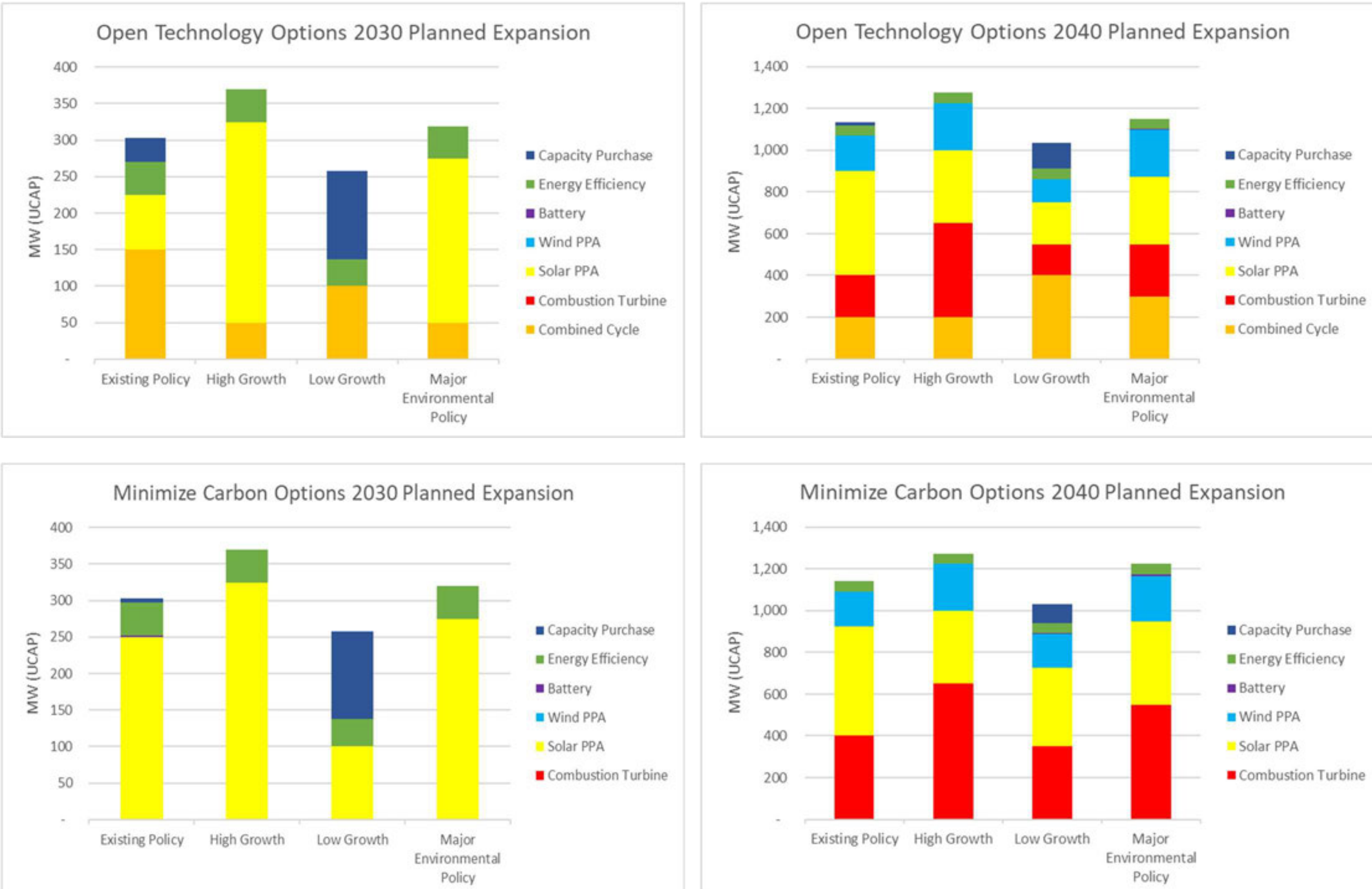
Table 5-4 shows how commodity prices differ in each potential future. We depict how much higher or lower each alternate future's commodity prices are compared to the Existing Policy future at various points in the time horizon. These price assumptions are the same under both scenarios. Appendix C Market Price Assumptions displays these energy, coal, natural gas and capacity market prices.

TABLE 5-4 Commodity Prices % Variance

Alternate Futures	Commodity	2025	2030	2035	2040
High Growth	Energy 7x24	15.0%	15.0%	16.2%	16.7%
	Coal	15.0%	15.0%	5.8%	2.7%
	Natural Gas	15.0%	15.0%	17.4%	18.6%
	Capacity	100.0%	100.0%	100.0%	100.0%
Low Growth	Energy 7x24	-15.0%	-15.0%	-14.1%	-13.8%
	Coal	-15.0%	-15.0%	-16.7%	-16.4%
	Natural Gas	-15.0%	-15.0%	-13.2%	-12.3%
	Capacity	-85.7%	-85.7%	-85.7%	-85.7%
Major Environmental Policy	Energy 7x24	15.0%	15.0%	46.6%	70.7%
	Coal	15.0%	15.0%	5.8%	2.7%
	Natural Gas	15.0%	15.0%	31.0%	38.3%
	Capacity	100.0%	100.0%	100.0%	100.0%

Capacity expansion plans for both scenarios for each of the four potential futures are presented below. Figure 5-5 compares the planned expansion resources for all eight cases in 2030, the mid-point of the time horizon, and in 2040, the final year. This capacity represents the resources selected to fill the capacity gap resulting from the forecasted retirement of owned generation and the expiration of existing purchase power agreements summarized in Table 4-9.

FIGURE 5-5 Scenario Comparisons



Key points of capacity additions by 2040 for all eight cases are summarized below by resource type:

Energy Efficiency (EE): Overall, EE resources have a low average total cost prompting their consistent selection across all eight expansion plans. The main limit of EE is its achievable potential.

Capacity Purchase: For the High Growth and Major Environmental Policy futures which utilize a high capacity price forecast, incremental capacity market purchases are low. For the Low Growth futures which utilize a low capacity price forecast, incremental capacity market purchases are high. For the Existing Policy futures which utilize a mid capacity price forecast, incremental capacity market purchases appeared to be relied upon more in the front half of the forecast than in the back half.

