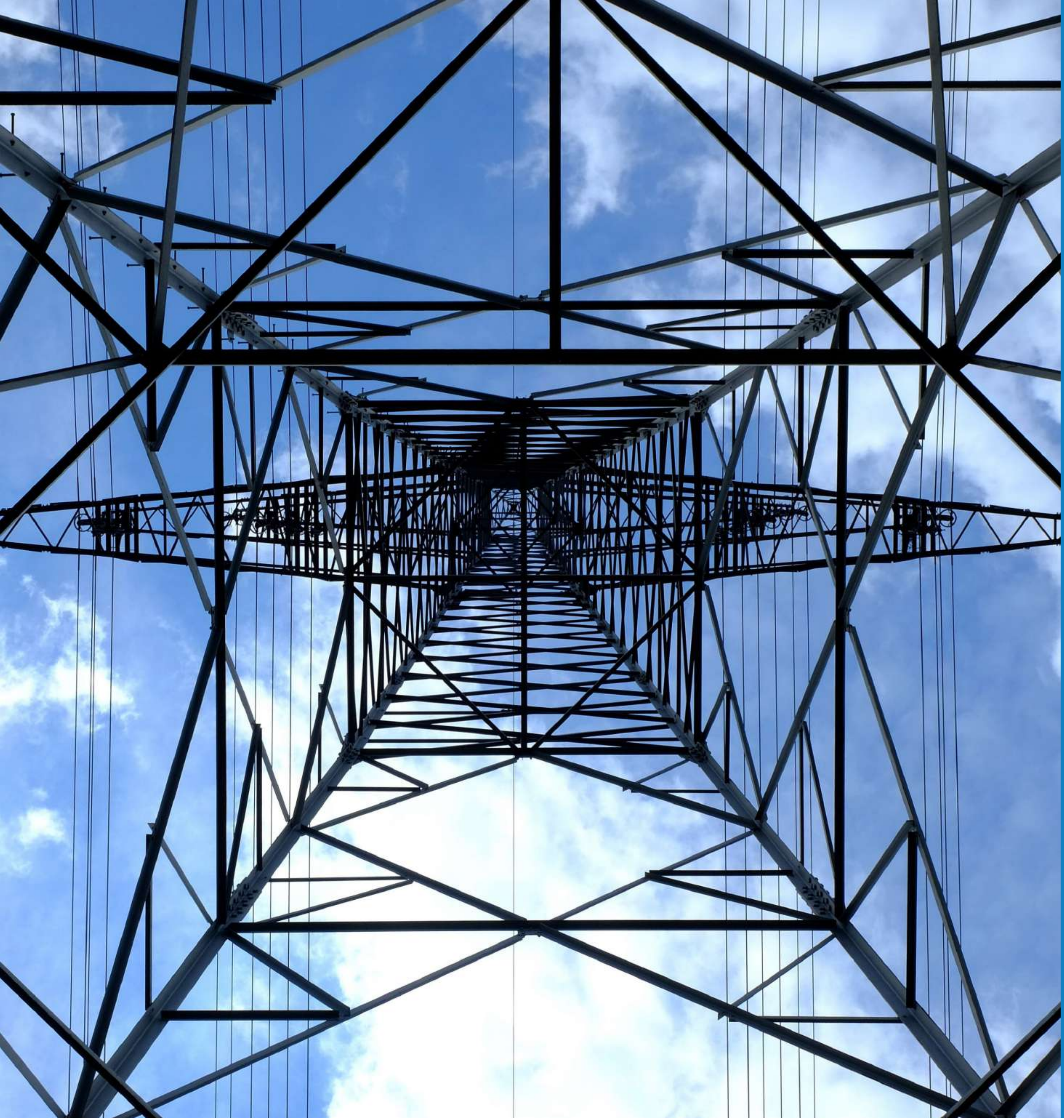
HOOSIERENERGY

# 2023 Integrated Resource Plan

## Executive Summary



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# What is Resource Planning?

## Key Features

The resource planning process projects future consumer needs and comprehensively evaluates options for meeting those needs.

**Resource plan inputs include:**

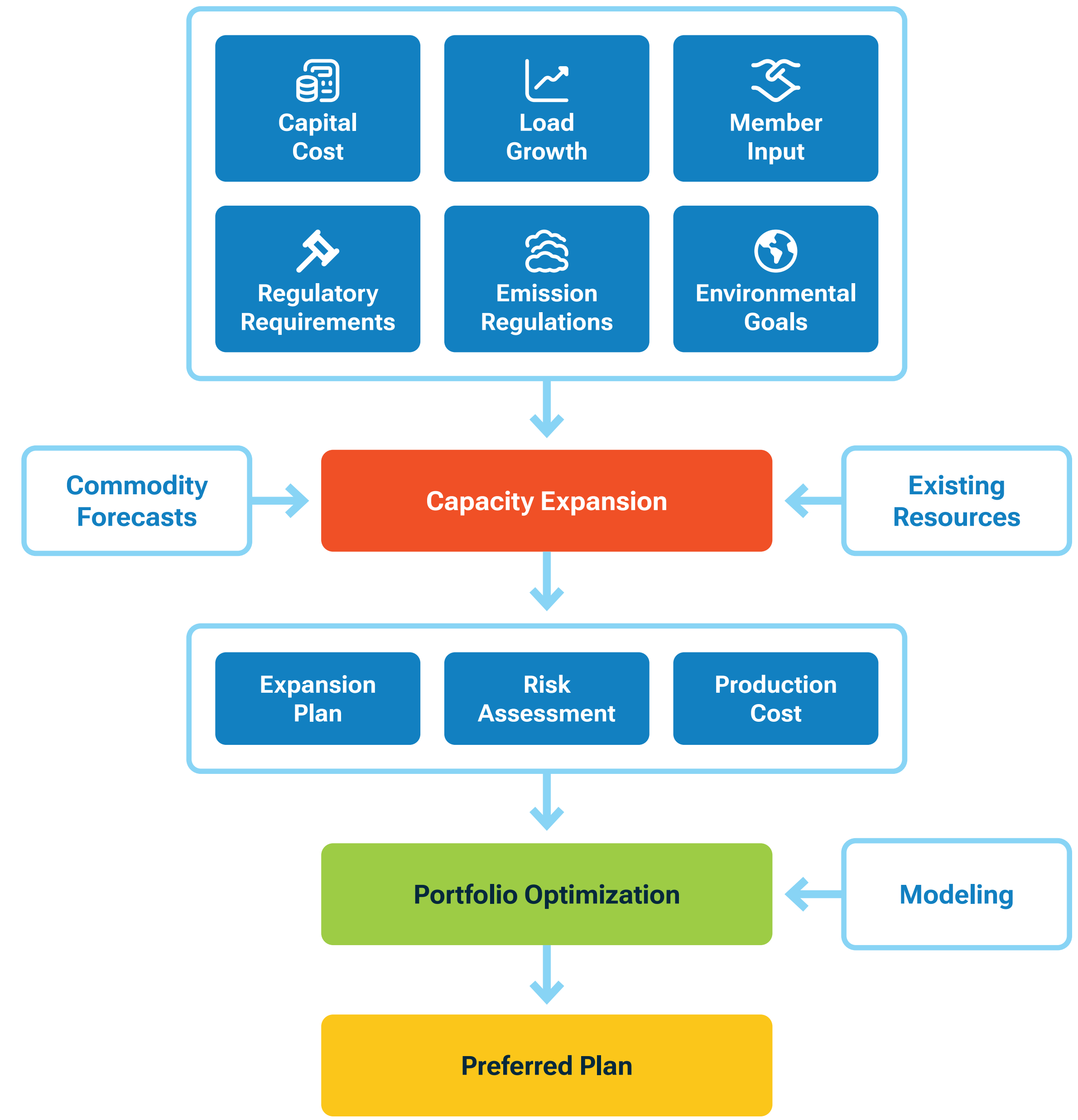
- Energy, peak demand and customer forecasts
- Resource strategies and regulatory policies
- Cost estimates and availability for current and future resources including capital, fixed and variable operating and maintenance costs
- Market projections for commodities

