2022 Integrated Resource Plan (IRP)

Public Advisory Meeting #4 Minutes

Date: Monday, Sept. 19, 2022
Time: 10:00 a.m. to 3:00 p.m. (EST)
Location: Virtual via Microsoft Teams

Agenda:

Time	Topic	Speakers
Morning 10:00 AM	Virtual Meeting Protocols and Safety	Chad Rogers, Director, Regulatory Affairs, AES Indiana
	Welcome and Opening Remarks	Kristina Lund, President & CEO, AES Indiana
	Stakeholder Presentations	Bhawramaett Broehm, Market Development Analyst, Wartsila Marcus Nichol, Senior Director, Nuclear Energy Institute
	IRP Schedule & Timeline	Erik Miller, Manager, Resource Planning, AES Indiana
	IRP Framework Review & Modeling Updates	Erik Miller, Manager, Resource Planning, AES Indiana
	Retirement & Replacement Analysis Results	Erik Miller, Manager, Resource Planning, AES Indiana
Break	Lunch	
Afternoon 12:30 PM	Replacement Resource Cost Sensitivity Analysis Results	Erik Miller, Manager, Resource Planning, AES Indiana
	Preliminary IRP Scorecard Results	Erik Miller, Manager, Resource Planning, AES Indiana
	Final Q&A and Next Steps	Erik Miller, Manager, Resource Planning, AES Indiana

Meeting Summary

Agenda and Introductions

Stewart Ramsay, Managing Executive, Vanry & Associates
(Slides 1 – 3)

Moderator Stewart Ramsay introduced himself and thanked stakeholders for attending Public Advisory Meeting #4. He then provided an overview of the agenda for AES Indiana's Integrated Resource Plan ("IRP") Public Advisory Meeting #4, and described the virtual stakeholder participation tools (e.g., the Microsoft Teams chat and audio/visual functions).

Virtual Meeting Protocols and Safety

Chad Rogers, Senior Manager, Regulatory Affairs, AES Indiana
(Slides 4 – 9)

Chad Rogers introduced himself and the AES Indiana IRP team, which is made up of a cross functional group of internal and external leadership and subject matter experts. He then introduced the registered stakeholders, which included state and local agencies, commercial and industrial ("C&I") customers, residential customers, and other members of the public. Chad thanked the stakeholders for attending AES Indiana's Public Advisory Meeting #4 and being a part of the stakeholder process as AES Indiana and its stakeholders plan to meet the future needs of AES Indiana's customers and community.

Chad further detailed the virtual meeting best practices to allow stakeholders to participate in Public Advisory Meeting #4. He encouraged stakeholders to ask questions and provide feedback. He emphasized candid stakeholder feedback is integral to the IRP process.

Chad then described AES Indiana's purpose and values and explained their relation to the IRP process. He stated AES Indiana's purpose is to accelerate the future of energy, together. He explained the IRP process allows AES Indiana to determine the future of energy and ensures AES Indiana is making this determination with input from its stakeholders. He shared AES Indiana believes how it completes its work is just as important, if not more important, than the work itself. He stated the value "safety first" represents that safety is at the core of everything AES Indiana does and is a guiding internal measure of success. He explained the value "highest standards" represents AES Indiana's commitment to act with integrity and hold the solutions it delivers to the highest standards of excellence. He stated the value "all together" represents AES Indiana's commitment to work as one team, all together across its business and with its stakeholders to meet the changing customer needs. He explained AES Indiana's purpose and values are core and fundamental to its IRP process.

Chad described AES Indiana's safety objectives, which served as AES Indiana's safety message for Public Advisory Meeting #4. He stated AES Indiana strives to provide a hazard-free place of employment that meets and exceeds governmental regulations regarding health and safety. He explained AES Indiana considers the health and safety of its people a fundamental value and is demonstrated through its inclusion in AES Indiana's key performance indicators that AES Indiana uses to measure its overall success. He shared AES Indiana's ultimate objective is that each day all AES Indiana people, contractors, customers, and the public it serves return home to their family, friends, and community free from harm.

Welcome and Opening Remarks

Kristina Lund, President and CEO, AES Indiana
(Slides 9-14)

Kristina Lund greeted stakeholders and thanked them for their participation in Public Advisory Meeting #4. She explained she would begin her presentation by providing background on the previous public advisory meetings. She explained AES Indiana had Public Advisory Meeting #1 in January 2022, when AES Indiana kicked-off its IRP process and focused on explaining the process to stakeholders. She then detailed Public Advisory Meeting #2 occurred in April 2022. She explained AES Indiana used Public Advisory Meeting #2 to provide initial modeling parameters, including the market potential study ("MPS") and commodity forecasts, and detail distribution system planning efforts. She stated reliability is a prominent focus for AES Indiana and is at the heart of everything it does. She explained to recognize this focus, AES Indiana added a reliability analysis to its IRP process, which AES Indiana announced in Public Advisory Meeting #2. Kristina then noted AES Indiana had several stakeholders present in Public Advisory Meeting #3. She recalled the Midcontinent Independent Service Operator

("MISO") presented on reliability and the Sierra Club and Faith in Place shared their views for AES Indiana's IRP. She stated AES Indiana discussed updated modeling assumptions and the portfolio metrics and scorecard it would use to develop the Preferred Resource Portfolio Public Advisory Meeting #3. She shared there has been a tremendous amount of effort and engagement in this process and thanked stakeholders for their input. She stressed AES Indiana takes stakeholder feedback very seriously as it moves through its IRP process.

Kristina stated the focus of Public Advisory Meeting #4 is to discuss preliminary modeling results. She explained AES Indiana took the work and stakeholder engagement it has completed up to this point to develop its model. She explained Public Advisory Meeting #4 will focus on the initial outputs of the model. Kristina stated AES's global purpose is to accelerate the future of energy together. She shared that she cannot think of a better process to achieve this purpose than the IRP process because AES Indiana utilizes input it receives from its stakeholders over a number of public meetings to establish key priorities around the future of energy. Kristina elaborated AES Indiana combines this stakeholder engagement with a robust analysis that it shares with stakeholders to accelerate the future of energy, together. She thanked stakeholders for all their meaningful input and engagement.

Kristina explained AES Indiana has been considering stakeholder feedback throughout its IRP process, which AES Indiana has received through both its public advisory meetings and technical meetings. She shared the technical meetings with stakeholders have been very fruitful and have caused AES Indiana to develop several items to incorporate into its IRP analysis. She detailed AES Indiana added the Clean Energy strategy to its IRP analysis at the direct request of several stakeholders. She explained AES Indiana has engaged in productive discussions with stakeholders around key inputs, including replacement cost assumptions, renewable tax credit assumptions, carbon pricing, and commodity pricing, that have helped AES Indiana shape its analysis.

Kristina reiterated AES's global purpose is to accelerate the future of energy, together and described what that means for AES Indiana. She stated AES Indiana has been serving Indianapolis and the surrounding communities for roughly a century through all the growth, challenges, and opportunities that occurred throughout that timeframe. She explained accelerating the future of energy together for AES Indiana requires taking a very strong, reliable, and affordable existing electric system and moving it into the future. She stated technology is changing every part of AES Indiana's business, including how its delivers safe, reliable electric service to its customers. She explained AES Indiana will maintain reliability and affordability while making progress on sustainability because of the emerging technologies that are changing AES Indiana's business. She shared almost all the strategies AES Indiana is evaluating have 80 to 90 percent of energy coming from renewables within 20 years. She explained in order to achieve the future of energy, AES Indiana and its stakeholders must consider how it will get from the energy mix of today and incorporate technologies in a manner that maintains reliability and affordability but also moves quickly towards sustainability. Kristina explained AES Indiana strives to be inclusive and achieve an energy future that is available to all its customers, so all of its customers and communities come out on the other side of this transition with strong infrastructure, reliability, affordability, and sustainability in a manner that facilitates community and economic development. She stressed energy is fundamental to how communities function, and by completing this transition in the right way, AES Indiana and its communities should all be stronger and become better together in the end. She concluded her presentation by thanking stakeholders for their continued input.

Stakeholder Presentations: Wartsila

Bhawramaett Broehm, Market Development Analyst, Wartsila
(Slides 15-26)

Stakeholder Bhawramaett Broehm began his presentation by introducing himself and explaining Wartsila is a provider of flexible energy solutions ranging from battery storage systems to reciprocating internal combustion engines ("RICE"). Bhawramaett Broehm thanked Kristina Lund, Erik Miller, Stewart Ramsay, and the entire AES Indiana IRP team for the opportunity to engage in AES Indiana's IRP process and present during Public Advisory Meeting #4. Bhawramaett Broehm shared the focus of his presentation will be the role of thermal resources in the clean energy transition.

Bhawramaett Broehm elaborated Wartsila is a global company headquartered in Finland and operates across both the energy and marine sectors in the United States where it has delivered roughly four gigawatts ("GW") of battery storage products. Bhawramaett Broehm stated Wartsila utilizes power system modeling tools similar to those that AES Indiana is using in its IRP process to better understand and be prepared to meet the future needs of the grid. Bhawramaett Broehm explained it is through this analytical lens that Wartsila sees the clean energy transition as inevitable. Bhawramaett Broehm said it is Wartsila's role to enable that leap into a renewable future through future-proof technologies, such as RICE resources and batteries, that compliment and balance the intermittent solar and wind resources that are currently leading the charge towards decarbonization.

Bhawramaett Broehm acknowledged many stakeholders are likely unfamiliar with RICE technology, so Bhawramaett Broehm wanted to take time to highlight key technology features so stakeholders can understand the importance of RICE technology for the clean energy transition. Bhawramaett Broehm recognized it may be counterintuitive that RICE technology can support the decarbonization of the grid, but Bhawramaett Broehm will discuss how RICE technology can act as a complementary resource to integrate more renewables onto the grid. Bhawramaett Broehm acknowledged the Sierra Club highlighted that inflexible thermal resources add unnecessary costs and emissions to the grid in Public Advisory Meeting #3, but Bhawramaett Broehm emphasized "inflexible" is the key term in the Sierra Club's claim. Bhawramaett Broehm stated over the next several years, as utilities add more renewables to the grid, flexibility is going to be the key to balance the variability of wind and solar on a minute-by-minute, hour-by-hour, day-by-day, and season-by-season basis. Bhawramaett Broehm explained it is important to develop a balanced and diversified portfolio that has the right attributes rather than discriminating against certain technologies. Bhawramaett Broehm stated RICE resource technology possesses many of the attributes listed on slide 18 and is well positioned to enable the integration of renewable resources due to its flexibility and efficiency. Bhawramaett Broehm said RICE resources have the best-in-class ramping capabilities amongst thermal resources with the ability to ramp up to full load and turn off within 5 minutes, which means RICE resources could respond quickly and turn off once they are no longer needed if wind stops blowing or clouds roll over a solar field. Bhawramaett Broehm explained this allows utilities to maximize the uptake of renewables and minimize curtailment that would have otherwise occurred due to constraints from less flexible thermal resources. Bhawramaett Broehm stated the maintenance required for RICE resources is similar to the maintenance required for engines in a car with maintenance being based on the RICE resource running hours, which means there are not maintenance penalties for starting and stopping several times a day as is found in traditional thermal assets. Bhawramaett Broehm said while batteries can provide many of the same benefits as RICE resources, batteries are limited to the duration of a charge. Bhawramaett Broehm stated these factors highlight RICE resources' ability to play an important role in optimizing reliability, emissions, and costs during the renewable resource transition.