Combined Cycle (NGCC): In the Open Technology Options scenario, for both the Existing Policy and Low Growth futures, NGCC was the first resource selected in 2026 as gas prices remain low to mid and the resource runs at a high baseload capacity factor. For the High Growth and Major Environmental Policy futures, solar PPA was the first resource selected in 2023 with lesser amounts of NGCC selected in 2026. By 2040, between 200 MW and 400 MW of NGCC resources were selected across all four futures.

Combustion Turbine (NGCT): In seven of the expansion plans, NGCT was selected in the mid 2030s. In the Minimize Carbon Options High Growth plan, NGCT was selected a bit earlier starting in 2031. By 2040, for most of the Minimize Carbon Options plans, it appears that NGCT replaced the capacity that would have been provided by NGCC. In both Low Growth futures, NGCT is operating at a higher capacity factor % than in the other futures. Wabash Valley presumes it is more economical to run the NGCTs at a higher capacity factor to capture peak load than to build or buy a different resource when energy needs are low.

Solar PPA: Solar PPAs were heavily selected across all eight expansion plans. For both scenarios in the High Growth and Major Environmental Policy futures, solar PPA was the first resource selected in 2023. For the Minimize Carbon Options plans, it appears that Solar PPAs replaces the capacity and energy that was provided by NGCC starting in the mid 2020s. As the RTOs move forward with changes to their resource adequacy constructs including seasonal requirements and resource accreditation, Wabash Valley will assess the impacts to this resource.

Wind PPA: Across all eight expansion plans, wind PPAs were selected consistently in the back half of the forecast; and by 2040, the amount of wind PPA resources selected was fairly similar. This resource may have been chosen less often than solar PPA due to its higher fixed costs, likely caused by the expiration of federal tax credits for wind generation which sunset at the end of 2025, and lower effective capacity %. As the RTOs move forward with changes to their resource adequacy constructs including seasonal requirements and resource accreditation, Wabash Valley will assess the impacts to this resource.

Battery: This resource was only selected at a very minimal level primarily in the back half of the forecast across all eight expansion plans. At its typical capacity factor, battery has a higher average total cost than either NGCC or NGCT. If the cost of this technology declines, it may be better able to compete in the future.

While Wabash Valley executed expansion plans for this range of potential futures, we focus the majority of our remaining discussion and analysis on the Base Existing Policy Expansion and Alternate Existing Policy Expansion. In Section 4 in Table 4-10, we provided the Base Existing Policy Power Supply Expansion Plan. Below, in Table 5-6, we provide the Alternate Existing Policy Power Supply Expansion Plan. The Power Supply Requirements, Existing Owned & Contracted Resources, Planned Additions and Capacity Needs are the same in both plans. The last five columns of Table 5-6 present the optimal incremental additions to the portfolio of supply-side and demand-side resources that meets Wabash Valley's future capacity needs under the Minimize Carbon Options scenario and Existing Policy future which excludes investment in new NGCC technology to minimize carbon output. This expansion plan does not specifically address Wabash Valley's recently announced plan regarding carbon reduction goals but it does provide a potential path to decarbonization which will inform future IRPs.

TABLE 5-6 Alternate Existing Policy Power Supply Expansion Plan

Year	Power Supply Req. MW (1)	Existing Owned & Contracted Power Resources (MW) (2)	Planned Additions (MW) (2)	Capacity Needs (MW) (2)	Capacity Market (2)	NGCT (2)	Solar and Wind PPAs (2)	EE (2)	Battery (2)
2022	2,146	1,675	0	471	496	0	0	5	0
2023	1,825	1,713	0	112	103	0	0	10	0
2024	1,851	1,713	100	38	25	0	0	15	0
2025	1,862	1,662	100	100	80	0	0	20	0
2026	1,872	1,489	100	283	135	0	125	25	1
2027	1,883	1,490	100	293	137	0	125	30	2
2028	1,858	1,486	100	272	110	0	125	35	2
2029	1,871	1,480	100	291	100	0	150	40	2
2030	1,881	1,479	100	302	6	0	250	45	2
2031	1,893	1,402	100	391	14	0	325	50	2
2032	1,906	1,270	100	536	85	0	400	50	2
2033	1,920	1,230	100	590	1	100	438	50	2
2034	1,948	1,028	100	820	99	100	570	50	2
2035	1,965	1,028	100	837	16	200	570	50	2
2036	1,983	1,028	100	855	0	200	623	50	2
2037	2,002	1,028	100	874	0	250	623	50	2
2038	2,021	857	100	1,064	110	250	653	50	2
2039	2,040	848	100	1,092	0	400	690	50	2
2040	2,058	825	100	1,133	0	400	690	49	2

(1) Power supply requirements include PJM and MISO reserves; 2022 requirements impacted by forward capacity sales.

(2) Resources are reported at their unforced capacity (UCAP) value.

From 2022 to 2025, the alternate existing policy expansion plan is the same as the base existing policy expansion plan which meets needs through incremental capacity market purchases and EE programs.

From 2026 to 2032, Wabash Valley's alternate existing policy capacity needs are met by up to 800 MW (ICAP)/400 MW (UCAP) of solar PPA resources, EE programs, incremental capacity market purchases and minimal battery resources. From 2033 to 2040, our capacity needs are met by adding 400 MW of NGCT, additional wind and solar PPA purchases and incremental capacity market purchases. The level of EE and battery resources remains stable during this last period of our time horizon. Appendix A contains a more detailed schedule of Wabash Valley's Alternate Existing Policy Expansion Capacity Plan (UCAP Capacity).

Figure 5-7 compares the planned expansion resources under both the base and alternate existing policy expansion plans. When NGCC is disallowed, those capacity needs are replaced primarily by solar PPAs initially starting in 2026 and later by NGCT.

