2022 Integrated Resource Plan (IRP)

Public Advisory Meeting #3 Minutes

Date: Monday, June 27, 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, Schedule	Chad Rogers, Senior Manager, Regulatory Affairs, AES Indiana
	IRP Midway Touchpoint	Kristina Lund, President & CEO, AES Indiana
	Stakeholder Presentations	Wendy Bredhold, Senior Campaign Representative, Sierra Club Ray Wilson, Faith in Place
	IRP Schedule & Meeting #2 Recap	Erik Miller, Manager, Resource Planning, AES Indiana
	2022 All-Source RFP & Replacement Resource Cost Update	Erik Miller, Manager, Resource Planning, AES Indiana
	Commodity Forecasts	Erik Miller, Manager, Resource Planning, AES Indiana
	RTO Reliability Planning: Resource Adequacy & Seasonal Construct	Lynn Hecker, Senior Manager, Resource Adequacy Policy and Analytics, MISO
Break	Lunch	
Afternoon 12:30 PM	Modeling Reliability Assumptions	Erik Miller, Manager, Resource Planning, AES Indiana
	Reliability Analysis	Hisham Othman, VP Transmission and Regulatory Consulting, Quanta
	Portfolio Metrics & Scorecard	Erik Miller, Manager, Resource Planning, AES Indiana
	AES Indiana Distribution System Planning	Kathy Storm, Vice President, US Smart Grid, AES Indiana Mike Russ, Senior Manager, T&D Forecasting, AES Indiana
	Final Q&A and Next Steps	

Meeting Summary

Agenda and Introductions

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

Moderator Stewart Ramsay started Public Advisory Meeting #3 by thanking stakeholders for their attendance and continued engagement in AES Indiana's IRP process. He then provided an overview of the agenda and a brief description of each topic to be presented.

Virtual Meeting Protocols and Safety, Schedule

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

Chad Rogers began his presentation by introducing the AES Indiana's IRP team, which is composed of AES Indiana leadership, AES Indiana IRP planning members, AES Indiana IRP third-party partners, and AES Indiana legal representatives. He then introduced the stakeholders that registered for AES Indiana's Public Advisory Meeting #3, which included state and local governmental agencies, commercial and industrial customers, residential customers, and interest groups. Chad then provided an overview of virtual meeting best practices, which included tips on submitting questions using audio or the chat function and a reminder to only use video functionality when commenting during the meeting to minimize bandwidth usage.

Chad next discussed AES's purpose and values. He explained AES's purpose and values reflect its dedication to improving lives and making a lasting difference in the community. He elaborated the IRP process allows AES Indiana to determine the future of energy together with its stakeholders. He explained safety is AES's first value and is at the core of everything it does. Chad then stated AES Indiana believes how it completes its work is just as important as the work itself, which demonstrates AES Indiana's commitment to the highest standards in all aspects of its work. He reiterated AES and its employees act with the utmost integrity and hold the solutions it delivers to the highest standards of excellence. He then explained AES works as one team all together with its stakeholders to meet the changing needs of its customers with agility and in a meaningful way. He stated AES's purpose and values are at the core of everything AES and AES Indiana do, which is especially true for AES Indiana's IRP process.

Chad then provided background on AES's safety beliefs as its safety message for AES Indiana's Public Advisory Meeting #3. He explained safety is AES's first priority in all aspects of AES's operations, whether its people are working in its plants, job sites, office locations, or traveling. He stated safety is an important mindset and does not happen by chance and is not an accident; rather, safety is a mindset and a condition of employment with AES. He detailed AES people and contractors have, not only a right, but an *obligation* to stop work if they identify a situation they believe to be unsafe. He explained through these core safety beliefs, all AES people can be safety leaders.

IRP Midway Touchpoint

Kristina Lund, President & CEO, AES Indiana
(Slides 10-11)

Kristina Lund began her presentation by providing context of where AES Indiana is in its IRP process timeline by explaining AES Indiana's IRP process is at its midpoint. She thanked stakeholders for their participation and explained their participation is critical for the planning of the future of energy for AES Indiana's customers and the communities in Indianapolis and the surrounding counties.

Kristina recalled at the end of AES Indiana's Public Advisory Meeting #2, several stakeholders asked questions around AES's global sustainability targets and how those targets relate to AES Indiana's planning at a local level. She explained there are three key points to address to answer this question. She stated first, AES is a global energy company and announced a

global ambition to exit coal generation by the end of 2025 subject to any necessary state and local approvals. She explained this target was created to align intentions across AES's global portfolio, which includes locations in Bulgaria, Vietnam, and Argentina, while recognizing local considerations play a key role in final decisions.

Kristina described the second point to address this question is AES's global target is consistent with feedback AES Indiana receives from many of its local stakeholders, and in fact, AES Indiana has been hearing this from its local stakeholders and customers for years, including two stakeholders that are presenting on their sustainability ambitions. She stated AES Indiana has received such strong feedback from many of its stakeholders that AES Indiana has added a clean energy strategy to its portfolio matrix where coal is retired and replaced only with renewables and storage.

Kristina explained the final point to address the initial question is AES Indiana must also consider three key items when making portfolio decisions: reliability, affordability, and sustainability. She previewed MISO will be presenting on reliability later in the meeting and will explain how MISO is considering reliability during the current energy transformation. Kristina elaborated AES Indiana has a legal objective to identify a reasonable, least cost portfolio to reliably serve its customers, which is a responsibility AES Indiana takes seriously and will meet. She explained the IRP process is designed to be a rigorous and objective process where AES Indiana will incorporate feedback and input from all its stakeholders and produce a robust analysis of generation alternatives to create reliable, affordable energy to serve its customers. She stated stakeholders' participation and input in this process is critical, and thanked stakeholders for their continued participation.