Bhawramaett Broehm stated an additional benefit of RICE resource technology is fuel flexibility, as modern RICE resources are being designed to be modular and capable of modifying operations to allow the use of multiple fuels of the future. Bhawramaett Broehm explained modern RICE resource technology can operate on 25 percent hydrogen blends and is expected to be able to operate on 100 percent hydrogen, as well as carbon neutral derivatives of hydrogen, such as synthetic ammonia, methane, and methanol, by roughly 2025. Bhawramaett Broehm stated this fuel flexibility makes RICE resource technology future proof by mitigating the stranded asset risks typically associated with conventional thermal resources.

Bhawramaett Broehm detailed Wartsila believes RICE technology will perform under the current and future grid operations. Bhawramaett Broehm described the graph on slide 20 shows the difference between day-ahead hourly prices and real-time five-minute energy prices in market with growing renewable penetration. Bhawramaett Broehm stated the "spikiness" of the real-time energy prices represents adding variable renewables to the grid can increase price volatility with real-time prices frequently spiking up to $1,000 per megawatt hour ("MWh") or more when renewable generation comes in below its forecasted level and requires dispatchable generation to supply the additional power. Bhawramaett Broehm said as the share of renewable resources increases, it is critical to hedge risk with physical assets. Bhawramaett Broehm stated traditional planning models, such as EnCompass, are complex, but they oftentimes only plan and optimize based on hourly forecasted conditions, which he stated fails to quantify the more granular, sub-hourly risks and constraints that are present in real-time operations. Bhawramaett Broehm said in practice, having flexible and responsive resources can mitigate the risks associated with integrating renewable resources, but the real value of flexibility remains hidden when modeling occurs at an hourly level. Bhawramaett Broehm stated Wartsila partnered with Ascend Analytics, which is a consulting firm based out of Boulder, Colorado, to perform a study to quantify the "flexibility premium" of RICE resource technology compared to more traditional turbine technology when real-time operations are considered.

Bhawramaett Broehm explained the table on slide 21 compares three types of thermal technologies: RICE, heavy duty gas turbines, and aero derivative gas turbines. Bhawramaett Broehm stated the model dispatched the resources against day-ahead hourly prices and real-time five-minute interval prices over the next 20 years. He stated traditional resource planning models only capture the hourly results, while Wartsila and Ascend Analytics' production cost model considers five-minute price volatility and dispatch constraints. Bhawramaett Broehm explained column A of the chart on slide 21 represents the costs to install and operate the resources, and RICE resources performed the least favorably compared to the other two options due to the higher construction costs associated with RICE resources. Bhawramaett Broehm stated column B of the chart on slide 21 represents the model's forecast of the value the resources capture in the five-minute real-time market, and when combined with the model results from column A, the model forecasts RICE resources to be less costly than heavy duty gas turbines and aero derivative gas turbines. Bhawramaett Broehm stated the reason Wartsila and Ascend Analytics' model forecasts RICE resources to be less costly over a 20-year period is traditional turbine technology incurs startup costs and has constraints related to minimum runtimes and minimum downtimes, while RICE resources do not have such constraints and are able to be more flexible and responsive to dispatch needs. Bhawramaett Broehm said this speaks to a broader trend of load serving entities placing larger importance on operating costs rather than capital costs. Bhawramaett Broehm stated traditional investment logic favored resources with lower capital costs, such as heavy-duty peaking turbines, which are relatively cheap sources of capacity but have lower efficiencies and higher costs to start and continue to run. Bhawramaett Broehm stated this might have been permissible in the past as peaker plants would only come online a few times each year, but due to increased renewable resource penetration, there will be a need for flexible resources that can operate in pulses as often as several times per day. Bhawramaett Broehm elaborated this need for flexible resources that operate frequently will place a greater importance on thermal resource operating costs, such as start-up and ramp costs, heat rate efficiency, and emissions reduction. Bhawramaett Broehm stated these operating costs are only reflected when real-time operations are considered, which causes resources with higher capital costs (e.g., RICE resources and batteries) to not appear to be cost effective when using hourly models. He said when real-time operations are considered, flexible resources with higher capital costs (e.g., RICE resources and batteries) tend to be cost optimal options.

Stakeholder Dr. Peter Schubert, a representative of Indiana University-Purdue University Indianapolis's Richard G. Lugar Center for Renewable Energy, stated Wartsila's analysis on slides 20 and 21 seem to have been chosen to provide favorable net present values for RICE resources. Dr. Peter Schubert asked Bhawramaett Broehm to describe what market was used to develop the cost comparison and how it compares to the AES Indiana footprint. Bhawramaett Broehm stated the study was conducted using data from the Southern Power Pool ("SPP") market, which is adjacent to the MISO market in which AES Indiana is a participant. Bhawramaett Broehm stated the cost values will change when comparing markets, and even different nodes within a market, but Bhawramaett Broehm believes the model would produce similar results in the MISO market because the renewable resource penetration is increasing in MISO as well. Moderator Stewart Ramsay asked Bhawramaett Broehm to clarify whether Wartsila has completed this research using MISO data. Bhawramaett Broehm stated Wartsila has not yet completed this research using MISO data.

Bhawramaett Broehm explained he would next summarize the five main steps Wartsila believes are necessary to achieve net zero carbon emissions. Bhawramaett Broehm stated the first step is to add renewable resources, but due to the existing fleet of less flexible resources, there will be substantial amounts of renewable curtailment since the existing thermal resources will not be able to respond to increasing amounts of solar or wind generation that periodically occur. Bhawramaett Broehm said the second step in the energy transition is to add more energy storage and thermal balancing resources to support the continued build out and integration of renewables. Bhawramaett Broehm stated adding flexible resources can allow the maximum uptake of renewables and minimize curtailment, while also mitigating risk associated with intermittency. Bhawramaett Broehm stated the third step is to phase out inflexible plants and replace them with renewable resources and flexible thermal and storage resources to fill in the generation gaps created by an increasing amount of intermittent renewable energy. Bhawramaett Broehm stated the energy industry is currently completing step three, and steps four (converting to sustainable fuels) and five (phase out fossil fuels) are crucial to achieve net zero carbon emissions goals. Bhawramaett Broehm stated the last 10 to 20 percent of carbon emissions is going to be the most difficult and costly to mitigate. Bhawramaett Broehm said batteries can utilize energy generated during off-peak hours to provide energy during peak hours but would need to be massively overbuilt to maintain reliability during extreme weather events, such as multiday renewable energy droughts. Bhawramaett Broehm stated the missing piece of the decarbonization puzzle is a source of clean and firm power that can deliver seasonal energy storage and balance intermittent resource output. Bhawramaett Broehm said by roughly 2050 the industry will try to decarbonize, which will cause the more flexible thermal resources to be converted to operate on sustainable fuels like hydrogen or hydrogen-based derivatives. Bhawramaett Broehm stated recent legislation is encouraging investment in sustainable fuels like hydrogen, which leads Wartsila to believe that over the coming decades, the industry should see these fuels economic to the point that thermal resources can be converted to operate on these emerging fuel technologies and cut ties with fossil fuel-powered plants.

Bhawramaett Broehm then summarized the items he wanted stakeholders to take away from his presentation. Bhawramaett Broehm reiterated RICE resources are flexible and well suited for integrating renewables. Bhawramaett Broehm stated RICE resources are unlike traditional peaking plants in that RICE resources can run on and off frequently and efficiently. Bhawramaett Broehm stated traditional planning models miss the importance of real-time flexibility, which is why it is important to utilize sub-hourly modeling, as exemplified by Wartsila and Ascend Analytics's study of the revenue requirement of resources using five-minute real-time operations modeling. Bhawramaett Broehm said volatility in real-time energy markets is expected to increase as more renewables come online. Bhawramaett Broehm stated this increased volatility highlights the importance of having flexible resources, such as RICE resources, that can mitigate volatility and keep the grid continually balanced. Bhawramaett Broehm thanked AES Indiana and the stakeholders for their time and provided his contact information in the event stakeholders would like to contact him with questions or input.

Stakeholder Presentations: Nuclear Energy Institute

Marcus Nichol, Senior Director, Nuclear Energy Institute
(Slides 27-37)

Stakeholder Marcus Nichol thanked AES Indiana and stakeholders for the opportunity to present at Public Advisory Meeting #4. Marcus Nichol introduced himself and explained the Nuclear Energy Institute ("NEI") is comprised of over 300 members in 17 countries. Marcus

Nichol explained there are many companies developing advanced nuclear reactors and included a list of 20 such companies on slide 28. Marcus Nichol noted the list of companies on slide 28 includes established companies, such as Westinghouse and General Electric Hitachi Nuclear Energy, as well as new entrants, such as Nuscale or Okolo, which are well-funded with venture capital and are making great progress on advanced reactors. Marcus Nichol stated many of the new entrants are competing in this industry because they see advanced nuclear technology as the solution to the world's sustainability needs for clean electricity.

Marcus Nichol described a study completed by Vibrant Clean Energy that aimed to reduce electric sector carbon emissions by 95 percent in 2050. Marcus Nichol stated a few years ago, many experts in the electric industry believed renewable resources could decarbonize 90 percent of the electric industry and potentially 100 percent of the electric industry if battery technology is included. Marcus Nichol said the thorough evaluation of the requirements necessary to achieve these carbon reduction goals caused industry experts to realize a diversified portfolio of generation sources would be required to achieve the decarbonization goals. Marcus Nichol noted Kristina Lund discussed this need for a diversified generation portfolio earlier in the Public Advisory Meeting #4 and highlighted her discussion regarding the need for reliable and affordable energy as well. Marcus Nichol stated it becomes apparent that nuclear generation resources will be necessary to optimize diversification, reliability, and affordability while achieving carbon emissions goals. Marcus Nichol explained the study completed by Vibrant Clean Energy studied two scenarios: one that included advanced nuclear reactors at currently projected costs with no constraints on the amount of nuclear generation that could be installed and one scenario that included advanced nuclear reactors at currently projected costs with certain constraints, such as regulator criteria or workforce constraints. Marcus Nichol stated the study found 43 percent of generation, roughly 300 GW, of nuclear energy would be added across the United States under the unconstrained scenario. Marcus Nichol said the study found 60 GW of nuclear energy would be added across the United States under the scenario with constraints on nuclear energy. Marcus Nichol stated the study found the scenario in which nuclear energy was constrained cost customers $450 billion more than the scenario in which nuclear energy was not constrained.

Marcus Nichol next discussed the different technologies currently being developed using figures contained on slide 30. Marcus Nichol stated there are two general parameters to classify the emerging nuclear reactor technologies: size and coolant type. Marcus Nichol explained the industry-wide capacity threshold for a nuclear reactor to be considered "small" is 300 megawatts ("MW"). Marcus Nichol stated the emerging technologies vary in capacity size ranging anywhere from less than 20 MW to as large as 1,000 MW, but he explained most utilities would utilize small modular reactors ("SMR") (i.e., reactors under 300 MW per unit). Marcus Nichol stated micro reactors, or reactors with capacities under 20 MW, would be used for strengthening resiliency. Marcus Nichol explained the technologies offer various coolants, including water, high temperature gas, liquid metal, and molten salt. Marcus Nichol stated the main differences between coolants is the operating temperature and the ability to utilize novel design and engineering solutions to achieve greater levels of safety.