FIGURE 5-7 Existing Policy Expansion Plan Comparison

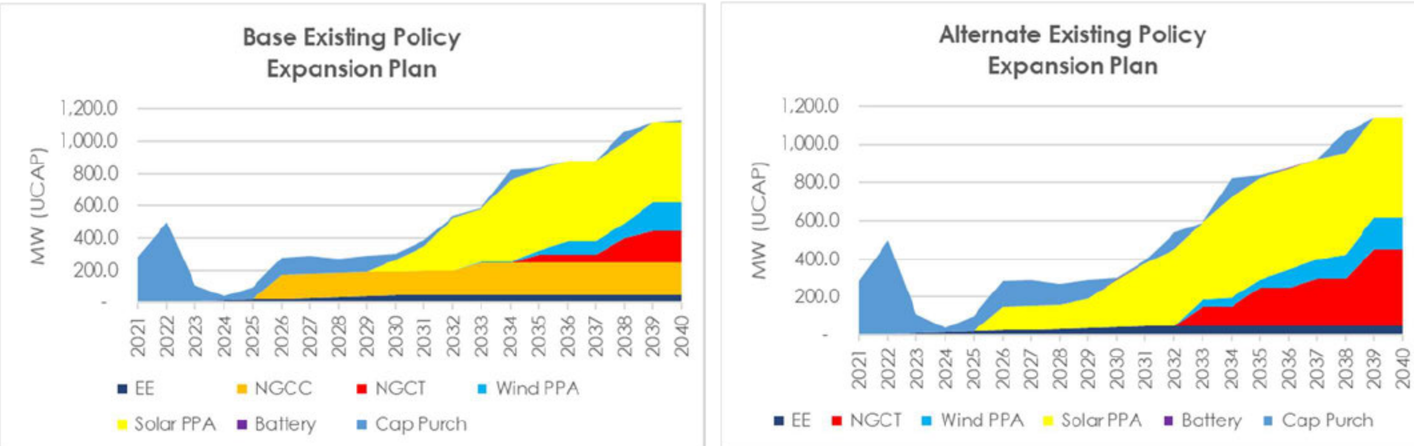


Table 5-8 and 5-9 summarize total power supply requirements and resources in 2030 and 2040 for the Existing Policy future for both the Open Technology Options and Minimize Carbon Options scenarios.

TABLE 5-8 2030 Requirements and Resources

Requirements including Reserve %	Units	Open Technology Options		Minimize Carbon Options	
	MW		1,881		1,881
Resources		**ICAP**	**UCAP**	**ICAP**	**UCAP**
Coal	MW	83	75	83	75
Natural Gas	MW	971	903	821	753
Landfill Gas	MW	14	11	14	11
Baseload PPAs	MW	399	396	399	396
Wind PPA	MW	209	27	209	27
Solar PPA/Owned Solar	MW	554	277	904	452
Demand Response	MW	64	64	64	64
Energy Efficiency	MW	45	45	45	45
Battery	MW	0	0	2	2
Capacity Forward Purchase	MW	50	50	50	50
Capacity Market Purchase	MW	33	33	6	6
Total	**MW**	**2,422**	**1,881**	**2,597**	**1,881**

TABLE 5-9 2040 Requirements and Resources

Requirements including Reserve %	Units	Open Technology Options		Minimize Carbon Options	
	MW		2,058		2,058
Resources		**ICAP**	**UCAP**	**ICAP**	**UCAP**
Coal	MW	41	37	41	37
Natural Gas	MW	1,074	1,022	1,074	1,022
Wind PPA	MW	1,150	172	1,100	165
Solar PPA/Owned Solar	MW	1,404	702	1,454	727
Demand Response	MW	64	64	64	64
Energy Efficiency	MW	46	46	49	49
Battery	MW	0	0	2	2
Capacity Market Purchase	MW	15	15	0	0
Total	**MW**	**3,794**	**2,058**	**3,784**	**2,066**

By 2040, the resource mix appears to be very similar for both scenarios. However, in the Minimize Carbon Options scenario, we do have 200 MW less NGCC than in the Open Technology Options scenario. The more notable difference is the natural transition away from carbon emitting resources. By 2030, Wabash Valley forecasts the retirement of Gibson Unit 5 and the expiration of two Duke Indiana PPAs which will reduce carbon output. By 2040, Wabash Valley forecasts the retirement of all remaining baseload PPAs, Wabash River Highland and Prairie State Unit 1 which will reduce carbon output even further. In either scenario, carbon emissions are forecasted to decrease by approximately 85% from the beginning to the end of the time horizon.

To determine how each plan performs against varying assumptions, we then tested the base and alternate existing policy expansion plans against several combinations of stochastic variables. The following discussion provides a description of our stochastic assumptions and the results of our modeling.

Stochastic Assumptions

Sensitivity analysis is an ongoing process at Wabash Valley. Financial forecasts are generally updated quarterly to reflect changes in energy, coal and natural gas market prices. We develop other sensitivities as needed to examine the potential impact of uncertainties due to Member load changes, plant outages, economic purchase and sales opportunities, resource availability and similar system planning functions.

Future Member energy requirements, energy, coal, natural gas and capacity market prices and environmental legislation are expected to have a significant impact on production costs. Wabash Valley ran sensitivity analysis to examine the impact of each uncertainty.

1. Member Energy Requirements

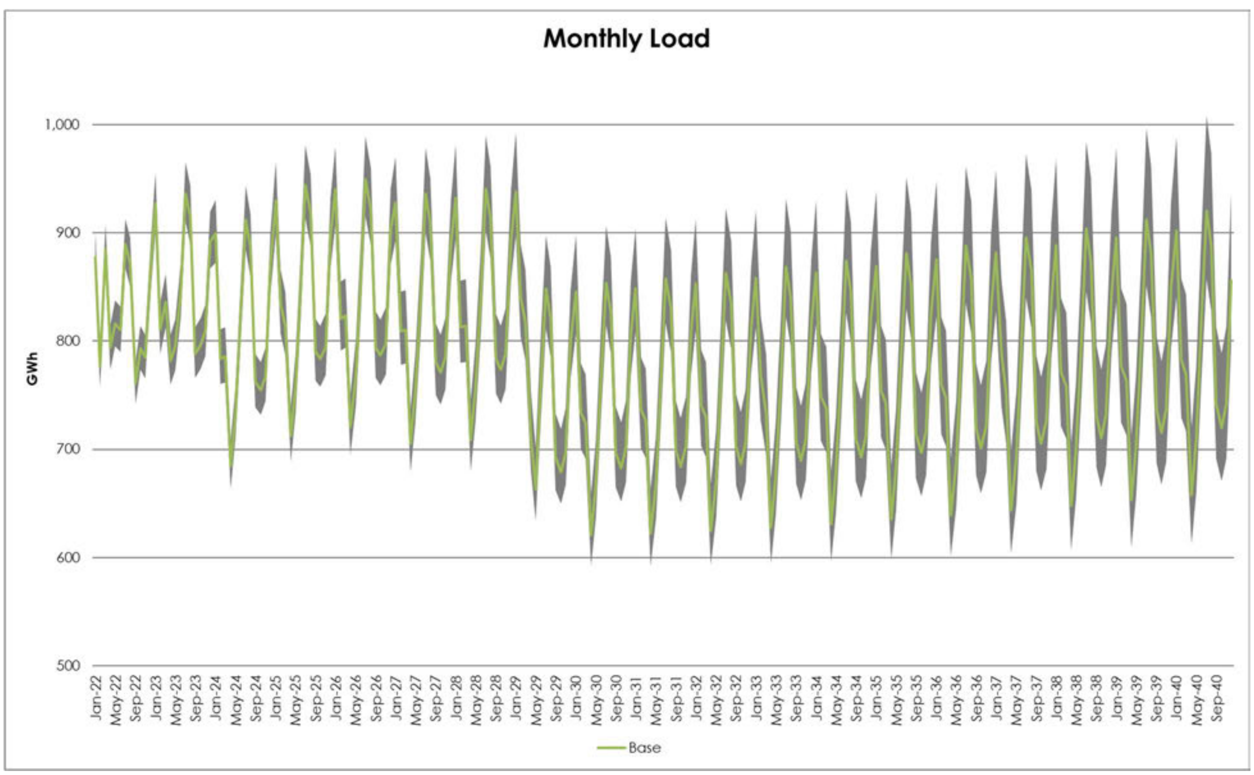
As discussed in Section 3 of this report, the 2021 Power Requirements Study produced a base case load forecast of Member consumption. Wabash Valley also developed two alternative forecasts estimating load under high and low growth. We modeled and analyzed these alternative forecasts as part of the high and low growth futures. We also used them to set our boundaries for the stochastic load variables.