**Risk Analysis**

Inputs for the resource planning process are not absolute. Variables are stressed to understand the implications and interaction of inputs and impacts on costs and rates.

**Uncertain Future**

Resource plans will change over time. Course adjustments will reflect input from members and regulators, changes in growth patterns and financial considerations.




# Power Network

## Peak Demand

Member peak demand is projected to increase 10% by 2043.

| | |
|---|---|
| 2023 | 1,585 MW |
| 2043 | 1,738 MW |

## Energy Requirements

Member energy needs are projected to increase 11% by 2043.

| | |
|---|---|
| 2023 | 8,400,000 MWh |
| 2043 | 9,300,000 MWh |

## Number of Meters

The number of meters are expected to increase 8% by 2043.

| | |
|---|---|
| 2023 | 314,000 |
| 2043 | 338,000 |

**4,100**

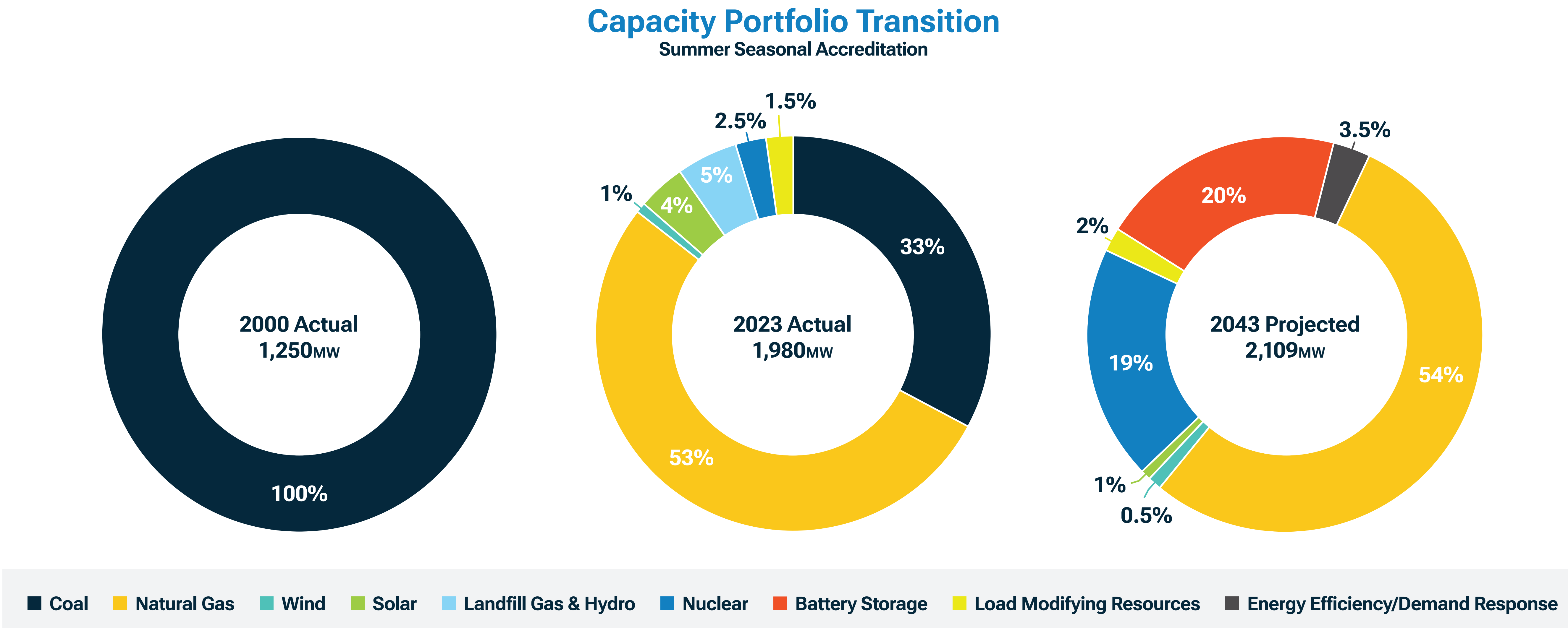
The estimated count of residential consumers having a plug-in hybrid or electric vehicle is 4,100. 8% of the surveyed residential consumers intend to acquire this particular type of car during the next 5 years.

**5,600**

There are 5,600 residential consumers who have renewable generation. Within the next 5 years, around 8% of residential users intend to implement renewable generation.