Stakeholder Anna Sommer, a representative of Energy Futures Group, asked Marcus Nichol which of the technologies listed on slide 30 have a rector design approved by the United

States Nuclear Regulatory Commission ("NRC"). Marcus Nichol stated one design has been approved by the NRC, which is Nuscale's design. Marcus Nichol stated the other designs are entering the process and will be reviewed by the NRC soon.

Marcus Nichol stated advanced nuclear reactors will be more versatile in their applications. Marcus Nichol explained nuclear reactors are currently almost exclusively used to generate electricity, whereas advanced nuclear reactors will be able to produce hydrogen more efficiently and generate heat efficiently. Marcus Nichol stated the improved efficiencies in these outputs will help decarbonize the industrial sector.

Stakeholder Dr. Peter Schubert asked Marcus Nichol whether NEI members were diligently working on breeder reactors to transmute thorium to U-233 (byproducts of which decay to safe levels in only 80 years) given waste disposal issues are not yet solved. Marcus Nichol stated some of NEI's developers are working on recycling technologies to be able to utilize used fuel as new fuel for their reactors. Marcus Nichol stated there is a misperception surrounding used nuclear fuel. Marcus Nichol said there are three items to consider when evaluating the ways to deal with waste for any resource: technology, money to pay for it, and a place to put it. Marcus Nichol stated the nuclear industry has the technology to safely handle, store, and dispose of nuclear waste. Marcus Nichol stated the nuclear industry collects waste management funds up front and during operations and has over $40 billion ready and sitting in a trust fund for disposal. Marcus Nichol explained the Yucca Mountain Nuclear Waste Repository is currently designated by law as the ultimate location to dispose of nuclear waste. Marcus Nichol acknowledged some individuals believe the industry should utilize a consent-based siting process to determine the location of final disposal. Marcus Nichol stated the United States Congress will work to determine the correct disposal locations, but in the meantime, there is not a lot of concern because there is a relatively small volume of waste in its solid form and is easily managed. Marcus Nichol said the industry is working on consolidated storage facilities to be able to manage nuclear waste storage, so he views this as an item to continue to pursue rather than a barrier for nuclear powered resources.

Marcus Nichol then discussed a report published by SMR Start that found the levelized cost of energy ("LCOE") of advanced nuclear reactors is similar to the LCOE of renewables and natural gas with carbon capture sequestration. Marcus Nichol stated strictly comparing the LCOE of resources is like comparing apples and oranges and added other factors, such as reliability, must be considered. Marcus Nichol stated the NEI utilized a method developed by the Electric Reliability Council of Texas ("ERCOT") that calculates the cost of covering the highest peak summer and winter days to account for the reliability and dispatchability characteristics of advanced nuclear reactors. Marcus Nichol said portfolios that contain advanced nuclear reactors are more affordable than other portfolios using this LCOE methodology. Marcus Nichol stated the ultimate cost to customers is more important to compare than LCOE because LCOE fails to account for other system costs that must be incurred, such as transmission costs. Marcus Nichol said in some cases, advanced nuclear reactors will provide the lowest cost option to customers, while in other cases other resources will provide the lowest cost option to customers. Marcus Nichol stated the lowest cost resource to customers will be dependent upon specific conditions of the system, load characteristics, supply characteristics, the transmission system, geographical location, and wind characteristics.

Stakeholder Bhawramaett Broehm asked Marcus Nichol to share a link to the LCOE methodology used for the graph on slide 32. Marcus Nichol provided the link via the Microsoft Teams chat function: https://smrstart.org/wp-content/uploads/2021/03/SMR-Start-Economic-Analysis-2021-APPROVED-2021-03-22.pdf.

Marcus Nichol next discussed the federal financial incentives for advanced nuclear reactors. Marcus Nichol detailed the Inflation Reduction Act ("IRA") offers financial incentives for operating nuclear reactors, including a production tax credit ("PTC") of at least $30 per MWh for 10 years and an investment tax credit ("ITC") of 30% of the investment. Marcus Nichol explained the IRA's PTC and ITC can be monetized directly by public power entities. Marcus Nichol stated the IRA also provides a 10% bonus tax credits for citing projects in certain "energy communities," 10% bonus credits for primarily using United States manufacturing, loan guarantees, and financial incentives for projects that use high-assay low-enriched uranium fuel.

Marcus Nichol then provided an overview of advanced nuclear reactor projects across the United States and Canada. Marcus Nichol stated the figure on slide 34 identifies the states that have enacted or are pursuing policies to support advanced nuclear reactors. Marcus Nichol shared the Indiana General Assembly passed legislation in 2022 that enables advanced nuclear reactors to access the same regulatory treatment and process that is available to renewable resources. Marcus Nichol explained the project located in Indiana identified on slide 34 represents a joint project between Purdue University and Duke Energy to evaluate replacing a coal plant with an advanced nuclear reactor. Marcus Nichol stated many projects across the United States and Canada are evaluating replacing coal plants with advanced nuclear reactors for multiple outputs, such as electricity, heat, or other heating applications.

Marcus Nichol explained NEI surveyed its member utilities, which account for 40% of the electric generation in the United States and asked the member utilities if they are considering building advanced nuclear reactors. Marcus Nichol stated the member utilities indicated in their response that they were considering building 90 GW of advanced nuclear reactors by 2050, which Marcus Nichol characterized as a significant amount especially considering the NEI members only represent 40% of the electric generation in the United States. Marcus Nichol stated the need for process heat might cause the demand for advanced nuclear reactors to increase as well.

Marcus Nichol concluded his presentation by providing an overview of the system benefits of SMRs. Marcus Nichol stated a benefit of advanced nuclear reactors is the long-term price stability because these advanced nuclear reactors have low fuel and operating costs, and while advanced nuclear reactors have relatively large capital costs, the costs associated with operating advanced nuclear reactors will not fluctuate in the long-term. Marcus Nichol stated advanced nuclear reactors are extremely reliable as they can produce energy on a constant basis with capacity factors over 92 percent. Marcus Nichol stated many reactors are designed to operate for roughly two years prior between refueling, while some reactors can operate 10 years or more between refueling. Marcus Nichol noted advanced nuclear reactors are designed to be flexible to integrate well with renewables and storage. Marcus Nichol said advanced nuclear reactors utilize land efficiently as it takes 0.1 acres to generate a terawatt hour of energy, while it would take over 1,000 times as much land to generate the same amount of energy using wind or solar resources. Marcus Nichol explained advanced nuclear reactors do not generate carbon emissions and have one of the lowest total carbon footprints of all generation types with a lower carbon footprint than solar resources. Marcus Nichol said some SMRs are being designed with dry air-cooling capabilities to avoid using local bodies of water as cooling sources. Marcus Nichol stated SMRs with black-start capabilities are being developed to be able to operate independent from the grid, which is especially important for mission critical activities as well as protection against natural phenomenon and cyber threats.

Stakeholder Christine Glaser, a representative of the Center for Sustainable Living, asked where nuclear fuel is sourced. Marcus Nichol responded nuclear fuel is mined mostly in Canada, Kazakhstan, and Australia, though other countries also provide some nuclear fuel, including the U.S. Marcus Nichol stated the fuel then needs to be processed, and enrichment is one of the most important of those steps. Marcus Nichol said there is enrichment in the United States. and other countries, but Russia is a key supplier of enrichment. Marcus Nichol added the United States is pursuing actions to eliminate the Russian source of enrichment in response to the invasion of Ukraine. Christine Glazer stated there was a question about technology that can destroy long-lasting nuclear waste that Christine Glazer did not hear answered. Marcus Nichol summarized his previous response by stating there are companies working on recycling technologies that can turn used fuel into new fuel for advanced reactors and reduce the amount of used fuel that needs to go to a final disposal facility.

IRP Schedule and Timeline

Erik Miller, Manager, Resource Planning, AES Indiana
(Slides 38-41)

Erik Miller began his presentation by welcoming and thanking stakeholders for their attendance in Public Advisory Meeting #4 as well as thanking stakeholders Wartsila and the NEI for their presentations. He shared AES Indiana is looking forward to continued stakeholder collaboration in its IRP process. He stated he would go through the schedule and timeline to provide stakeholders an update on the status of AES Indiana's IRP process. He recapped AES Indiana discussed the base assumptions and evaluation framework in Public Advisory Meetings #1, 2, and 3. He stated AES Indiana will discuss the preliminary model results in Public Advisory Meeting #4. He shared AES Indiana will likely conduct Public Advisory Meeting #5 in the first week of November 2022. He previewed AES Indiana will review the stochastic risk analysis, the reliability analysis, the final scorecard, the Preferred Resource Portfolio, and the Short-Term Action Plan in Public Advisory Meeting #5.

Erik informed stakeholders that AES Indiana's IRP filing has been extended from November 1, 2022 to December 1, 2022. He explained AES Indiana requested this extension to provide stakeholders sufficient time to provide feedback considering many recent developments, including the passage of the IRA that changed the ITC and PTC assumption for AES Indiana's Current Trends scenario. Erik acknowledged it has been a challenging year to conduct an IRP as commodity and power prices spiked drastically early in the year and AES Indiana's RFP came back with significantly higher costs for projects that utilize particular technologies, such as solar resource projects. He emphasized the importance AES Indiana places on stakeholder feedback and stated AES Indiana requested the extension of the IRP deadline to ensure stakeholders had adequate time to provide feedback.

Stakeholder Jennifer Washburn, a representative of the Citizens Action Coalition ("CAC"), stated the CAC appreciates the opportunity to have enough time to provide feedback and have AES Indiana incorporate stakeholder feedback. Jennifer Washburn acknowledged incorporating feedback can take a lot of time, so the CAC appreciates AES Indiana being nimble with its schedule.

Erik then provided an overview of AES Indiana's IRP process. He detailed AES Indiana started this process over a year ago by starting to work on the MPS with GDS Associates, the load forecast with Itron, and other inputs and modeling assumptions. He explained AES Indiana used the bids from its 2022 Request for Proposals ("RFP") as inputs for its replacement resource cost assumptions. Erik stated supply constraints and uncertainties around solar tariffs caused prices for certain projects to be much greater than expected. He explained these items are used as inputs for the EnCompass capacity expansion model, which AES Indiana uses to model portfolios for several strategies. Erik stated AES Indiana then takes the resulting generation mixes and performs an 8,760-hourly dispatch analysis that models several items, including the portfolio present value revenue requirement ("PVRR"), portfolio energy mix, and the portfolio emissions. Erik stated AES Indiana has initial results from its capacity expansion and production cost modeling as well as partial scorecard results. He shared AES Indiana will provide the reliability analysis and risk analysis results in Public Advisory Meeting #5 as well as discuss scorecard results and select the Preferred Resource Portfolio. He explained several major filings utilize the results of AES Indiana's IRP, including demand-side management ("DSM") plan filings and certificate of public convenience and necessity ("CPCN") filings. He stated AES Indiana's DSM plan is selected through its IRP process by modeling DSM measures as resources. He explained the IRP is also used to support CPCN filings to receive approval to add or replace generation on the system.