As described in Section 3, the base case load forecast does not account for any electric vehicle (EV) growth and the high growth forecast was developed by adjusting population, households, and GDP variables only. For stochastic modeling purposes, we felt it was important to capture some level of EV growth. Member systems were categorized by anticipated speed of adoption (i.e. high, medium, low), and EVs as a percent of new car sales grows over the 2021-2040 timeframe. This results in an additional 48,589 EVs by 2040 resulting in 216,674 MWhs of additional load. Because this load mostly occurs in off-peak hours, peak load was only increased by 24 MWs.

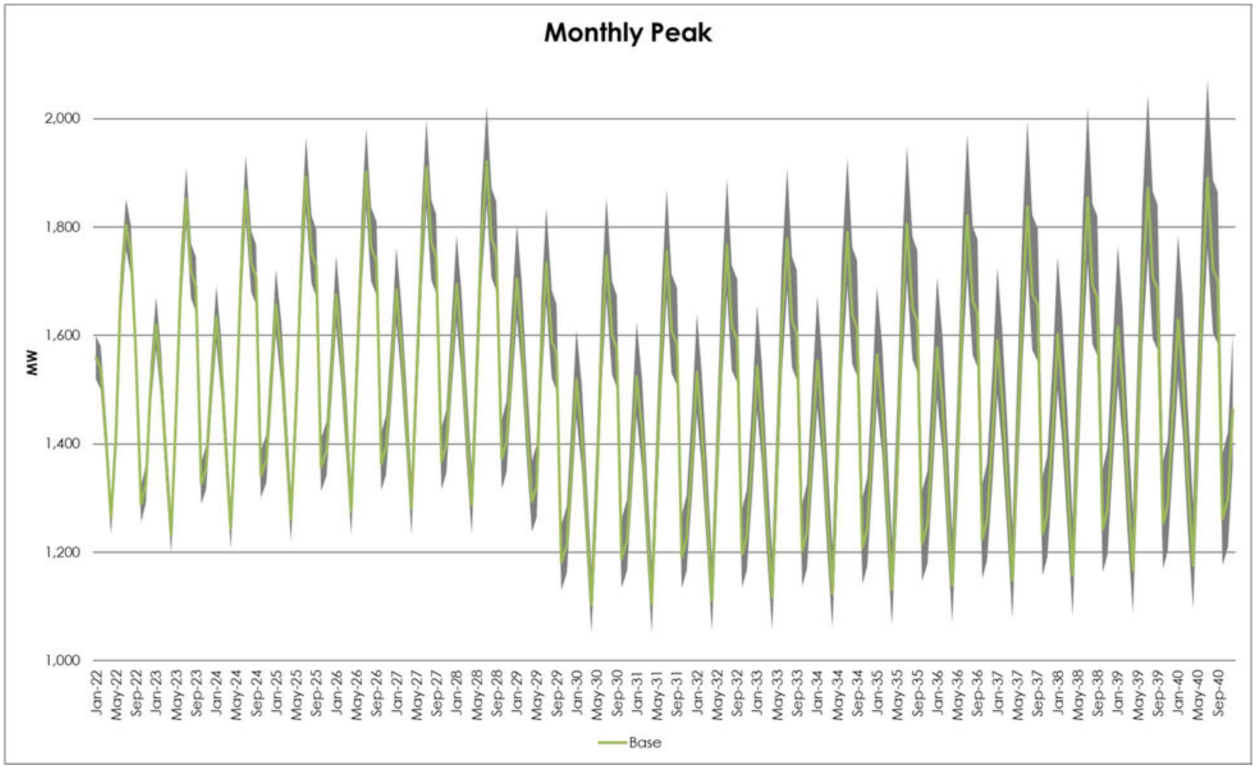
The high growth (including EV) energy and demand forecasts are 7.6% higher and 6.4% higher, respectively, than the base case forecast in 2040. The low growth energy and demand forecasts are 4.8% lower and 4.7% lower, respectively, than the base case forecast in 2040.

For stochastic modeling purposes, Wabash Valley created a Member Load variable using the low growth forecast as the floor and the high growth forecast (including EVs) as the ceiling. The resulting variable profile is reflected in the following graphs:

GRAPH 5-10 Monthly Load (GWh)



GRAPH 5-11 Monthly Peak (MW)



2. Market Prices

Wabash Valley uses projections of energy, coal, natural gas and bilateral capacity market prices in forecasting expected production costs. The PLEXOS® production cost model estimates the amount of energy purchased from the energy market based on unit dispatch limitations, the marginal cost of incremental supply from the Company's portfolio and the projected market price at the time of a proposed transaction. For this IRP, Wabash Valley chose to limit market purchases to a maximum of 235 MWs from 2021-2028 then subsequently decreasing to 126 MWs due to the expiration of a non-member pass-through load sale. We added this limit in part because Wabash Valley's Pass-Through Loads customers have traditionally chosen to meet their energy requirements by entering into short-term forward contracts or purchasing on the spot market. Furthermore, we did not want to presume that higher volumes of spot energy would be available while planning to meet the long-term energy requirements of our Members.