**1.8%**

The industrial energy sector is now having the highest energy growth rate among all energy sectors, with a compound annual growth rate of 1.8%.




# Meeting Member Needs

## Changes from 2020 to 2023

- Increased portfolio size (in MW) approximately 11% between 2020 and 2023.
- Added 200 MW of solar to the portfolio in 2022 via the Riverstart Solar project.
- Diversified counterparties from four in 2020 to 10 in 2023.
- Signed agreements to participate in the Palisades Nuclear re-powering.
- Added natural gas resources to lessen coal dependency.
- Added purchased power agreements (PPAs) to shift operating risk.
- Board decided in Jan. 2020 to pursue a more diverse resource mix, which included stepping away from Merom ownership.
- Board approved ownership transfer of the Merom plant to Hallador Energy in 2022.

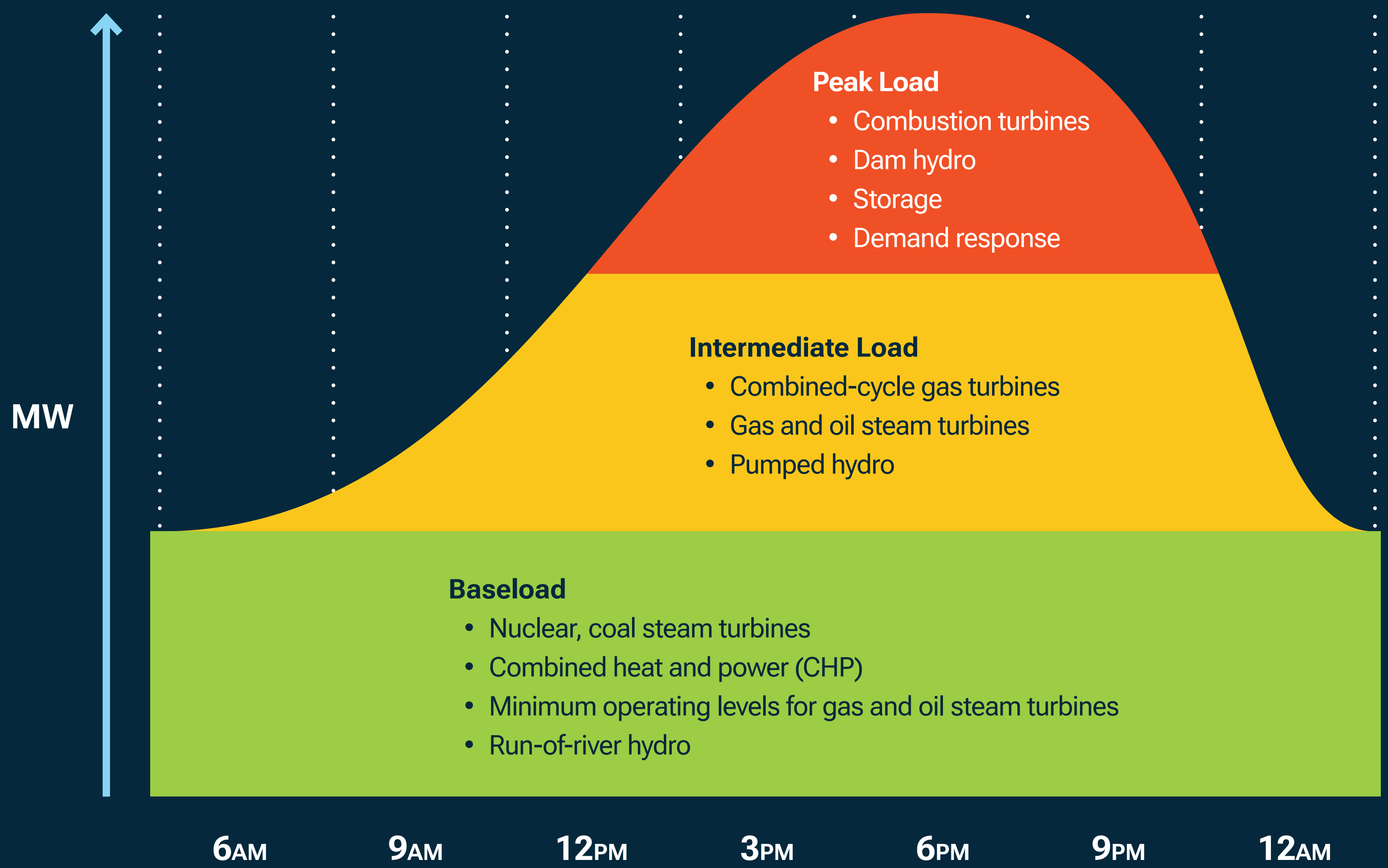
## Expected changes from 2023 to 2043

- Replacement resources are expected to include a combination of natural gas, nuclear, wind, solar, and battery storage, both owned and purchased.
- Adapt to MISO's evolving reliability regulations by prioritizing stable, firm resources in order to meet load requirements during periods of high risk.
- Mitigate environmental regulatory risk by diversifying resources to include wind, solar and battery storage.
- Enhance risk and opportunity analysis to understand and mitigate vulnerabilities without compromising possibility.

# Intermediate Load

Intermediate load represents electricity demand that falls between base load and peak load levels. While base load denotes the minimum demand that remains constant over time, typically occurring during periods of low consumption, and peak load refers to maximum demand experienced during high-consumption periods, intermediate load occurs during moderate demand times, such as weekdays when commercial and industrial activities are ongoing but residential usage is not at its peak.

Power plants catering to intermediate load must be flexible to adjust output quickly, such as natural gas-fired plants, combined cycle plants and certain renewable sources like hydroelectric or geothermal plants. Managing intermediate load efficiently ensures grid stability, reliability and optimal utilization of electricity generation and distribution systems, preventing shortages or excess capacity while supporting consistent delivery of electricity to consumers.



# Available Resources

## Natural Gas Combined Cycle (NGCC)

NGCCs provide both capacity and energy for extended periods of the day. The Holland plant, which is a 613 MW plant jointly owned with Wabash Valley Power Alliance, is an example within Hoosier's resource mix. Holland is an important component of the portfolio and has an excellent operating history.