Modeling Updates and IRP Framework Review

Erik Miller, Manager, Resource Planning, AES Indiana
(Slides 42-53)

Erik Miller stated he would next update stakeholders on any changes AES Indiana has made to its modeling and assumptions to ensure transparency in the modeling process as well as review the IRP framework. He began by differentiating capacity planning from energy planning in resource planning. He explained capacity planning ensures utilities have sufficient resources to meet its peak load hour in a season with a reserve margin that serves as a buffer. He explained capacity planning historically only considered the summer peak because MISO previously only had a summer capacity construct. He stated resource adequacy in non-summer seasons has become a concern as more renewable generation resources have come online, which do not perform as well in non-summer seasons. Erik explained MISO filed a seasonal capacity construct proposal that requires load serving entities to meet capacity requirements in the summer, fall, winter, and spring to ensure there is sufficient capacity across the system throughout the year. Erik stated MISO's seasonal capacity proposal was approved by the Federal Energy Regulatory Commission ("FERC") in late August 2022. He explained AES Indiana anticipates its capacity obligation will peak in the winter due to the increased planning reserve margin requirement ("PRMR") in the winter season under MISO's seasonal capacity methodology. He added AES Indiana's load has peaked in the winter three out of the last six years. Erik noted there is a market for capacity, so if AES Indiana needs to purchase or sell capacity, there is a market for it. He explained AES Indiana assigned a monetary value of $89 per kilowatt ("kW") year for capacity purchases and sales in its planning model, which represents the MISO cost of new entry.

Erik explained AES Indiana must generate or purchase energy for its customers. He stated generating too much or too little energy presents market risks to customers as both situations require the utility to rely on the market to sell or purchase energy. He stated the focus of capacity planning is ensuring there is sufficient power to serve the peak period, while the focus of energy planning is continuously sourcing sufficient energy for customers. He elaborated energy planning is the source of emissions as energy generation produces emissions. He explained controlling emissions through energy planning can be achieved through optimizing resource technology. He stated certain resources are better suited to supply capacity, such as thermal resources and battery energy storage resources. He explained these resources are dispatchable and receive almost full capacity credit in all seasons, whereas solar and wind resources do not receive full capacity credit in any season with solar resources receiving close to no capacity credit in winter months. Erik explained certain resources can be built for their capacity values and operate to supply energy very infrequently.

Erik then provided an overview of AES Indiana's current capacity position if it continues to operate as it currently does for the next 20 years (i.e., no resource additions, early retirements, or replacements). He explained the charts on slide 45 represent AES Indiana's capacity positions in summer and winter. He stated the dotted black lines on the charts on slide 45 represent AES Indiana's load and the planning reserve margin, while the solid black lines represent the load AES Indiana must serve by removing AES Indiana's DSM savings from its load and planning reserve margin. Erik noted AES Indiana is currently positioned well in the summer for the near-term, but AES Indiana will require additional capacity when Harding Street Units 5 through 7 retire by 2034. He explained MISO's new seasonal capacity methodology and the larger PRMR in the winter caused AES Indiana to need to procure capacity in the near-term. Erik recalled AES Indiana was asked why its model is not selecting solar in the near term in a technical meeting on September 14, 2022 and explained AES Indiana needs capacity in the winter and solar receives essentially no capacity credit during the winter.

Erik stated the model is currently selecting thermal resources or battery energy storage to fill AES Indiana's near-term capacity needs. Erik stated he believes the model will ultimately select storage as the replacement resource largely due to the ITC stand-alone battery energy storage resources received from the IRA. Erik stated if storage is selected by the model, storage will likely be selected to fill AES Indiana's near-term capacity needs in AES Indiana's preferred resource portfolio. Erik shared if storage is selected in AES Indiana's Preferred

Resource Portfolio, AES Indiana would not preclude solar and storage projects in its RFP process in recognition of efficiencies gained by bundling those resource types but clarified AES Indiana would not consider solar projects that were not bundled with storage in this situation.

Stakeholder Tim Maloney, a representative of Hoosier Environmental Council, asked AES Indiana if MISO's dispatchable intermittent resource program is still in place. AES Indiana responded MISO has been working towards dispatchable solar, although exact timelines for implementation are not clear. AES Indiana added this is an area AES Indiana will continue to monitor, and it is important to note that MISO's dispatchable intermittent resource program would impact resources' capacity factor but would not likely have an impact on resources' capacity credit. Tim Maloney provided a link to an article that indicates MISO already includes wind resources in its dispatchable intermittent resource program. AES Indiana responded the dispatchable intermittent resource program has been implemented for wind resources but has not yet been implemented for solar resources. Tim Maloney responded that he posed the question about MISO's dispatchable intermittent resource program in response to the statement that renewables were not dispatchable and asked if he heard the statement correctly. AES Indiana responded MISO can dispatch wind resources in one direction (adjusting output lower than instantaneous capability), which helps to optimize generation and curtailments in real-time. AES Indiana added wind and solar are still only available when weather allows, therefore renewable resources are not in the same category as dispatchable resources, such as thermal and storage. AES Indiana clarified wind and solar were assumed to follow a defined generation profile for modeling purposes.

Erik then provided an overview of the constraints AES Indiana used in its capacity expansion model. He explained modeling constraints ensure the capacity expansion model provides meaningful and reasonable results that do not overly rely on the capacity or energy markets. He stated AES Indiana limited portfolios to those that purchase or sell at most 50 MW of capacity on an annual basis and generate anywhere from 90 percent to 110 percent of AES Indiana's energy sales on an annual basis. Erik elaborated AES Indiana is building generation resources to meet its capacity obligation to ensure AES Indiana does not under-build resources and rely on the capacity market for purchases or over-build resources and rely on the capacity market for sales. He explained generating too much or too little energy also presents energy market price risks. Erik stated AES Indiana also limited the quantity of resources that were able to be selected in the near-term by technology type to align with AES Indiana's 2022 RFP results. He explained since only 200 MW of installed capacity ("ICAP") of wind projects were submitted in AES Indiana's 2022 RFP, AES Indiana would set the maximum level of wind additions to 200 MW (ICAP) in the near-term. Erik stated AES Indiana opened the model up in 2027 to allow 1,000 MW (ICAP) of any resource technology type. Erik added AES Indiana also limited capacity additions to 2,000 MW total for each resource technology type over the 20-year modeling time span to ensure portfolio diversity. Erik noted certain stakeholders raised concerns that the 20-year, 2,000 MW per resource technology type constraint would limit the amount of wind or solar resources that were selected by the capacity expansion model. Erik noted while AES Indiana tested this concern and found it did not appear to be an issue until the last two years of the 20-year study. Erik explained this constraint addresses AES Indiana's concern regarding resource diversity and ensures it does not overly rely on a particular resource technology.

Stakeholder Ben Inskeep, a representative of the CAC, asked AES Indiana if the 2,000 MW per technology type constraint does not impact AES Indiana's modeling results, why would AES Indiana include it as a constraint. Ben Inskeep noted it seems that the constraint is not actually serving as a constraint. Moderator Stewart Ramsay asked Erik to clarify that AES Indiana added these modeling constraints because it does not want the model to make choices that are unreasonable. Stewart stated he understood Erik to mean the 2,000 MW cap on each resource type over 20 years was added to act as a safety valve because AES Indiana did not know what the model would select, but the constraint did not impact the model results until the last two years. Erik stated Stewart was correct and added since the constraint did not impact the results until the very end of the 20-year modeling timeframe, remodeling everything with the constraint removed for comparison would not add value.

Stakeholder Ben Inskeep asked whether AES Indiana's 2022 RFP results for wind resources can be relied upon given the RFP was issued prior to the enactment of the IRA, which substantially changed the costs of wind. Ben Inskeep further asked AES Indiana to clarify whether the cost impacts from the enactment of the IRA would increase developer interest in constructing wind resources. Erik stated AES Indiana agrees the passage of the IRA would likely impact wind costs and project availability. Erik explained the price volatility in the market has caused AES Indiana to consider issuing RFPs more frequently – possibly even at the conclusion of AES Indiana's 2022 IRP process. Erik added AES Indiana and Sargent & Lundy are working with RFP bidders to determine how the IRA impacts the offers it received in its 2022 RFP.

Erik then provided an overview of the updates AES Indiana made to its modeling since Public Advisory Meeting #3. He noted the IRA was enacted in August 2022 and caused AES Indiana to change the underlying assumptions in its Current Trends/Reference Case scenario. He explained the IRA impacted the ITC and PTC assumptions AES Indiana used for its Current Trends scenario, including extending the ITC to stand-alone storage and extending the tax credits to 10 years, which effectively covers the 20-year planning horizon due to the safe harbor provision.

Stakeholder Ben Inskeep stated the CAC continues to believe AES Indiana's tax credit assumptions are overly conservative. Ben Inskeep said the IRA bonus tax credits (e.g., 10 percent tax credit for projects in "energy communities") would likely be available for many projects, including those using AES Indiana's injection rights at Petersburg. Ben Inskeep stated AES Indiana's modeling assumptions cause solar prices to be overstated because AES Indiana uses a 30 percent ITC assumption in its modeling. Erik thanked Ben Inskeep for his question. Erik stated while AES Indiana wants to consider solar projects around Petersburg to take advantage of the Petersburg interconnection, it is not guaranteed that a project AES Indiana selects would be located in an "energy community." Erik noted it is important to consider the "energy community" tax credit, and Erik will discuss the replacement resource cost sensitivity AES Indiana included for renewables to reflect the additional 10% bonus ITC renewables are eligible to receive later in his presentation.

Stakeholder Devi Glick, a representative of Synapse Energy Economics, asked Erik if AES Indiana could include the bonus 10% "energy community" ITC in its Current Trends scenario without performing a sensitivity analysis because Devi Glick is concerned the Current Trends scenario will receive the most attention. Devi Glick suggested to quantify the amount of solar or storage at Petersburg or Harding Street to estimate the achievable quantity of solar or storage resources that could located in known “energy communities.” Devi Glick also suggested AES Indiana add a scenario that replaces Petersburg with solar and storage at that site to account for this. Erik stated AES Indiana does not consider modeling at specific locations for its IRP modeling as the modeling process considers the advantages of the interconnection at Petersburg in its process and similar results can be achieved using the sensitivity analysis around the 10% “energy community” bonus ITC. Erik explained the Current Trends scenario modeling results will determine the base volume of renewables and the sensitivity analysis will provide a range of renewables that will be built based on cost. Devi Glick followed up by expressing concern that some utilities model specific RFP results that have costs based on the specific citing of the project, so Devi Glick suggested AES Indiana consider the price of resources based on the location of the resource in its model. Erik stated he understood Devi Glick’s feedback and thanked Devi Glick for the input.