Wabash Valley projects natural gas prices, based on the forward price at the Henry Hub delivery node, for resources with fuel costs indexed to natural gas prices. All of our natural gas resources and the natural gas portion of our cost based purchase power agreements are indexed to natural gas forward price projections.

Wabash Valley also projects coal prices, based on the spot market in the Illinois Basin, for resources with fuel costs that are either coal-fired or fuel costs that have a relationship to the fluctuation in coal prices. The Company owns a share of three coal-fired units, Gibson Unit 5 and Prairie State Units 1 and 2. Prairie State includes an on-site captive coal mine and is not subject to the price volatility of Illinois Basin coal. However, the unhedged coal related to Gibson Unit 5 and the cost based purchase power agreements is indexed to Illinois Basin forward cost projections.

Recent history can attest to the broadening volatility of energy, natural gas and coal markets. Long-range market price forecasts provided by ACES and other forecasting sources suggest a steady increase in energy market prices. Wabash Valley is active in the energy market as both a seller and buyer. Therefore, the Company considers it prudent to assess a scenario where market prices not only decrease from the current forecasted levels but also increase.

Wabash Valley reviewed the volatility of historical forward-looking price curves used in long-term forecasts over the previous ten years. We analyzed period-over-period growth in the individual forecasts. Therefore, year one volatility is significantly lower than year twenty volatility. We then applied this analysis to our base case market price assumptions. Due to the extreme volatility of the curves, we constrained our high price calculations to two standard deviations of the mean and our low price calculations to one standard deviation of the mean.

For capacity price stochastic modeling, Wabash Valley created a variable that trended toward ACES' forecasted 2040 low bilateral price as the floor and trended toward MISO's forecasted 2040 Cost of New Entry (CONE) as the ceiling. This IRP analysis assumes annual capacity requirements only as seasonal requirements have not yet been finalized.

Wabash Valley's Market Price stochastic variables are defined as follows:

- Energy Prices: High Prices range from +14% in 2022 to +125% in 2040. Low Prices range from -6% in 2022 to -60% in 2040
- Natural Gas: High Prices range from +17% in 2022 to +92% in 2040. Low Prices range from -9% in 2022 to -48% in 2040.
- Coal Prices: High Prices range from +11% in 2022 to +85% in 2040. Low Prices range from -5% in 2022 to -42% in 2040.
- Capacity Prices: High Prices range from +6% in 2022 to +186% in 2040. Low Prices range from -10% in 2022 to -86% in 2040.

The resulting variable profiles are reflected in Graph 5-12, Graph 5-13, Graph 5-14 and Graph 5-15.

GRAPH 5-12 7x24 Energy Price

[redacted]

GRAPH 5-13 Coal Price

[redacted]

GRAPH 5-14 Natural Gas Price

[redacted]

GRAPH 5-15 Capacity Price

[redacted]

3. Carbon Tax

Wabash Valley obtained carbon tax projections and the resulting effect on energy and fuel prices from ACES. Since no history exists on which to base volatility and due to the influx of renewables[i] in utility portfolios, linking the volatility to another variable did not seem logical. Therefore, we elected to broaden the volatility of the carbon tax. For purposes of this IRP, the Company chose a range of +100% to -75%. It is important to note that we used a separate set of base and stochastic energy and fuel prices that assume carbon regulation impacts will take effect in 2031. The resulting variable profile is reflected in Graph 5-16.

GRAPH 5-16 CO_2 Tax

[redacted]

Scenario Results

The following discussion provides a summary of the impact of the stochastic variables on the base and alternate existing policy expansion plans. Please note that all of the costs reflected in the charts are 20-year levelized costs. Therefore, the impact of carbon is less since the effect of carbon regulation does not start until 2031 then it would be if it started in 2021. For example, if we levelized the base case carbon impact over ten years, the result is a $15.45/MWh spread instead of the $11.05/MWh shown in Chart 5-17.

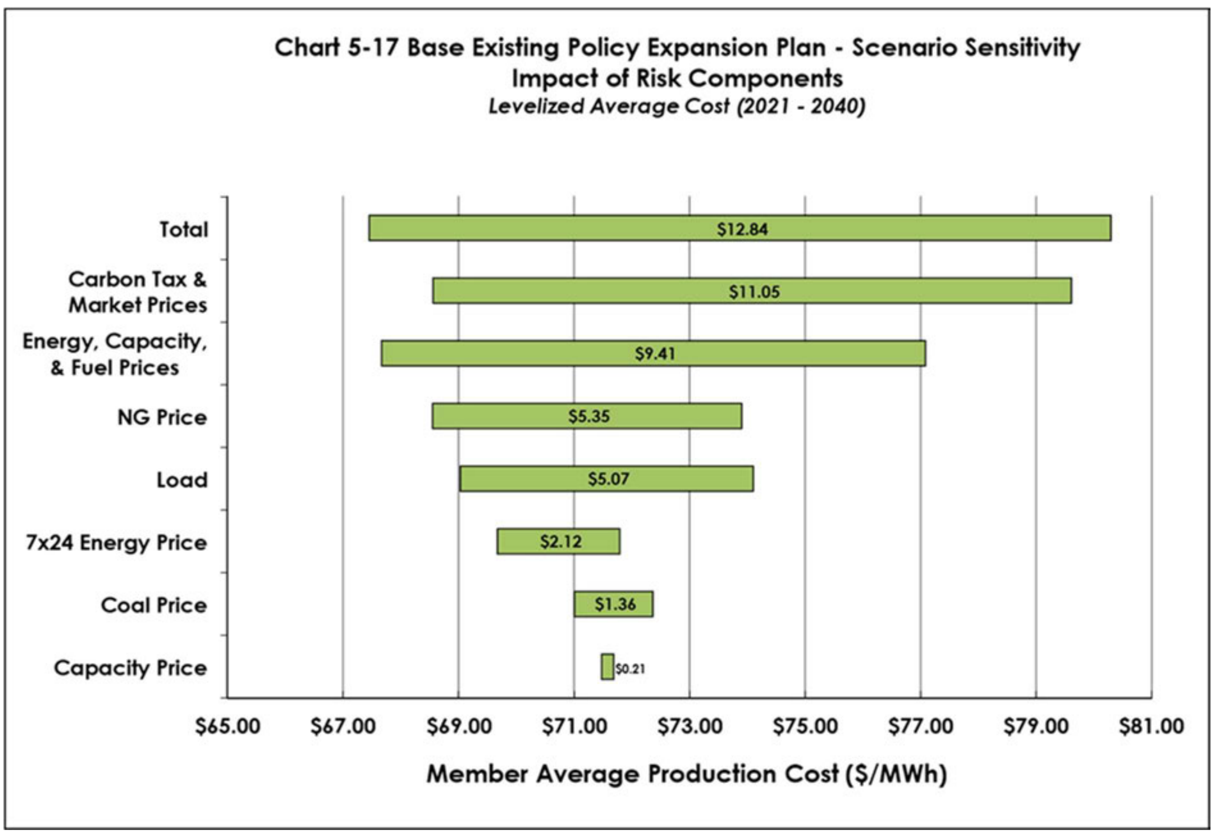
Wabash Valley believes our recent portfolio changes, such as the additions of 397 MWs of solar purchase power agreements, fixed price energy purchases, wind purchase power agreements and the 2026 forecasted retirement of Gibson Unit 5, have helped to manage risk associated with load and price fluctuations. In addition, other refinements including modeling improvements and enhancements to assumptions and stochastic variable ranges have also contributed to differences between the 2020 IRP and prior submissions.