## Combustion Turbines (CTs)

CTs are usually natural gas-fired and sometimes have fuel-oil backup. CTs are generally quick start and can provide energy on short notice. CTs are designed to operate during peak demand periods but are generally available all hours of the year except during planned maintenance outages. Lawrence and Worthington generating stations are both examples of this technology within Hoosier's resource mix.

## Wind

Federal production and investment tax credits have made wind resources economically appealing for energy portfolio diversification. Despite intermittent operation and lower capacity value during peak periods, wind resources, accounting for 15% of nameplate capacity in MISO's assessment, may require additional resources for planning reserve fulfillment. Hoosier Energy currently purchases 100 MW of wind through two separate PPAs and anticipates future additions based on Integrated Resource Plan projections.

## Solar

Tax incentives, public policy requirements and growing consumer support have driven widespread solar project construction nationwide. Hoosier Energy's commitment to renewables is evident by the recent addition of 200 MW of solar generation with the Riverstart Solar PPA in 2022. This expansion aims to efficiently meet member load while signaling a shift toward cost-effective, reliable and sustainable energy sources, reflecting a broader trend toward a cleaner energy future.

## Market Purchases

The forward power market remains a viable option for assistance in meeting member needs. Recent factors like low natural gas and renewables additions have reduced market power prices, challenging coal-fired generation. Continued downward pressure can provide opportunities to benefit from additional market participation, but it does not come without risk. Recent and expected future market volatility reinforce the importance of insuring long-term market exposure through strategic short-term hedging activity, owned assets, and purchased power agreements.

## Other Generation

Other generation sources include nuclear, hydro, biomass and future technologies that have yet to mature. The current portfolio contains nuclear, hydro and biomass which all assist in the carbon neutrality transition. As technologies like battery storage continue to become more proven and cost-effective, Hoosier will be diligent in its analysis and understanding of these resources in order to capitalize on future opportunities.

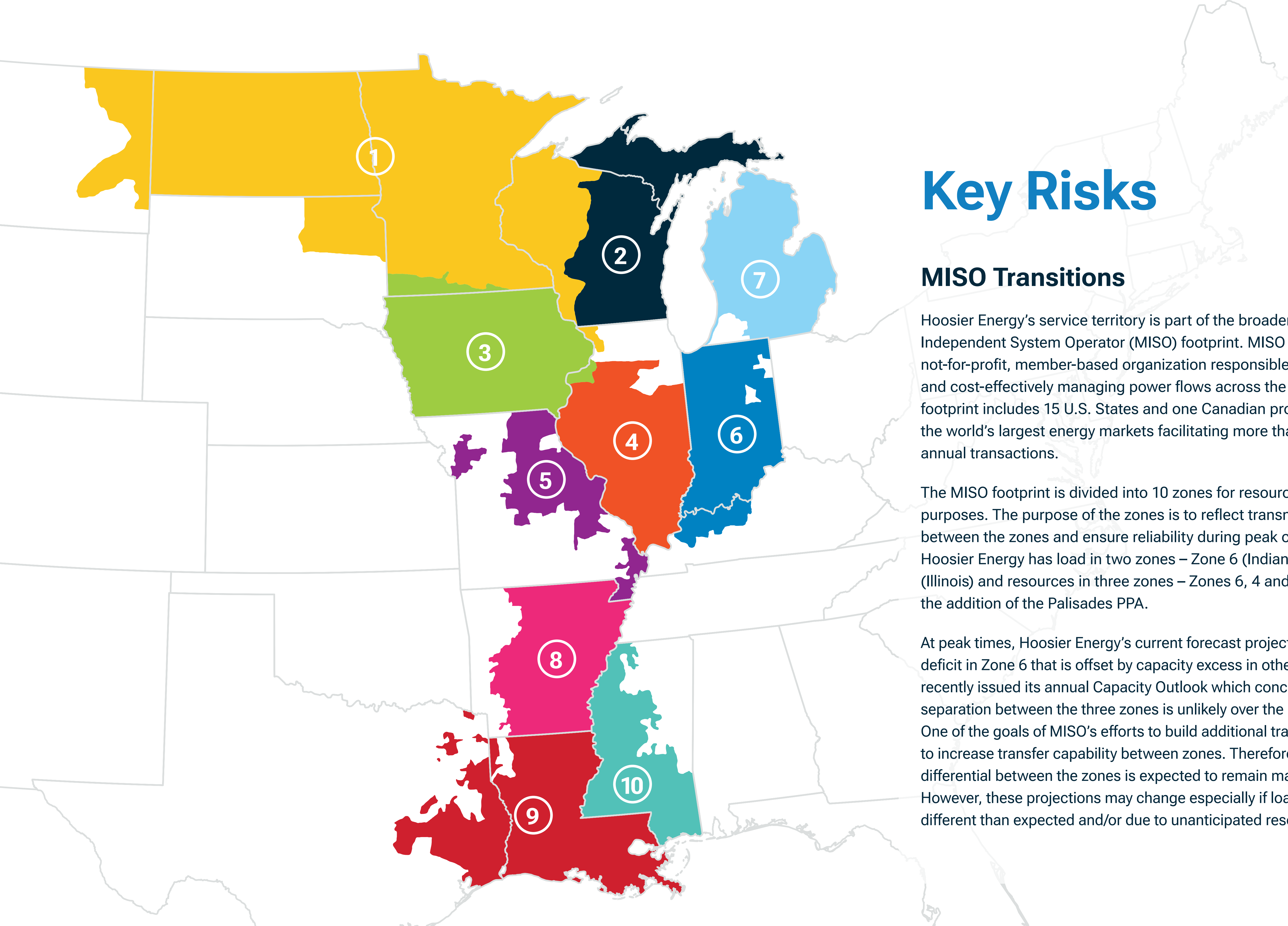
## Demand Response

Demand response refers to requests for retail customers to reduce or interrupt load during times of peak usage and/or emergency events. Demand response requires coordination between Hoosier Energy, the member cooperative and the retail customer. Hoosier Energy recently implemented a demand response program consistent with MISO's rules. The program has successfully registered 10 customers with a total of roughly 30 MW of seasonal capacity.

## Energy Efficiency

Consumers can help manage system demand through energy efficiency. When consumers use new strategies, products and technologies to reduce consumption, the effect can be equivalent to adding generation.