Stakeholder Anna Sommer asked Erik whether AES Indiana has considered exploring surplus interconnected renewables. Anna Sommer stated the IRA has made tax credits for wind and solar relatively inexpensive, which made Anna Sommer wonder if there is an opportunity to add solar in particular places like Petersburg without going through the interconnection process in MISO with the understanding there would be surplus injection at Petersburg when the Petersburg units are not operating assuming the Petersburg units are refueled to gas. Anna Sommer asked if this is something AES Indiana has explored modeling. Erik stated this is not something AES Indiana has explored through modeling, but as he mentioned earlier in his presentation, since the model is picking storage to fill AES Indiana’s near-term capacity need, AES Indiana will not preclude considering solar and storage at the site as well. Erik noted as Anna mentioned, since the tax credit value for solar resources increased under the IRA, complementing storage with solar could be an attractive option. Anna Sommer thanked Erik for his response.

Erik also noted AES Indiana has seen a lot of volatility in the nitrogen oxides (“NOx”) allowance market due to the proposed “Good Neighbor” provision through the Cross-State Air Pollution Rule (“CASPR”), which has caused utilities to sell significantly less NOx allowances into the market. He explained AES Indiana has seen NOx allowance prices hit around $40,000 per ton and provided the updated NOx allowance assumptions for the Current Trends, Aggressive Environmental, and Decarbonized Economy scenarios on slide 49. He noted the NOx allowance market forecasts for 2023 through 2027 are confidential to protect AES Indiana since it is in the market for NOx allowances.

Erik stated AES Indiana also updated its carbon tax assumption in its Aggressive Environmental scenario. He explained the carbon tax in the Aggressive Environmental scenario originally started in 2035 at around $30 per ton, which was consistent with the Interagency Working Group Social Cost of Carbon Forecast; however, this assumption caused Petersburg to remain online until 2035. Erik said AES Indiana did not believe a portfolio in which Petersburg remained online using coal as a fuel until roughly 2035 aligned with the intentions of evaluating an aggressive environmental scenario, so AES Indiana moved the carbon tax date to 2028. He noted the carbon tax amount still aligns with the Interagency Working Group Social Cost of Carbon Forecast.

Erik then provided further detailed AES Indiana's Decarbonized Economy scenario. He explained the Decarbonized Economy scenario is essentially a renewable portfolio standard that was included as part of the Build Back Better legislation that was proposed in 2021. He noted the Build Back Better legislation contained aggressive requirements for clean energy that required utilities to serve a percentage of their loads with clean energy, and if a utility failed to meet the target, the utility would receive a $40 per MWh penalty for each MWh the utility was short of its target. He explained the Build Back Better legislation also provided a $150 per MWh grant for each MWh of clean energy the utility generated over its requirement. Erik explained AES Indiana used this approach for its Decarbonized Economy scenario, despite the low likelihood of this policy being implemented in the near-term, to ensure the Decarbonized Economy scenario is sufficiently aggressive.

Erik then provided an overview of the structure for the modeling results review for Public Advisory Meeting #4. He reviewed AES Indiana is evaluating five generation strategies with an additional strategy that allows the EnCompass model to optimize on its own. He stated the No Early Retirement keeps Petersburg operating on coal through the full 20 years of the IRP planning horizon. He explained the Pete Refuel to 100% Gas strategy refuels both Petersburg units to operate on 100% natural gas by 2025. He said the Both Pete Units Retire strategy has one Petersburg unit retiring in 2026 and the other unit retiring in 2028. Erik noted AES Indiana added a Clean Energy strategy after considering stakeholder feedback, which has both Petersburg units retiring and being replaced with wind, solar, and storage by 2028.

Erik stated AES Indiana takes its strategies and runs them across four different scenarios. He explained the scenarios represent four different potential paths of the future. Erik explained the first scenario is the No Environmental Action scenario, which assumes there are no ITC or PTC extended to renewables and there are low costs for fossil fuel commodities. He noted the No Environmental Action scenario is unlikely to happen due to the enaction of the IRA but is still possible. He stated AES Indiana has a Current Trends scenario that has ITC and PTC values that align with the IRA as well as base fundamental prices. Erik explained the Current Trends Scenario includes a low carbon tax starting in 2028 at around $650 per ton, which escalates 5% per year through the 20-year IRP planning horizon. He stated the next scenario is the Aggressive Environmental scenario, which includes a carbon tax consistent with the social cost of carbon developed by the Interagency Working Group starting in 2028, high gas prices, and base coal prices. Erik explained AES Indiana is including high gas prices in its Aggressive Environmental scenario because it assumes increased regulation in the fracking industry would limit supply while demand would increase because gas would be used as a transitional fuel to assist the industry's transition to cleaner resources. He stated the final scenario is the Decarbonized Economy scenario, which uses the clean energy performance program contained in the Build Back Better legislation to move the industry to cleaner resources.

Erik previewed AES Indiana will next discuss results from its retirement and replacement analysis. He explained the retirement and replacement analysis will consist of 24 portfolios across AES Indiana's six strategies and four scenarios, and the next section will focus on the portfolio and PVRR results for the Current Trends scenario portfolios. He stated AES Indiana will focus on the Current Trends scenario because the Current Trends scenario portfolios are AES Indiana's candidate portfolios that will be used to select AES Indiana's Preferred Resource Portfolio. Erik noted AES Indiana has the portfolio results for the other scenarios that AES Indiana published on its IRP website under its Public Advisory Meeting #4 materials (https://www.aesindiana.com/integrated-resource-plan), but AES Indiana will not discuss these results in depth during Public Advisory Meeting #4 due to time constraints.

Erik stated after AES Indiana reviews the results for the Current Trends scenario and portfolio matrix, it will focus on the replacement resource cost sensitivity analysis. He shared AES Indiana would conclude Public Advisory Meeting #4 by providing a partial review of the scorecard across the five scorecard categories: affordability; environmental sustainability; reliability, stability, and resiliency; risk and opportunity; and economic impact. He noted AES Indiana is still awaiting the results for several scorecard categories, but AES Indiana will discuss the results from the environmental sustainability metrics, which includes carbon dioxide ("CO2") emissions, sulfur dioxide ("SO2") emissions, NOx emissions, coal combustion products ("CCP"), water use, and clean energy progress. He stated AES Indiana will also share the property tax scorecard results for the Current Trends scenario in Public Advisory Meeting #4. He previewed AES Indiana will have all scorecard results to share by Public Advisory Meeting #5.

Retirement and Replacement Analysis Results

Erik Miller, Manager, Resource Planning, AES Indiana
(Slides 54-100)

Erik Miller began his discussion of the retirement and replacement analysis results by reiterating the discussion would focus on the Current Trends scenario. He stated AES Indiana used the base load, electric vehicle ("EV"), and distributed solar forecasts as well as the base commodity prices for its Current Trends scenario. Erik stated the Current Trends scenario used Horizon Energy's fundamental forecast to develop the power prices used in the model and the low CO2 price assumptions. Erik explained AES Indiana will discuss key components of each portfolio across the six strategies, including the generation mix and unforced capacity ("UCAP") position, installed capacity over the planning period, percentage of energy mix to serve the load, DSM selections, and PVRR. He said the generation mix and UCAP position component will provide background on the capacity used to serve AES Indiana's load at the peak hour for each season. He stated the installed capacity component will evaluate the amount of installed capacity added to the portfolio, which will focus on the next five or six years to align with the Short-Term Action Plan timeframe. He explained the percentage of energy mix to serve load component will evaluate the actual energy generated by the portfolio and the emissions from the generation. He said the DSM selection component will evaluate the DSM programs that were selected as resources under each strategy. He stated AES Indiana will also provide the PVRR of each portfolio, which measures the cost of each portfolio to customers.

Erik then detailed the results of the No Early Retirement/Current Trends portfolio. He reiterated the No Early Retirement strategy keeps Petersburg running on coal through 2042. He explained the chart on slide 68 is the same as the chart that represented AES Indiana's current capacity position on slide 45. He explained this strategy has Petersburg operating on coal through 2042, Harding Street Units 5 and 6 retiring in 2030 and 2031 (respectively), and Harding Street Unit 7 retiring in 2034. Erik stated the model replaces most of the Harding Street retirements with solar and storage. He said the model fills a significant portion of the capacity shortfall with storage in recognition of its capacity value in the winter. Erik then provided an overview of the installed capacity credit for the No Early Retirement strategy, which shows the incremental capacity additions. Erik stated the model added 240 MW ICAP of stand-alone storage and 45 MW ICAP of solar and storage in 2025 as well as 500 MW ICAP of wind in 2027. He shared the results from the No Early Retirement strategy tends to indicate the Preferred Resource Portfolio will include the capacity additions identified under this portfolio to fulfill its near-term capacity need with the caveat that AES Indiana will not preclude projects that have solar in addition to storage in recognition of the ITC associated with solar and the efficiencies gained by bundling solar with storage.

Erik then discussed the No Early Retirement/Current Trends portfolio energy mix results. He explained the charts on slide 61 represent the energy mix of the No Early Retirement/Current Trends portfolio. Erik noted the energy mix starts at 92 percent thermal and eight percent renewable and changes to 85 percent renewable and 15 percent thermal in the final years of the 20-year IRP horizon, which Kristina Lund mentioned earlier in the meeting. He explained AES Indiana provided its ITC, PTC, carbon tax, and commodity assumptions to Horizon Energy for use in its fundamental price model to develop the power price forecast. Erik stated the power price forecast under the No Early Retirement/Current Trends portfolio has low spark and dark spreads due largely to the ITC and PTC assumptions that cause renewables to be built out within MISO, which drives power prices down. He explained the lower power prices create less opportunity for thermal units to run later in the planning period – even under the No Early Retirement strategy. Erik noted AES Indiana added the Clean Energy metric to its scorecard after collaborating with the CAC. He explained the Clean Energy scorecard metric evaluates the percentage of the energy mix of each portfolio that is generated by renewable resources in 2032, which is half-way through the IRP horizon. He stated the No Early Retirement/Current Trends portfolio generates 55 percent of its energy from thermal resources and 45 percent from renewable resources in 2032.

Erik next explained the DSM results of the No Early Retirement/Current Trends portfolio. He began by discussing the results for the energy efficiency ("EE") programs. He recalled DSM is modeled as a resource in the planning model and is broken into three vintages. He stated Vintage 1 represents 2024 through 2026, which coincides with AES Indiana's Short-Term Action Plan and DSM Plan filing. He said Vintage 1 is also broken into the individual program bundles. He noted AES Indiana segmented the DSM measures for Vintage 2, which is 2027 through 2029, into two groups: residential and C&I. Erik noted AES Indiana received input from stakeholders Dan Mellinger with Energy Futures Group and the CAC that suggested AES Indiana break up the efficient products bundle and the residential bundles in Vintages 2 and 3. He explained AES Indiana incorporated this stakeholder suggestion into its model, and as a result, the model picked up the lower cost DSM bundles in Vintages 2 and 3. He stated the only bundles that were not picked up were the higher-cost EE residential products in Vintage 1 and the higher-cost residential bundles in Vintages 2 and 3. Erik then discussed the results for demand response. He stated demand response rates were selected for both residential and C&I customers, while direct load control was not selected for either customer group. He summarized the total DSM annual savings. He stated the total savings for EE Vintage 1 was 134,263 MWh, 1.1% of 2021 sales, and 89 MW cumulative for summer capacity purposes. Erik stated the demand response savings represents 75 MW cumulative for summer capacity purposes.