1. Base Existing Policy Expansion Plan

We executed the base existing policy expansion plan against the stochastic variables defined earlier. Chart 5-17 shows the impact of the various risk components. The largest risk component is carbon emissions regulation. At this time, any carbon regulation is unknown as to specific form, magnitude or timing. Additional information is necessary before the Company can develop this analysis further. As stated earlier, the carbon tax overall levelized effect on the portfolio is somewhat misleading due to costs being levelized over twenty years.

Market energy, capacity and fuel price volatility also has a large impact on levelized cost. We based our stochastic samples on the historical forward-looking price curves used in long-term forecasts over the previous ten years. Over that time frame, the natural gas, coal, capacity and spot energy markets have experienced dramatic price changes.

Comparing this IRP to past submissions is difficult due to evolving modeling practices as well as reexamination and broadening of stochastic variables. These changes help to enhance the accuracy and overall measurement of risk. While comparison is challenging, some changes in risk are intuitive due to portfolio changes.



An analysis of Wabash Valley's six separate risk variables follows:

- Capacity Price – Capacity price has been a minor risk component in the past and it continues to be a minor risk in 2021 based on assumed continuation of annual capacity constructs. The driver of this is that Wabash Valley prepares our IRP with the idea that we will build or procure almost all our capacity needs. Moreover, we do not allow the model to sell capacity (or energy) in the spot market to eliminate building based on speculation as opposed to minimizing risk.

- Coal Price – Coal generation has historically supplied a large portion of Wabash Valley's needs either through ownership or cost based PPAs. With the forecasted retirement of Gibson Unit 5 and expiration of our cost based PPAs, Wabash Valley's exposure to coal will be limited to Prairie State after 2033. Prairie State's coal has very little price volatility due to the on-site captive coal mine. Furthermore, Duke Indiana and AEP continue to retire coal units and replace them with renewable energy which further limits our exposure to coal.

- Energy Price – As with capacity, Wabash Valley prepares our IRP with the idea that we will build or procure almost all our energy needs and not sell excess energy into the spot market. Again, this is to eliminate building based on speculation as opposed to minimizing risk. As referenced earlier, we do allow a portion of our pass-through loads' energy needs to be purchased in the market. While model economics leads to substantially less market purchases than allowed, we currently have around 2,000 GWhs of annual pass-through loads energy needs (including one non-member). Therefore, Wabash Valley still displays some risk in the energy market.

- Member Load – This risk has grown over past IRPs, but this is mostly due to changes in defining the stochastic variables. We not only broadened our alternative growth assumptions, but we chose to include the anticipated growth of EVs as part of the ceiling. Still, load variance is a significant risk to Wabash Valley as we will need to replace a large quantity of generation and capacity in the next decade due to plant retirements and contract expirations. Earlier, we referenced limiting market purchases; but, that limitation is turned off for this variable because at higher loads Wabash Valley's base expansion plan does not meet the capacity and energy needs of our Members.

- Natural Gas Price – As our exposure to coal declines, we might assume that our exposure to natural gas would increase. While Wabash Valley continues to have significant exposure to natural gas, a noteworthy change from past IRPs is the addition of large amounts of solar and wind in our base expansion plan. While natural gas resources (both baseload and peaking) contribute to our projected future, a very large part of our expiring generation is now replaced with renewable[i] energy and capacity.

- Carbon Tax – Wabash Valley's carbon tax exposure continues to be the leading risk metric in this analysis. There is no denying that carbon legislation would lead to added costs and risks, but this measurement of levelized costs is also being driven by underlying model assumptions. Several factors are driving this high risk impact.
    - The carbon tax stochastic includes the impact on associated energy and fuel prices. As mentioned above, pass-through loads' needs can be purchased on the spot market. These purchases now occur at an inflated price.
    - The forecasted increase in natural gas prices makes it more expensive to meet member load.
    - We disallow spot energy sales. This prevents lower carbon emitting resources like NGCC units from realizing the margin they could earn by dispatching.

2. Alternate Existing Policy Expansion Plan

We executed the alternate existing policy expansion plan against the stochastic variables defined earlier. Chart 5-18 shows the impact of the various risk components. The main difference between the alternate existing policy expansion plan and the base existing policy expansion plan is the removal of combined cycle as an expansion alternative. The theory behind this assumption being that eliminating baseload carbon could help Wabash Valley meet milestones toward our goal of achieving net-zero carbon dioxide emissions by 2050.

This scenario was not intended to be a net-zero carbon emissions study but more of a high-level pathway to net-zero. In both the base and alternate plans, Wabash Valley forecasts the retirement of Wabash River Highland in 2037 due to end of life and Prairie State Unit 1 in 2038 to adhere to the Illinois clean energy bill. Even though these retirements occur within the time horizon of the IRP, the effects are minimal from a levelized average cost basis. Two of Wabash Valley's existing baseload/intermediate carbon emitting resources are forecast to retire after the time frame of this IRP prompted by the Illinois legislation that requires the retirement of all carbon emitting generation by the mid-2040s.