In 2022, annual savings from the demand-side management programs totaled 6,937 MWh. Summer demand was reduced by 3.14 MW and winter demand was reduced by 7.2 MW.




# Key Risks

## MISO Transitions

Hoosier Energy's service territory is part of the broader Midcontinent Independent System Operator (MISO) footprint. MISO is an independent not-for-profit, member-based organization responsible for reliably and cost-effectively managing power flows across the region. MISO's footprint includes 15 U.S. States and one Canadian province. It is one of the world's largest energy markets facilitating more than $40 billion in annual transactions.

The MISO footprint is divided into 10 zones for resource adequacy purposes. The purpose of the zones is to reflect transmission capability between the zones and ensure reliability during peak conditions. Hoosier Energy has load in two zones – Zone 6 (Indiana) and Zone 4 (Illinois) and resources in three zones – Zones 6, 4 and 7 (Michigan) with the addition of the Palisades PPA.

At peak times, Hoosier Energy's current forecast projects a capacity deficit in Zone 6 that is offset by capacity excess in other zones. ACES recently issued its annual Capacity Outlook which concludes that separation between the three zones is unlikely over the next few years. One of the goals of MISO's efforts to build additional transmission is to increase transfer capability between zones. Therefore, the price differential between the zones is expected to remain manageable. However, these projections may change especially if load growth is different than expected and/or due to unanticipated resource retirements.

The results of a recent MISO Survey indicate that, based on current assumptions, there are sufficient resources to serve expected load through the 2025/26 Planning Year. This means that short-term capacity should be available in the near term. However, the same report shows a projected mid- to long-term need for additional generation in order to meet demand across the footprint, all within the midst of baseload retirements and replacement generation with less reliability.

In addition to the seasonal construct that was approved by FERC in August of 2022 and implemented beginning in PY 2023-24, MISO continues to analyze changes to the capacity construct with the stated goal of further enhancing long-term resource adequacy. These changes include MISO's reliability-based demand curve (aka sloped demand curve) and changes to capacity accreditation methodology.

MISO has also developed a list of generation resource attributes that are deemed necessary to operate the system. These attributes include:  availability, fuel assurance, ramp up capability, voltage stability, rapid startup, and long-duration energy at a high output. MISO's current timeline for implementation of these additional requirements is later this decade.

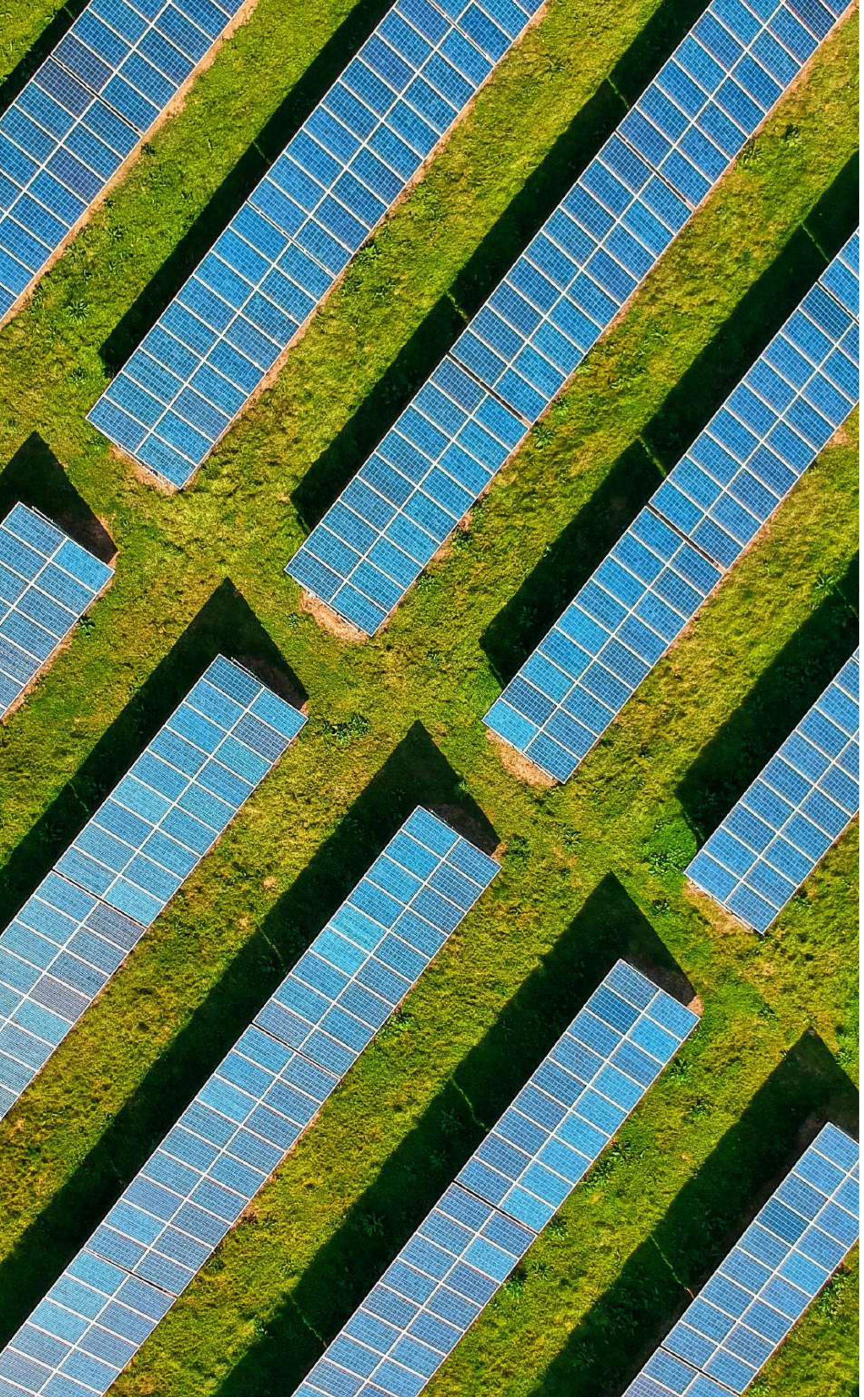
## Market Volatility & Price Risk

The resource planning process includes market price forecasts for power, natural gas, capacity and other commodities. These forecasts will change over time. Dramatic changes, such as price spikes from severe weather or an economic recession, will have material impact on expected outcomes.