Stakeholder Shannon Anderson, a representative of Earth Charter Indiana, asked if AES Indiana will be using any of the benchmarking data being collected by the city of Indianapolis to target EE resources based on need. AES Indiana responded the IRP identifies the level of EE that AES Indiana will pursue through customer programs independent of the city of Indianapolis's data. AES Indiana stated the city of Indianapolis's Building Benchmarking and Transparency Ordinance (https://www.indy.gov/activity/benchmarking-and-transparency) can help building owners understand how efficiently their buildings are operating relative to other similar buildings. AES Indiana added its programs are available to help customers act on these insights through program rebates and incentives and provided a link to its website for more details (https://www.aesindiana.com/your-business).

Erik then detailed the PVRR results for the No Early Retirement/Current Trends portfolio. He stated the retirements include 618 MW of natural gas capacity from Harding Street Units 5-7 and noted Petersburg does not retire under this strategy. He recapped the capacity additions come from 490 MW ICAP of DSM, 2,500 MW ICAP of wind, 2,080 MW ICAP of solar, 700 MW ICAP of storage, and 45 MW ICAP of solar and storage by 2042. Erik noted the total PVRR of the portfolio is $9,572 million and ranks third amongst the other strategies under the Current Trends scenario.

Erik then discussed the Pete Refuel by 2025 strategy under the Current Trends scenario portfolio. He began by providing an overview of the capacity results of the portfolio. He noted the chart on slide 65 depicts the replacement of coal with natural gas in 2024 and 2025, which represents the refuel of Petersburg from coal to natural gas. He stated the results from this portfolio look very similar to the results of the No Early Retirement/Current Trends portfolio apart from the refuel of Petersburg. Erik explained the same resources were selected to replace Harding Street Units 5-7 under the Pete Refuel by 2025/Current Trends portfolio as were selected under the No Early Retirement/Current Trends portfolio. He noted the Pete Refuel by 2025/Current Trends portfolio also has additional storage being built in the near-term to address AES Indiana's current capacity shortfall in winter. He explained AES Indiana included six years of incremental capacity additions because multiple strategies retire Petersburg by 2028, so the six-year analysis captures the retirement and replacement of Petersburg across the strategies. Erik stated 1,052 MW ICAP of natural gas will be added in 2025 under the Pete Refuel by 2025/Current Trends portfolio to represent Petersburg's refuel, while 240 MW ICAP of stand-alone storage and 45 MW ICAP of solar and storage would be added in 2025. Erik noted the model also adds 450 MW ICAP of wind resources in 2027 under the Pete Refuel by 2025/Current Trends portfolio.

Erik then provided an overview of the energy mix under the Pete Refuel by 2025/Current Trends portfolio. He stated the energy mix under the Pete Refuel by 2025/Current Trends portfolio sources 55 percent of its energy from renewable resources and 45 percent from thermal resources by 2032, which is a higher percentage of renewables than that of the No Early Retirement/Current Trends portfolio. He noted the Pete Refuel by 2025/Current Trends portfolio's energy mix is 87 percent renewables and 13 percent thermal, which is similar to the 2042 energy mix in the No Early Retirement/Current Trends portfolio.

Stakeholder Ben Inskeep stated slide 19 from AES Indiana's presentation for Public Advisory Meeting #4 stated the estimated capital costs excluding gas infrastructure upgrades associated with the Petersburg Unit 3 and 4 refuel are approximately $160/kW. Ben Inskeep asked AES Indiana if it included gas infrastructure upgrades as part of its IRP modeling, and if so, what were those costs. AES Indiana responded it included infrastructure upgrades in the rate for firm gas delivery and are included as a fixed cost, not a capital cost, for the refueled units. AES Indiana added more specific cost information can be shared with stakeholders that have signed a non-disclosure agreement with AES Indiana.

Erik next explained the DSM results of the Pete Refuel by 2025/Current Trends portfolio. He stated the only difference between the Pete Refuel by 2025/Current Trends portfolio and the No Early Retirement/Current Trends portfolio is the appliance recycling program is not selected in Vintage 1 of the Pete Refuel by 2025/Current Trends portfolio. He stated the Vintage 1 EE program accounts for roughly one percent of AES Indiana's 2021 total sales.

Erik then discussed the PVRR, retirement, and replacement results of the Pete Refuel by 2025/Current Trends portfolio. He noted the addition of 2,500 MW wind resources by 2042 surpasses the 2,000 MW per resource technology type constraint because AES Indiana modeled wind projects sited in northern and southern Indiana separately. He stated AES Indiana modeled wind projects sited in northern and southern Indiana separately across all portfolios because AES Indiana expects the number of available wind projects in norther Indiana to be limited, so it capped the amount of northern Indiana wind at 500 MW and allowed southern Indiana wind to reach the 2,000 MW threshold. Erik highlighted the Pete Refuel by 2025/Current Trends portfolio has under 2,000 MW of solar additions (1,983 MW) and clarified the solar capacity value contained on slide 70 is on a direct current ("DC") basis rather than an alternating current ("AC") basis. He stated AES Indiana capped the amount of solar resource additions at 2,000 MWac, which means the model's result (1,983 MWdc) was further from the 2,000 MWac constraint than just 17 MW. Erik stated the Pete Refuel by 2025/Current Trends portfolio PVRR ($9,330 million) was the second lowest of all portfolios under the Current Trends scenario and the lowest of all portfolios under the Current Trends scenario apart from the EnCompass optimized portfolio. He noted the EnCompass Optimized/Current Trends portfolio has many practical issues because AES Indiana allowed the EnCompass to "blindly" optimize the portfolio, such as it staggers the Petersburg refuel dates to retire one unit in 2025 and the other unit in 2027, which would create additional costs that are not reflected in the model results.

Moderator Stewart Ramsay asked Erik to clarify that it is hard to capture the economies of scales and potential savings of completing the refuel of both Petersburg Units 3 and 4 at the same time in the model. Erik stated Stewart was correct.

Stakeholder Ben Inskeep asked Erik why the Pete Refuel by 2025/Current Trends portfolio adds natural gas resources during the refuel of Petersburg Units 3 and 4 and later retires natural gas units at Harding Street. Erik explained the retirement of the Harding Street units are age-based retirement dates and the Harding Street units are modeled to operate until the end of their useful lives. Ben Inskeep asked Erik what the assumed useful life of a refueled coal unit is. Erik stated the assumed useful life of the refueled Petersburg units is 20 years. Ben Inskeep followed up by asking if AES Indiana has considered utilizing the existing units at Harding Street and defer additional refueling investment at Petersburg and expressed concern with investment in the Petersburg refuel due to high natural gas prices and AES's global emissions goals. Erik stated the Harding Street units are being retired in the model because they reached the end of their useful life without requiring significant upgrades. Erik stated as the Harding Street retirement dates get closer, AES Indiana could reexamine the full cost associated with upgrading the Harding Street units to extend their useful lives but noted he believes it would likely be cost prohibitive to complete the necessary upgrades to extend the Harding Street units' useful lives.

Erik next discussed the One Pete Unit Retires/Current Trends portfolio. He began by discussing the capacity characteristics of the portfolio. He explained the One Pete Unit Retires/Current Trends portfolio retires Petersburg Unit 3 in 2026 and runs Petersburg Unit 4 through the 20-year planning period. He stated the model replaces the capacity lost when Petersburg Unit 3 retires in 2026 with storage resources. He added the model replaces the capacity lost when the Harding Street units retire with solar resources. He noted the capacity value from solar in winter is practically zero and the model adds solar resources for their energy value rather than capacity value. Erik stated the One Pete Unit Retires/Current Trends portfolio adds 300 MW ICAP of storage resources in 2025 and 400 MW ICAP of storage resources in 2026 to replace the capacity lost from Petersburg Unit 3's retirement. He explained storage is likely to be included in AES Indiana's Preferred Resource Portfolio due to the prevalence of solar resource additions across all strategies in the Current Trends scenario.

A representative of the Office of Utility Consumer Counselor ("OUCC") asked AES Indiana given that NOx seasonal allowance prices have increased substantially and Petersburg Unit 4 does not currently have significant NOx control devices, why would the model select Petersburg Unit 3 to retire before Petersburg Unit 4. AES Indiana responded Petersburg Unit 4 is newer and has better operating and performance characteristics than Petersburg Unit 3, which caused Petersburg Unit 3 to be selected to retire first. AES Indiana stated seasonal NOx prices are highest in the near-term and present less of a penalty, and therefore a less meaningful impact for Petersburg Unit 4 dispatch economics in the long-term. AES Indiana added long-term fundamentals also show increasing value outside the NOx season.

Erik then discussed the energy mix of the One Pete Unit Retires/Current Trends portfolio. He stated by 2032, the One Pete Unit Retires/Current Trends portfolio's energy mix is 48 percent thermal and 52 percent non-thermal. He stated the energy mix of the One Pete Unit Retires/Current Trends portfolio in 2023 and 2042 is relatively the same as the 2023 and 2042 energy mixes under the No Early Retirement/Current Trends portfolio and the Pete Refuel by 2025/Current Trends portfolio.

Erik detailed the DSM results for the One Pete Unit Retires/Current Trends portfolio. He noted the appliance recycling program was not selected in this portfolio. He stated the EE programs are roughly one percent of 2021 sales across all three vintages. He said the demand response program under this portfolio has 75 MW of cumulative summer savings.

Erik next provided the PVRR, retirement, and replacement results of the One Pete Unit Retires/Current Trends portfolio. He stated the One Pete Unit Retires/Current Trends portfolio has 520 MW of coal resource retirements from Petersburg Unit 3 and 618 MW of natural gas resource retirements from Harding Street Units 5-7. Erik noted the solar resource additions on slide 77 is above the 2,000 MW in the One Pete Unit Retires/Current Trends portfolio because the capacity amount contained on slide 77 is denoted in MWdc while the resource technology constraint is 2,000 MWac per resource type. Erik stated the One Pete Unit Retires/Current Trends portfolio performs the least favorably amongst all strategies under the Current Trends scenario largely because certain costs from Petersburg Unit 3 roll into the costs associated with Petersburg Unit 4 in the planning model after Petersburg Unit 3 is retired. Erik stated this causes AES Indiana to incur costs related to Petersburg Unit 3 without receiving benefits from Petersburg Unit 3 since it is retired. He noted the One Pete Unit Retires/Current Trends portfolio is not an economic strategy compared to other portfolios across the portfolio matrix.

Erik next discussed the Both Pete Units Retire/Current Trends portfolio. He began by discussing the capacity characteristics of the portfolio. He stated the retirements of the Petersburg units are staggered with one occurring in 2026 and the other occurring in 2028. He said Harding Street Units 5-7 retire as well by 2034. He explained other strategies have unique constraints on the resource technology that is used to add or replace capacity, such as the Clean Energy Strategy only allows renewable resource to fill capacity needs. Erik stated the Both Pete Units Retire/Current Trends portfolio has no such constraint on replacement resource technology. He stated the model selected to build a 325 MW closed cycle gas turbine (“CCGT”) in 2028. He noted the Both Pete Units Retire/Current Trends portfolio adds storage resources in the near-term as well as after the Harding Street units retire. He stated the Both Pete Units Retire/Current Trends portfolio has solar resource additions in the 2030s for the energy value associated with solar resources. Erik elaborated the model is selecting the CCGT in the Both Pete Units Retire/Current Trends portfolio due to its capacity and energy values, especially in winter. He noted the Both Pete Units Retire/Current Trends portfolio adds 300 MW ICAP of stand-alone storage resources in 2025; 100 MW ICAP of wind resources and 400 ICAP MW of stand-alone storage resources in 2026; 400 ICAP MW of wind resources and 20 ICAP MW of stand-alone storage resources in 2027; and 100 MW ICAP of wind resources, 40 MW ICAP of stand-alone storage resources, and 325 ICAP MW of natural gas resources in 2028.