The overall direction of the results shown in Chart 5-18 are as expected, but the magnitude of the change is quite a bit less than expected. This was driven primarily by our practice of capping market purchases and sales. A summary of the changes between the base and alternate plans follows:

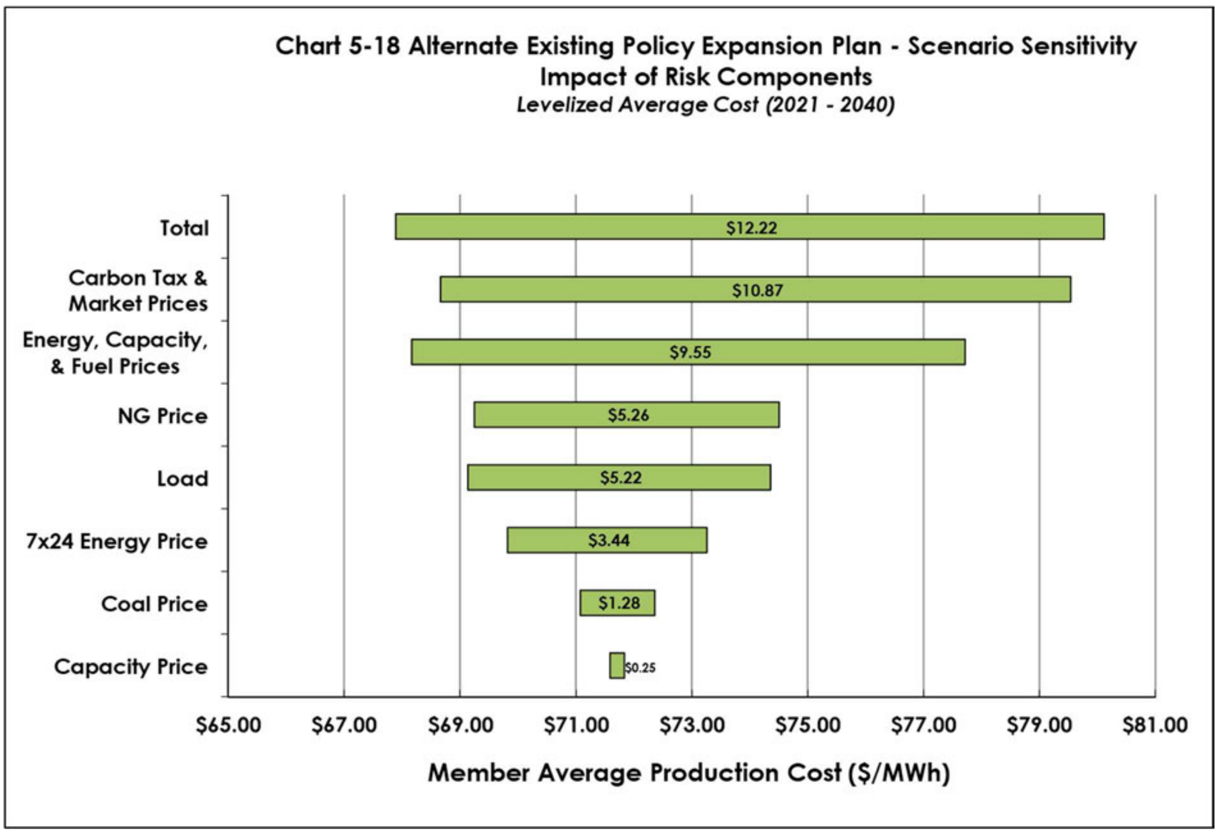
- Capacity Price – The slight increase in risk from the base plan is due to the increase in capacity purchases. This is driven by the UCAP differences between NGCC and solar resources which are the baseload options selected in the first half of the forecast.

- Fuel Prices – The increase in fuel risk is largely due to the reliance on current (less efficient) owned or contracted generation to meet load requirements when renewable[i] generation is limited. This leads to a greater variance band (on a per MWh basis).

- Energy Prices – The increase in energy risk is due to a greater reliance on market purchases to help meet demand when renewable[i] generation is limited.

- Member Load – This risk increased slightly due to the reasons mentioned above. Higher priced resources are used more during times of higher load and less during lower load. This leads to an increase in cost variance.

- Carbon Tax – The decrease in this risk is caused by eliminating NGCC as an expansion choice which translates to a reduction in carbon costs. This decrease is partially offset by the higher utilization of existing (less efficient) natural gas resources to fulfill generation needs.