While several market price scenarios are incorporated into the portfolio modeling to attempt to recognize a variety of market futures, it is impossible to capture all variability. Therefore, the Integrated Resource Plan should be viewed as a snapshot in time based upon current market forecasts and economic assumptions. The resources selected as part of the IRP process are highly dependent upon market price and will change over time, requiring additional hedging strategies such as managing market position and exposure, fixedprice energy contracts, a balance of owned assets, and a proactive formal hedging program.

## Environmental Rules & Regulations

The EPA 111(b) and 111(d) rules pose significant challenges to a reliability portfolio. This ruling would require additional energy-producing resources in order to fill the gap from reduced natural gas generation. Other federal regulations such as a carbon tax could put additional cost pressure on a future resource strategy that does not add additional renewables and battery storage. This ruling also includes technology that needs additional time for development and infrastructure whose pricing is difficult to incorporate into modeling scenarios. Hoosier works with regulatory counsel and consultants within the cooperative network to navigate an accelerated regulatory environment with very few paths to success.



## Transmission Price Constraints

Congestion is a significant cost risk. Congestion results from the locational marginal pricing (LMP) market methodology, which reflects the value of energy at specified locations throughout the electrical footprint. If the same priced electricity can reach all locations throughout the grid, then LMPs are the same. Transmission congestion, which can be caused by changes in consumer load requirements, generation outages, stress on the transmission system, etc., results when energy cannot flow either from or to other locations. This requires more expensive and/or more advantageously located electricity to flow in order to meet the demand. As a result, the LMP is higher in the constrained locations.

Hoosier Energy works with both ACES and outside consultants to analyze congestion between generation resources and load. This forward-looking analysis includes MISO-approved transmission expansion generation resource additions and retirements. In general, the analysis projects improved congestion impacts even though construction of new lines may impact dispatchability of existing generating units. Therefore, long-term congestion impacts appear to be a low risk at this time.

## Counterparties & Resource Cost

Hoosier Energy members are well served by maintaining a mix of owned and purchased resources. Hoosier uses PPAs to acquire a mix of generation types including gas, nuclear, wind, solar and hydro. Future and current resource options include additional partnerships with existing or new counterparties to meet capacity and energy requirements. In addition to traditional PPAs, options may include shared ownership or Hoosier Energy taking a partial interest in generation resources owned by other companies. The increase and diversification of counterparties has opportunity but also includes risk with counterparty credit, reduction of negotiation position during times of scarcity or high pricing, and execution risk in an environment where new generation is increasingly more difficult to build.

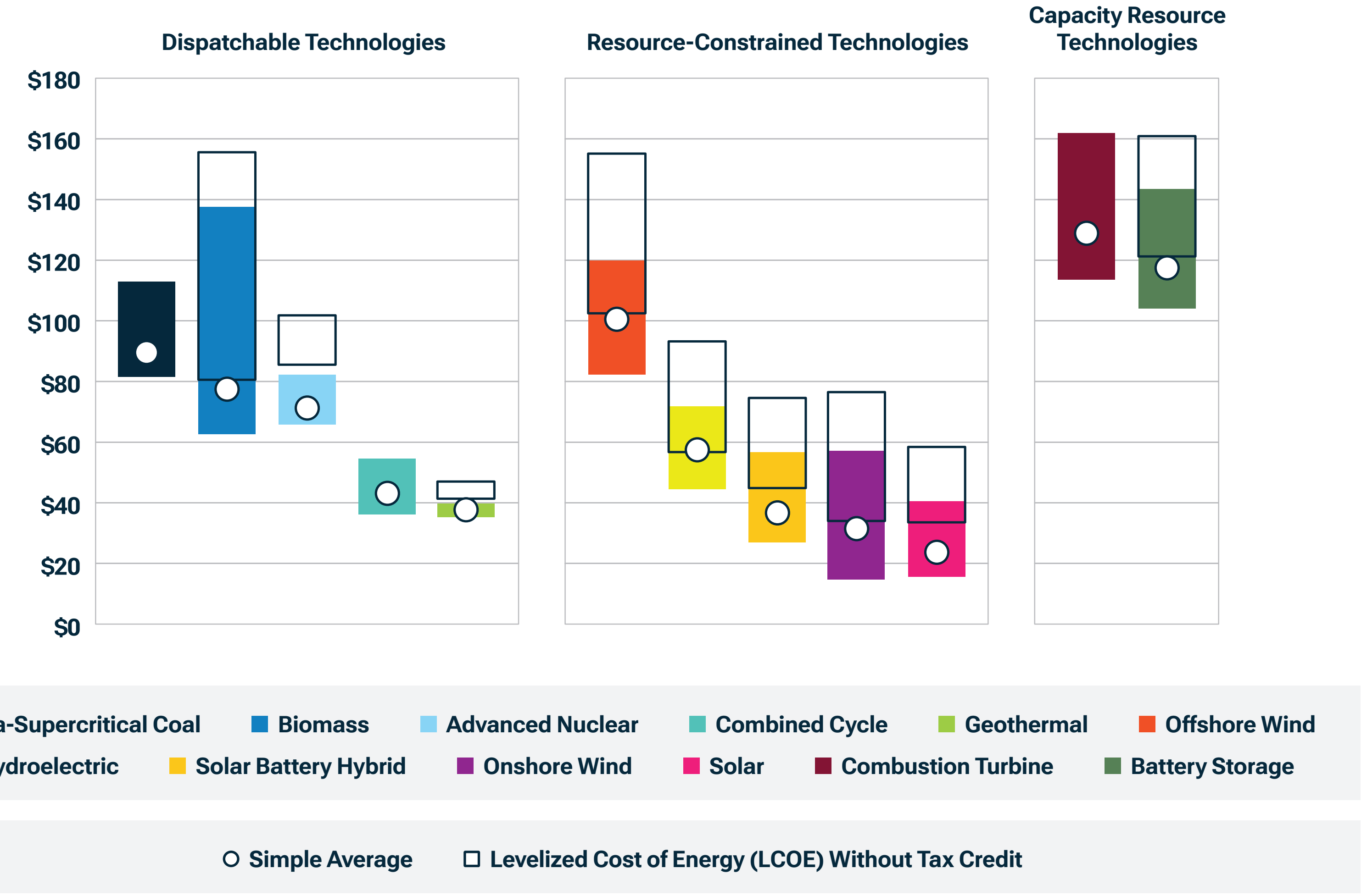
It has also been extremely difficult to bring new generation online due to supply chain obstructions, construction costs, significant ISO interconnection delays, and inflationary interest rates. These setbacks exist whether contracting or self-building and drive the cost of the resource (and therefore it's capacity and energy) higher, impacting overall power supply costs. Some of these costs can be avoided by contracting with existing resources, pursuing federal funding for resource development assistance, extending existing agreements, and participating more actively in the market. However, the risks of those efforts have to be measured and compared in order to make prudent resource decisions in an uncertain and volatile environment.