Erik then discussed the energy mix of the Both Pete Units Retire/Current Trends portfolio. He stated by 2032, the Both Pete Units Retire/Current Trends portfolio produces 52 percent of its energy from thermal resources and 48 percent from renewable resources. Erik stated the Both Pete Units Retire/Current Trends portfolio’s comparatively large proportion of thermal energy generation in 2032 is due to the construction of the CCGT, which has a relatively favorable heat rate that causes it to produce more energy than other thermal resources in other portfolios (e.g., the refueled Petersburg units). He stated the energy mix of the Both Pete Units

Retire/Current Trends portfolio in 2023 and 2042 is largely the same as the other portfolios under the Current Trends scenario in 2023 and 2042.

Erik detailed the DSM results of the Both Pete Units Retire/Current Trends portfolio. He stated the EE results are the same under the Both Pete Units Retire/Current Trends portfolio as the One Pete Unit Retires/Current Trends portfolio and the Pete Refuel by 2025/Current Trends portfolio as the higher cost-efficient products and the appliance recycling programs were not selected in Vintage 1. He noted the Both Pete Units Retire/Current Trends portfolio selected residential direct load control, which caused the cumulative summer capacity savings of AES Indiana's demand response program to be roughly 195 MW.

A representative of the OUCC asked AES Indiana why a smaller CCGT is being selected in 2028 rather than a combustion turbine as the smaller CCGT would not be able to take full advantage of a heat recovery steam generator. AES Indiana responded the model preferred the CCGT for its capacity and energy value. AES Indiana stated new CCGTs are roughly 325 MW per selectable resource, whereas new combustion turbines are roughly 100 MW per selectable resource. AES Indiana added the CCGT size is assumed to be a 1x1 and thus benefits from a combustion turbine and heat recovery steam generator configuration.

Erik next provided the PVRR, retirement, and replacement results of Both Pete Units Retire/Current Trends portfolio. He stated all 1,040 MW of the Petersburg units are retired by 2028 and 618 MW of the Harding Street units are retired by 2033, which created a relatively large need for replacement capacity. He said 325 MW of thermal resources, 1,280 MW of stand-alone storage resources, 225 MW of solar and storage resources, 2,450 MW of wind resources, and 2,308 MW of solar resources are added under the Both Pete Units Retire/Current Trends portfolio. He stated the PVRR of the Both Pete Units Retire/Current Trends portfolio is one of the least economic portfolios under the Current Trends scenario because of the large capital expenditure or purchased power agreement ("PPA") costs associated with retiring both Petersburg units.

Erik then discussed the Clean Energy Strategy/Current Trends portfolio. He began by discussing the capacity characteristics of the portfolio. He stated both Petersburg units retire and are replaced with storage, solar, and wind under the Clean Energy Strategy/Current Trends portfolio. He noted the model was constrained to not be able to select gas resources under the Clean Energy Strategy/Current Trends portfolio. Erik explained the model filled its winter capacity needs with storage and wind under the Clean Energy Strategy/Current Trends portfolio. He detailed the Clean Energy Strategy/Current Trends portfolio adds 300 MW ICAP of stand-alone storage resources in 2025; 100 MW ICAP of wind resources and 400 MW ICAP of stand-alone storage resources in 2026; 400 MW ICAP of wind resources in 2027; and 400 MW ICAP of wind resources, 280 MW ICAP of stand-alone storage resources, and 45 MW ICAP of solar and storage resources in 2028.

Erik detailed the energy mix of the Clean Energy Strategy/Current Trends portfolio. He stated, the Clean Energy Strategy/Current Trends portfolio will produce 36 percent of its energy from thermal resources and 64 percent from renewable resources by 2032. He detailed the Clean

Energy Strategy/Current Trends portfolio is one of the most effective portfolios at transitioning to clean energy as quickly as possible.

Erik described the DSM results of the Clean Energy Strategy/Current Trends portfolio. He stated the Clean Energy Strategy/Current Trends portfolio includes appliance recycling in Vintage 1, which caused the Vintage 1 EE savings to be 1.1 percent of 2021 sales. He stated residential direct load control was selected under AES Indiana's demand response program, which created a cumulative summer capacity savings of 195 MW for the demand response program.

Erik next provided the PVRR, retirement, and replacement results of the Clean Energy Strategy/Current Trends portfolio. He stated the Clean Energy Strategy/Current Trends portfolio was one of the least cost-effective portfolios across the Current Trends scenario with a PVRR of $9,711 million. He stated the cost required to replace resources is a large driver of the relatively high costs regardless of the ownership structure of the resources (e.g., build-transfer, PPA, etc.).

Erik then discussed the EnCompass Optimization/Current Trends portfolio. He began by discussing the capacity characteristics of the portfolio. He stated the portfolio refuels Petersburg Unit 3 in 2025 and Petersburg Unit 4 in 2027. He reiterated the EnCompass Optimization/Current Trends portfolio is largely unconstrained and staggering the refuel would increase costs that were not fully captured by the modeling, such as the loss of economies of scale. Erik stated other than the staggered refuel of Petersburg, the EnCompass Optimization/Current Trends portfolio is nearly identical to the Pete Refuel by 2025/Current Trends portfolio. He noted storage was selected to fill AES Indiana's near-term capacity need under the Pete Refuel by 2025/Current Trends portfolio. He stated solar is built in 2030 for its energy value when the Harding Street units are retired. He explained 526 MW ICAP of natural gas resources, 240 MW ICAP of stand-alone storage resources, and 45 MW ICAP of solar and storage resources are added in 2025. He added 526 MW ICAP of natural gas resources and 500 MW ICAP of wind resources were added in 2027.

Erik detailed the energy mix of the EnCompass Optimization/Current Trends portfolio. He stated by 2032, the EnCompass Optimization/Current Trends portfolio produces 46 percent of its energy from thermal resources and 54 percent from renewable resources, which is identical to the Pete Refuel by 2025/Current Trends portfolio. He stated the energy mix of the EnCompass Optimization/Current Trends portfolio in 2023 and 2042 is largely the same as the other portfolios under the Current Trends scenario in 2023 and 2042.

Erik described the DSM results of the EnCompass Optimization/Current Trends portfolio. He stated the EnCompass Optimization/Current Trends portfolio includes appliance recycling in Vintage 1, which caused the Vintage 1 EE savings to be 1.1 percent of 2021 sales. He stated the residential direct load control was not selected in demand response. He stated only residential and C&I rate programs were selected for demand response, which created cumulative summer capacity savings of 75 MW.

Erik next provided the PVRR, retirement, and replacement results of the EnCompass Optimization/Current Trends portfolio. He stated the EnCompass Optimization/Current Trends portfolio was the most cost-effective portfolio across all the Current Trends scenario portfolios with a PVRR of $9,262 million. He detailed while the EnCompass Optimization/Current Trends portfolio has the lowest PVRR amongst all other portfolios under the Current Trends scenario, it does not reflect the true costs of staggering the Petersburg refuel that AES Indiana was not able to reflect in modeling. Erik added the EnCompass Optimization/Current Trends portfolio PVRR is only less than 1 percent less than the Pete Refuel by 2025/Current Trends portfolio PVRR.

Erik then compared the PVRR results of all strategies across all scenarios. He stated the EnCompass Optimization strategy refuels both Petersburg units in 2025 under the No Environmental Action scenario, refuels Petersburg Unit 4 in 2027 under the Aggressive Environmental scenario, and refuels Petersburg Unit 3 in 2025 and refuels Petersburg Unit 4 in 2027 under the Decarbonized Economy scenario. He said the refuel performs the best under the No Environmental Action scenario because refueling Petersburg is an economic investment that allows AES Indiana to avoid fixed costs associated with operating Petersburg on coal. Erik noted the Clean Energy Strategy does not perform well under the No Environmental Action scenario because the No Environmental Action scenario does not provide ITC and PTC to renewable resources. He noted the One Pete Unit Retires strategy performed poorly across all scenarios because costs associated with Petersburg Unit 3 would get rolled into Petersburg Unit 4 after Petersburg Unit 3 retires, which causes AES Indiana to incur costs related to Petersburg Unit 3 without receiving benefits from Petersburg Unit 3 since it is retired.

Erik then provided an overview of the PVRR performance of the Aggressive Environmental scenario. He explained the Encompass Optimization/Aggressive Environmental portfolio refuels Petersburg Unit 4 in 2027 and retires Petersburg Unit 3 in 2028. He noted the Aggressive Environmental scenario used high gas prices and a carbon tax starting in 2028, which was a key driver for the model’s replacement decisions under the Aggressive Environmental scenario.

Erik detailed the results from the Decarbonized Economy scenario. He recalled the Decarbonized Economy scenario is based on the Clean Energy Performance program associated with the Build Back Better Plan legislation in which utilities would be required to meet clean energy targets. He stated AES Indiana assumes base gas prices under the Decarbonized Economy scenario, which is consistent with the Current Trends scenario. He stated the model selects the refuel in the Decarbonized Economy scenario for its capacity value around AES Indiana’s times of peak demand, while the model predicts the refueled Petersburg units would have relatively low capacity factors and would not produce much energy. Erik noted at the capacity factors of the refueled Petersburg units would start around 20 to 25 percent for roughly five years following the refuel but would decrease even further in the future, highlighting its value as a capacity resource rather than an energy resource. Erik stated the refueled Petersburg units’ 20 to 25 percent expected capacity factor in the near term under the Decarbonized Economy scenario is similar to the current capacity factor of Harding Street Units 5-6.

Replacement Resource Cost Sensitivity Analysis Results

Erik Miller, Manager, Resource Planning, AES Indiana
(Slides 101-109)

Erik Miller began his discussion of the replacement resource cost sensitivity analysis by providing an overview of the replacement resource cost sensitivity analysis. He explained replacement resource costs are important to the IRP process because the replacement resource costs are inputs of the model, and the model ultimately selects resources based on the lowest cost options. Erik explained AES Indiana developed its initial replacement resource cost analysis in February 2022 using data from Wood Mackenzie, the National Renewable Energy Laboratory ("NREL"), and Bloomberg New Energy Finance ("BNEF") to develop averages to estimate replacement resource costs. He stated AES Indiana then benchmarked these averages with its 2019 RFP results to determine AES Indiana's initial replacement resource costs. He stated AES Indiana then utilized its 2022 RFP results to inform its replacement resource costs, but the 2022 RFP results were significantly more expensive than AES Indiana initially included in its analysis for a variety of reasons, including supply chain issues and solar tariffs. He stated due to the price volatility AES Indiana identified in its 2022 RFP, it decided to run a replacement resource cost analysis.