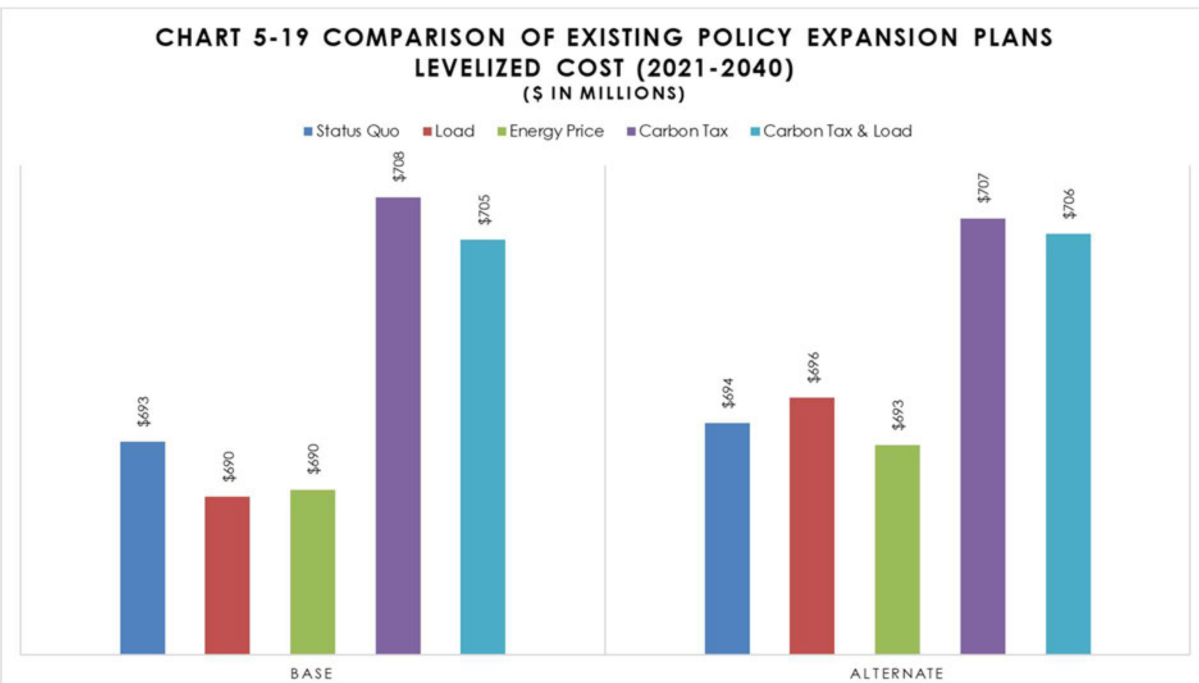
Conclusions

The objective of Wabash Valley's IRP is to develop a resource portfolio that minimizes the long-run cost of providing service to our Members while delivering that service at levels consistent with prudent utility practice and acceptable risk levels.

While the Company may consider sole ownership of a generation asset, it is more likely that we will participate in a joint ownership project or enter into a long-term power purchase agreement in order to diversify our portfolio while taking advantage of economies of scale. Because of this, the models in this IRP are designed to look at different fuel options along with energy efficiency and demand response alternatives as well as participation in RTO capacity markets.

Aside from incremental capacity market purchases and EE, the model chose natural gas and solar PPA resources to meet baseload energy and capacity needs. New wind PPAs were selected to replace expiring energy only contracts and existing wind PPAs when fulfilling capacity needs was not as much of a concern. Assuming the cost of renewable[i] energy continues to decline, wind, solar and battery resources will continue to serve as viable resource options, especially in a potential future with carbon regulation.

Chart 5-19 displays a comparison of 20-year mean levelized costs for both the base and alternate existing policy expansion plans showing the various stochastic parameters. The two expansion plans compare closely to one another on a levelized cost basis. The main difference is the base (Open Technology) plan is better equipped to handle changes in load due to its greater reliance on dispatchable resources. The alternate plan (Minimize Carbon) is in a better position to handle a carbon tax; however, this benefit is partially obscured due to Wabash Valley's legacy portfolio and carbon taxes assumed to take effect in 2031.



Short-term Action Plan

Wabash Valley has made substantial progress towards the activities outlined in our 2017 IRP short-term action plan.

- Wabash Valley contracted to purchase 100.4 MW of wind power from Meadow Lake Wind V and VI, located in White County, Indiana. Both phases commenced commercial operation in 2018.
- Wabash Valley contracted to purchase 100 MW of wind power from Harvest Ridge Wind Farm, located in Douglas County, Illinois, which commenced commercial operation in 2020.
- Although not specifically delineated in our 2017 IRP, Wabash Valley contracted to purchase a combined 198 MW of solar power from Prairie State Solar and Dressor Plains Solar, located in Perry County, IL and Fayette County, IL, respectively. Both projects commenced commercial operation in 2021.
- Wabash Valley constructed three additional community solar facilities totaling 5.1 MW located in LaOtto, IN, Wheatfield, IN and Perryville, MO. We placed these facilities in-service in late 2019.
- In 2017, Wabash Valley had 55 MW of peak load reduction enrolled in the PowerShift® program. Although our 2017 IRP did not propose adding DR resources, Wabash Valley has expanded the program to approximately 65 MW in 2021.
- Wabash Valley continued to coordinate residential and C&I EE programs to deliver cost-effective energy savings and a high level of member satisfaction.
- To improve transmission reliability and maintenance, Wabash Valley built an Operations Center in 2019 which has improved transmission outage response and coordination with Members and investor-owned utilities. Additionally, capital investments have been made with upgrades and additions to Wabash Valley's transmission system.
- Working with our joint owners, Wabash Valley has made specific capital expenditures on transmission plant to improve our investment position within the Joint Transmission System (JTS).
- Wabash Valley has complied with the Mercury and Air Toxics Standards (MATS) and the Cross-State Air Pollution Rule (CSAPR).

Major activities in the next three years include:

- Wabash Valley has contracted to purchase 199 MW of solar power from Speedway Solar, located in Shelby County, Indiana, due to commence commercial operation at the beginning of 2024.
- Wabash Valley will work with our joint owners to determine the plan, timing and cost for retirement of Gibson Unit 5, currently anticipated in 2026.

- Wabash Valley will continue to coordinate various residential and C&I EE programs and work to increase Member participation in these programs.

- Although our base resource plan does not propose adding DR resources, Wabash Valley will continue to offer residential and C&I DR programs. Furthermore, the Risk & Resource Portfolio Department along with a newly formed Innovation Committee plans to track the status and penetration of DERs, EVs and other new technologies and business models to plan for their potential disruption and to explore ideas and investigate new ways to serve Members through pilot programs.

- Wabash Valley will continually evaluate available projects that show potential to provide cost effective renewable[i] energy.

- Wabash Valley will monitor the changing energy landscape and adjust to incorporate changes to the RTO's resource adequacy constructs including seasonal requirements and resource accreditation.

- To continually improve reliability, expenditures will be made in upgrades or additions to Wabash Valley's transmission system. The Company also plans to maintain its investment position within the JTS.

- Wabash Valley will manage its resources to meet its capacity and reliability requirements of MISO, PJM and NERC.

- Wabash Valley will monitor developments surrounding the carbon emission pollution standards for new, modified, reconstructed and existing electric utility generating units and other environmental legislation. The Company expects to take the necessary steps to meet requirements and manage the cost impacts for the Members. These steps may include installing facilities at power stations in order to continue economic operation of the Company's existing generation facilities.

- Wabash Valley may seek alliances, partnerships and opportunities for joint operations with other electric utilities. These activities may include participation in new or existing power production facilities and combined system planning. The Company anticipates that these strategies have the potential to produce lower costs and mitigate risks.

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[i] Wabash Valley supports renewable energy by owning landfill gas and solar generation and purchasing the output from wind, solar and biogas facilities. Wabash Valley sells, separately, the environmental attributes associated with this generation to third parties, and therefore does not claim the generation as renewable within our own supply portfolio.