# Energy Cost of New Generation

The chart on the the right reflects the U.S. Energy Information Administration's forecasted ranges of levelized cost of electricity for new generation resources entering service in 2028 (in 2022 dollars). This chart indicates that gas-fired, wind, solar and battery storage generation will be the most economic alternatives as portfolio additions. While wind and solar generation may be less expensive on a levelized cost basis than some alternatives, they are intermittent energy sources and only contribute a fraction of their nameplate capacity toward Hoosier's load obligation. The future development of economic utility-scale storage is expected to increase the value of intermittent resources.

*Data source: U.S. Energy Information Administration, Annual Energy Outlook 2023*

## 2022 Dollars Per Megawatt Hour (MWh)




## Ownership vs. Purchased Power Agreements

Hoosier Energy members benefit from a balanced approach of owned assets and purchased power agreements (PPAs), which encompass coal, wind, solar, natural gas, nuclear, and hydro resources. PPAs enable risk mitigation, particularly operational risks, while leveraging counterparties' expertise to diversify the generation portfolio. Hoosier Energy strategically acquires a mix of solely and jointly owned facilities to further mitigate specific risks associated with owned generation resources. Future resource acquisitions will consider both ownership and PPA structures, with the preference determined by resource type, availability and counterparties' capabilities. Alongside traditional PPAs, alternatives such as shared ownership or partial interest in other companies' generation resources are under consideration, taking into account Hoosier Energy's advantageous capital structure, characterized by lower-cost debt and equity requirements. Ownership may prove economically favorable and suitable in appropriate circumstances.

# 2023 IRP Framework

Hoosier Energy used a portfolio matrix scenario design that evaluated seven hypothetical portfolio strategies. The seven strategies included:

- **Reference (Base) Case –** Currently projected commodity and resource costs (most likely future) with no new environmental regulation
- **EPA Rule –** Reference Case gas and power price capacity factor limitations for new and existing resources per EPA's CAA 111(b) and 111(d), as well as Reference Case technology costs
- **Carbon Tax –** Reference Case natural gas prices, higher power prices as a result of a federal carbon tax of $21/ton of CO2 starting in 2028 and increasing to $62/ton of CO2 by 2050, and Reference Case technology costs
- **EPA Rule + Carbon Tax –** Reference Case natural gas price capacity factor limitations plus a carbon tax which drives power prices higher, essentially combining the second and third scenarios, as well as Reference Case technology costs
- **Aggressive Environmental –** Low renewables and storage costs from additional federal incentives, high natural gas prices with the addition of upstream regulations, the full EPA Rule as well as a carbon tax driving power prices higher, and low technology costs
- **High-Price Environment –** High natural gas and power prices, and a high cost of replacement resources offset slightly by IRA benefits
- **Low-Price Environment –** Low cost of replacement resources, low natural gas and power prices, no environmental regulation, and low technology costs, basically a best-case-scenario

| | Affordability & Stability | | | Environmental Sustainability | | | | Risk & Opportunity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Reference Case 20-Year PVRR | 10-Year Avg. Supply Cost | 20-Year Avg. Supply Cost | Reference Case Cumulative Carbon Emissions | Avg. Carbon Emissions Across Scenarios | % Zero-Carbon Generation | | Lowest PVRR Across Scenarios | Highest PVRR Across Scenarios | Avg. Market Interaction | | Max % Generation from Single Resource Type | |
| | $MM | $/MWh | $/MWh | Tons | Tons | 2030 | 2040 | $MM | $MM | Purchases | Sales | 2030 | 2040 |
| Reference Case | $7,792 | $64.29 | $72.08 | 56,516,882 | 54,379,730 | 42% | 45% | $6,896 | $10,205 | 17% | 5% | 48% | 37% |
| EPA Rule | $7,970 | $65.94 | $73.72 | 48,531,016 | 47,350,905 | 53% | 59% | $7,150 | $9,042 | 16% | 9% | 38% | 35% |
| CO2 Tax | $7,925 | $64.59 | $73.29 | 46,729,713 | 44,838,013 | 46% | 70% | $7,102 | $9,218 | 16% | 10% | 43% | 33% |
| EPA + CO2 Tax | $8,038 | $66.25 | $74.35 | 45,926,685 | 44,456,416 | 57% | 70% | $7,241 | $8,941 | 16% | 11% | 36% | 33% |
| Aggressive Environmental | $8,082 | $66.61 | $74.76 | 46,218,628 | 44,617,299 | 56% | 70% | $7,300 | $8,897 | 15% | 12% | 37% | 33% |
| High-Price | $8,122 | $66.37 | $75.11 | 47,305,607 | 46,708,489 | 57% | 62% | $7,320 | $9,255 | 16% | 10% | 36% | 34% |
| Low-Price | $7,759 | $64.18 | $71.77 | 60,897,317 | 56,939,664 | 42% | 40% | $6,838 | $11,397 | 17% | 5% | 48% | 48% |

# Scorecard Evaluation & Results Summary

In partnership with ACES, Hoosier Energy performed an extensive Scorecard Analysis of the various Portfolio Scenarios to select the Preferred Path with action steps.