Erik detailed AES Indiana's replacement resource cost analysis uses three levels of replacement resource costs: low, base, and high. He stated the low level of costs are based on AES Indiana's initial replacement resource cost analysis that used data from Wood Mackenzie, the National Renewable Energy Laboratory ("NREL"), and Bloomberg as well as benchmarking from AES Indiana's 2019 RFP. He explained AES Indiana used the average of the lowest 50 percent of results based on cost from its 2022 RFP as its base level of replacement resource costs. He stated AES Indiana used the average of the highest 50 percent of results based on cost from its 2022 RFP as its high resource cost level.

Erik stated AES Indiana then modeled the Current Trends scenario using the high and low replacement cost levels to develop a range of capacity expansion results. He noted the low replacement cost level allows AES Indiana to evaluate portfolios if costs were to be significantly lower than the results AES Indiana received in its 2022 RFP. Erik explained this low cost level could account for price differentials due to projects qualifying to receive certain benefits, such as the "energy community" provision in the IRA. He stated the high replacement resource cost level will allow AES Indiana to evaluate portfolio results if prices were to increase.

Erik first described the replacement resource cost sensitivity analysis results for the No Early Retirement/Current Trends portfolio. He reviewed both Petersburg units continue to operate on coal through 2042 under the No Early Retirement/Current Trends portfolio. He stated the total amount of retirements (618 MW) is the same for each replacement resource cost level under the No Early Retirement/Current Trends portfolio. He described the replacement resource cost level impacted the total amount of replacement capacity the model selected with the low, base, and high cost levels selecting 5,536 MW, 5,329 MW, and 5,031 MW, respectively, under the No Early Retirement/Current Trends portfolio. He noted solar resources account for a large portion of the replacement capacity when replacement resource costs are lower. He described natural gas resources tended to be added when replacement resource costs were high because AES Indiana did not identify as much price volatility for natural gas resources compared to other resources in its 2022 RFP, such as solar resources. He noted this could be attributable to the lower demand for gas resources compared to the past.

Erik then detailed the replacement resource cost sensitivity analysis results for the Pete Refuel by 2025/Current Trends portfolio. He said the cost sensitivity analysis produced similar results under this portfolio. He stated the total amount of retirements (1,658 MW) is the same for each replacement resource cost level under the Pete Refuel by 2025/Current Trends portfolio. He described the replacement resource cost level impacted the total amount of replacement capacity the model selected with the low, base, and high cost levels selecting 6,643 MW, 6,383 MW, and 5,936 MW, respectively, under the No Early Retirement/Current Trends portfolio. He noted similar to the other portfolios, solar resources account for a large portion of the replacement capacity when replacement resource costs were lower, while natural gas resources were added when replacement resource costs were higher.

Erik then described the replacement resource cost sensitivity analysis results for the One Pete Unit Retires/Current Trends portfolio. He explained the cost sensitivity analysis produced similar results under this portfolio. He stated the total amount of retirements (1,138 MW) is the same for each replacement resource cost level under the One Pete Unit Retires/Current Trends portfolio. He described how the replacement resource cost level impacted the total amount of replacement capacity the model selected with the low, base, and high cost levels selecting 6,184 MW, 6,129 MW, and 5,514 MW, respectively. He stated similar to the other portfolios, solar resources account for a large portion of the replacement capacity when replacement resource costs were lower, while natural gas resources were added when replacement resource costs were higher.

Erik then provided the replacement resource cost sensitivity analysis results for the Clean Energy Strategy/Current Trends portfolio. He stated the total amount of retired capacity (1,658 MW) is the same for each replacement resource cost level under the Clean Energy Strategy/Current Trends portfolio. He described the replacement resource cost level impacted the total amount of replacement capacity the model selected with the low, base, and high cost levels selecting 6,609 MW, 6,631 MW, and 6,319 MW, respectively. He noted this portfolio produces similar results across all replacement resource cost levels because the model selected the near the maximum amount of renewables and the Clean Energy strategy is constrained to not allow the model to select gas resources.

Erik then detailed the replacement resource cost sensitivity analysis results for the EnCompass Optimization/Current Trends portfolio. He said the cost sensitivity analysis produced similar results under this portfolio. He stated the total amount of retirements (1,658 MW) is the same for each replacement resource cost level under the EnCompass Optimization/Current Trends portfolio. He explained the replacement resource cost level impacted the total amount of replacement capacity the model selected with the low, base, and high cost levels selecting 6,735 MW, 6,426 MW, and 6,013 MW, respectively. He noted similar to the other portfolios, solar resources account for a large portion of the replacement capacity when replacement resource costs were lower, while natural gas resources were added when replacement resource costs were higher.

Erik then discussed the PVRRs of the Current Trends portfolios under the three different replacement resource cost levels. He stated he already described the base results when he went through the Current Trends scenario results in the previous section. He noted the EnCompass Optimization/Current Trends portfolio refuels Petersburg Unit 3 in 2025 and Petersburg Unit 4 in 2027 under the base and high replacement resource cost levels, while the EnCompass Optimization/Current Trends portfolio refuels Petersburg Unit 3 in 2025 and retires Petersburg Unit 4 in the 2030s under the low replacement resource cost level. He stated the overall takeaway from this analysis is solar resources account for a large portion of the replacement capacity when replacement resource costs were lower, while natural gas resources were added when replacement resource costs were higher.

Preliminary IRP Scorecard Results

Erik Miller, Manager, Resource Planning, AES Indiana
(Slides 110-112)

Erik Miller then provided the preliminary IRP scorecard results. He prefaced the discussion by reiterating that AES Indiana is still working to finalize the Reliability, Stability, and Resiliency Risk and Opportunity scorecard metric results. He stated AES Indiana has the results for the Affordability, Environmental Sustainability, and property tax scorecard metrics, which will be the focus of this section of his presentation. He noted the PVRR values under the Affordability metric on slide 111 are the same PVRR values that were discussed earlier in the presentation. He stated the Environmental Sustainability metric evaluates each portfolio’s emissions levels, water use, CCP level, and the percentage of energy mix generated by renewable energy resources.

Erik noted AES Indiana and its stakeholders were surprised to learn the Pete Refuel/Current Trends portfolio produced the lowest emissions by 2032 of all portfolios under the Current Trends scenario, which AES Indiana shared with stakeholders in its technical meeting prior to Public Advisory Meeting #4. He stated it seems intuitive that the Clean Energy Strategy would produce the lowest emissions; however, the Clean Energy strategy keeps both Petersburg units operating on coal through 2028, while the Pete Refuel strategy refuels both Petersburg units in 2026. He explained the additional time the Clean Energy strategy operates the Petersburg units on coal and the relatively low capacity factor of the refueled Petersburg units causes the Clean Energy strategy to produce more emissions by 2032 than the Petersburg Refuel. He reiterated emissions are produced through energy production, so the lower amount of energy generation completed by the refueled Petersburg units also contributes to the relatively low amount of emissions produced by the Pete Refuel/Current Trends portfolio.

Erik detailed the renewable energy production values for each portfolio under the Current Trends Scenario. He stated the Clean Energy/Current Trends portfolio produces the most renewable energy as a percentage of its total generation output in 2032 of all the Current Trends portfolios. He said the Pete Refuel by 2025/Current Trends portfolio produces the second most renewable energy as a percentage of its total generation output in 2032 of all the Current Trends portfolios. He noted the No Early Retirement/Current Trends portfolio produces the least amount of renewable energy as a percentage of its total generation output in 2032 of all the Current Trends portfolios.

Erik described the property tax results under the Economic Impact scorecard metric. He stated the Clean Energy strategy and the Both Pete Units Retire strategies had the highest property tax values of the portfolios under the Current Trends scenario. He explained this is because the portfolios in which both Petersburg units retire would require the most investment, which would require AES Indiana to either directly or indirectly pay property taxes. He elaborated both capital investment and PPA projects have property tax values associated with their costs. He added the portfolio with the lowest property tax value of the Current Trends portfolio is the No Early Retirements portfolio.

Erik then compared the annual revenue requirement of each portfolio under the Current Trends Scenario to the No Early Retirement/Current Trends portfolio. He stated the comparison, illustrated by the graph on slide 112, represents the incremental revenue requirement of each strategy compared to the revenue requirement if AES Indiana did not retire any of its resources early. He noted the Current Trends portfolios under the Clean Energy and Both Pete Units Retire strategies have higher revenue requirements compared to the No Early Retirement/Current Trends portfolio in the near term to the early 2030s but have lower revenue requirements in the early 2030s to the 20-year planning horizon. He explained the increased revenue requirement in the near term of the Clean Energy/Current Trends portfolio and Both Pete Units Retire/Current Trends portfolio is caused by the costs associated with replacing the Petersburg units. He noted the Pete Refuel by 2025/Current Trends portfolio drops below the revenue requirement of the No Early Retirement/Current Trends portfolio by 2027 due to the avoided fixed costs associated with refueling the Petersburg units rather than continuing to operate them on coal.

Final Q&A and Next Steps

Erik Miller, Manager, Resource Planning, AES Indiana
(Slides 113-114)

Stakeholder Bhawramaett Broehm asked Erik to clarify that the next Public Advisory Meeting #5 will be held at the beginning of November and stakeholders should expect AES Indiana to discuss the results from the reliability analysis. Erik confirmed the Public Advisory Meeting #5 will be held in the first week of November. Erik stated the focus of Public Advisory Meeting #5 will be to review the Reliability, Stability, and Resiliency and Risk and Opportunity scorecard metrics as well as announce AES Indiana's Preferred Resource Portfolio and Short-Term Action Plan. Erik shared AES Indiana is currently finishing the reliability analysis with Quanta as well as the risk and stochastic metrics. Erik stated Quanta will present the findings of the reliability analysis and AES Indiana will present the results of the stochastic analysis as well as discuss the final scorecard results in Public Advisory Meeting #5.

Stakeholder Anna Sommer asked when AES Indiana anticipates it will share its EnCompass files with stakeholders that have signed non-disclosure agreements with AES Indiana and when the deadline for stakeholders to provide feedback to AES Indiana will be. Erik stated AES Indiana will try to get the EnCompass database out to stakeholders within a few days of Public Advisory Meeting #4. Erik added that he would reach out to stakeholders roughly two weeks after stakeholders receive the database to establish a deadline for stakeholders to provide AES Indiana feedback. Anna Sommer supported Erik's suggestion and asked Erik to clarify the format of the data AES Indiana will provide to stakeholders. Erik stated AES Indiana will provide stakeholders the data exported from EnCompass into spread sheets. Erik elaborated stakeholders will be able to use this to input the information into their own EnCompass models or other capacity expansion models and evaluate AES Indiana's modeling results. Anna Sommer asked Erik whether AES Indiana will provide adequate information to inform stakeholders what was used to create the EnCompass modeling inputs, such as whether the inputs were based on revenue requirement values or LCOE values. Erik responded AES Indiana will share the values that were loaded into the EnCompass model and will provide sufficient data to support the input value calculations as well. Anna Sommer thanked Erik for his response.

Erik concluded Public Advisory Meeting #4 by thanking stakeholders for their time and participation in Public Advisory Meeting #4 and stating he looked forward to continued stakeholder collaboration.