In the Scorecard Analysis, Hoosier compared evaluations of the chosen hypothetical portfolios using three primary categories that address important risks and impacts for resource considerations: Affordability & Stability, Environmental Sustainability and Risk & Opportunity. These categories include several elements illustrated in the Five Pillars of Electric Service as defined by the State of Indiana's 21st Century Energy Policy Development Task Force of Affordability, Sustainability, Reliability, Resiliency and Stability. Although not included in the formal Scorecard, Hoosier also partnered with Quanta Technologies to asses the hypothetical portfolios' reliability properties, including during extreme weather events.

### Affordability & Stability

The Scorecard Analysis revealed that, outside of an extremely low-price environment, the Reference Case provides the most affordable strategy for Hoosier Energy members. This is illustrated by the metric of 20-Year Present Value of Revenue Requirements (PVRR) which represents the total expected future revenue requirements, or revenue collections to cover costs, associated with a particular resource portfolio. Additional Affordability metrics include a 10-year and 20-year average of supply costs. These amounts are not finite or guaranteed, simply representations of the potential cost implications of future decision making.

### Environmental Sustainability

Although the Scorecard Analysis did not demonstrate that the Reference Case results in the largest reduction of Cumulative Carbon Emissions, a balance must be struck in order to provide affordability and reliability to our members. Regulatory risk, which may eventually translate as cost risk, can be mitigated by investing in high-efficiency gas as an intermediate load resource replacement for coal, contracting for capacity-only products to create flexibility in order to diversify energy from non-carbon intensive generation, and beginning to layer in wind, solar and battery storage in the late 2020s/early 2030s.

### Risk & Opportunity

The Scorecard Analysis also evaluated the portfolios for the risk and opportunity associated with cost exposure ranges in shifting environments, market interaction and exposure, and generation diversity. While the Reference Case had the lowest PVRR across all scenarios, it also had the widest range of costs if conditions significantly change from the ‘most likely’ conditions that were assumed for that capacity expansion. The Reference Case also had the largest concentration of a single resource type by 2030, but it evens out significantly in the next decade.

### Reliability

Although reliability is not included on the Scorecard, it was important to understand the portfolios’ potential impacts on operational reliability. While reliability and resource adequacy are not holistically the same, there is a significant impact between available and reliable generation and the ability to assess:

1. Ability to balance energy (ramping, dispatchability, flexibility)
2. Ability to control frequency (inertial response, primary response)
3. Ability to provide adequate short circuit strength to integrate inverter-based resources and mitigate their flicker-induced concerns
4. Ability to supply the dynamic reactive power required by loads to avoid motor stalling and ensure rapid transient voltage recovery

Their analysis demonstrated that all scenarios scored relatively similar with a demonstrated need of geographic proximity of generation to load.

# Preferred Path & Short-Term Action Plan

Hoosier Energy's 2023 Integrated Resource Plan was created in an environment of uncertainty, volatility and unprecedented market and industry changes that create continuous challenges for long-range planning. Through changes in EPA regulations, MISO's resource adequacy approach, volatility in commodity prices, and inflated costs for replacement resources, the process of long-range planning has shifted from a long-distance view to a recurring, constant analysis as the industry continues to transition. All of these elements have influenced, and will continue to influence, Hoosier Energy's strategy and process for this IRP.

Hoosier Energy's Preferred Resource Portfolio and Short-Term Action Plan will:

### Add reliable intermediate load resources through the changing dynamics of MISO's generation mix.

Capacity additions in the 2029-2035 timeframe will be critical for Hoosier to meet MISO capacity obligations and ensure member load is met through the increased winter seasonal need. As the IRP shows, natural gas resources and battery storage are currently the two best technologies for meeting winter firm capacity needs, but they need to be balanced with affordability. Capacity needs can also be met by taking advantage of demand response programs that allow load adjustments to consumption in order to save costs and maintain stability.

### Balance market opportunities to meet short-term needs.

In the near-term, Hoosier still has a need to enhance the balance between risk and opportunity through a robust hedging program, advantageous short-term contracts, and monitoring markets for opportunities in order to hedge capacity between MISO zones and external ISOs. By staying informed about market trends and forecasts, Hoosier can better anticipate price fluctuations and help to mitigate events that are nearly impossible to anticipate by protecting against severe price exposure through various hedging approaches.

### Create a balance between affordability and stability in order to mitigate regulatory risk exposure.

Expected changes to the portfolio mix may include the addition of low-to-zero carbon resources in order to mitigate potential future regulatory risks. This includes taking advantage of existing and future incentives to reduce costs of resources that may only provide sporadic value. This also includes monitoring emerging technologies for inclusion in future planning that could serve as viable clean energy options for future IRP planning. If/when these technologies are deemed cost-effective and viable, Hoosier will include them as replacement options in future Integrated Resource Plans.

# Strategic Partners

Hoosier Energy worked alongside ACES, Quanta Technology, GDS Associates and others to inform and execute an analysis of hypothetical portfolio performance under differing economic and regulatory scenarios. The analysis consisted of a 20-year forward assessment of the member load forecast and resources required to achieve an affordable and reliable portfolio profile. The preferred strategy is to bolster Hoosier's baseload capacity while diversifying energy sources to avoid fuel, development and regulatory risk. Flexibility should also be created to take advantage of an evolving technology landscape as new advancements are made in energy storage and grid management.

ACES excellence in energy

ACES Power Marketing navigates energy risk management with precision and excellence, partnering closely with members and customers to deliver comprehensive services. Positioned as a trusted leader, they prioritize inclusivity, innovation and community support, ensuring every transaction serves clients' best interests. With a hands-on approach and unique agency model, ACES fosters success and integrity every step of the way.

GDS Associates, Inc. ENGINEERS & CONSULTANTS

GDS Associates, established in 1986, is a multi-service consulting and engineering firm with over 175 professionals across seven U.S. locations. Specializing in utilities and offering additional services such as information technology and market research, GDS stands as a reliable choice for engineering and energy consulting services.

QUANTA

Quanta Technology leads in infrastructure, focusing on electric power, renewables and engineering. They excel in constructing and maintaining global power grids, offering transmission and distribution line construction, EPC and emergency restoration. In renewables, Quanta leads with solar and wind power EPC, battery storage and hydrogen pipeline installation. Their utility solutions and engineering division provide expertise in professional engineering, surveying, environmental consulting and project management, shaping the future of energy infrastructure.

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