Kristina then described AES Indiana's strategy of leading the inclusive, clean energy transition that reliably and affordably serves all its customers as the industry transitions from the current electric system to the future of energy, which will rely on a variety of new technologies. She stated AES Indiana's has a goal to continue reliably and affordably serving its customers while doing more for its customers as new technologies enable AES Indiana to achieve more of its customers objectives, namely sustainability. Kristina stated AES Indiana has engaged in a thoughtful, incremental process over the last 10+ years, which has resulted in a very significant reduction to AES Indiana's generation carbon intensity. She elaborated once the Short Term Action Plan from AES Indiana's 2019 IRP was implemented, AES Indiana's carbon intensity will be reduced by more than 40% from 2015 to 2025. She explained this was the result of careful planning and incremental actions over many years, which include being one of the first utilities to sign power purchase agreements ("PPA") for wind projects in 2010, converting Harding Street Station from coal to natural gas, and retiring the coal units at Eagle Valley and replacing them with a new combined cycle gas turbine ("CCGT"), which commenced operation in 2018. Kristina stated as a result of AES Indiana's 2019 IRP, AES Indiana announced its Short Term Action Plan, which included the retirements of Petersburg Units 1 and 2 as well as the additions of two solar projects, Hardy Hills, located in Clinton County, Indiana, and the Petersburg Energy Center, located in Pike County, Indiana, which uses the interconnection rights of Petersburg Unit 2. She recapped these actions allowed AES Indiana to bolster its environmental performance through a careful, incremental plan over many years. She then reminded stakeholders the electric sector is highly regulated, and AES Indiana works with a

variety of regulators, including the Indiana Department of Environmental Management ("IDEM") and the United States Environmental Protection Agency ("EPA"), and AES Indiana complies with all existing environmental regulations, which is a very important component of AES Indiana's daily operations and an item AES Indiana works on constantly.

Stakeholder Presentation: Sierra Club

Wendy Bredhold, Senior Campaign Representative, Sierra Club
Tony Mendoza, Senior Attorney, Sierra Club
(Slides 12-31)

Stakeholder Wendy Bredhold began Sierra Club's presentation by thanking the AES Indiana IRP team for allowing Sierra Club to present during AES Indiana's Public Advisory Meeting #3. Wendy Bredhold explained Sierra Club has three basic arguments, but the main point Sierra Club wishes to convey is AES Indiana should retire its Petersburg plant within the decade and replace it with renewable energy – not fossil fuels, which she characterized as risky. Wendy Bredhold stated when Petersburg is operating properly, it is among the dirtiest and most polluting coal plants in the country and is one of 22 "super polluter" coal plants and one of four that are concentrated in the southwest corner of Indiana. Wendy Bredhold stated Petersburg has also violated its air and water permits, and the Indianapolis Star described Petersburg as the worst water polluter in Indiana.

Stakeholder Tony Mendoza stated coal units are inflexible as they cannot be turned off or on quickly and they do not respond quickly to changing energy market signals. Tony Mendoza claimed AES Indiana, like other coal operators, operates Petersburg when cheaper energy is available on the market by committing the units as must run. Tony Mendoza stated a Sierra Club analysis examining a three-month period in 2019 found AES Indiana customers paid $1.5 million in excess costs because Petersburg was committed as must run into the MISO market. Tony Mendoza stated this inflexibility is one reason maintaining coal units on an evolving grid does not make sense from a customer perspective. Tony Mendoza then stated the forced outage at Eagle Valley that caused it to be offline coupled with high electric prices in Indiana that were primarily caused by high gas prices demonstrate the unreliability of fossil fuel generation units. Tony Mendoza added the remaining Petersburg units were also on outage during different periods of the summer as was one of the units at Harding Street Station that was converted from coal to gas due to boiler tube leaks or pump problems, which are common issues with aging fossil fuel steam units. He stated the lights remained on in Indianapolis because the MISO grid is resilient and robust and has sufficient resources to keep the grid online. Tony Mendoza then claimed AES Indiana customers paid at least $1 million related to excess energy purchases.

Stakeholder Tony Mendoza then claimed converting Petersburg to run on gas is an irresponsible choice from a climate perspective as well as from a reliability perspective because it will convert a coal unit, which Tony Mendoza characterized as growing less and less reliable, to a gas unit, which he claimed was even more unreliable. Tony Mendoza stated converting Petersburg Units 3 and 4 to run on natural gas would leave AES Indiana over reliant on natural gas, which he stated was the most volatile commodity in the electric system. Tony Mendoza stated following its 2019 IRP, AES Indiana's generation fleet was comprised of

roughly 90% of natural gas or coal fuel sources. Tony Mendoza stated if AES Indiana converted Petersburg Units 3 and 4 to natural gas, 80% of its generation would come from a single source, natural gas, which he characterized as an overreliance on a single fuel source because customers would be exposed to volatile gas prices without the reliability benefits that some might expect because the units would age and face operational issues. Tony Mendoza claimed the Petersburg coal units currently fail to compete in the MISO energy market many hours of the year and converting those units to run on natural gas would leave the units less efficient and less likely to compete in the energy market and will require continual upgrades to function properly. Tony Mendoza reiterated natural gas prices are volatile and are currently high, and states such as Minnesota, which gets 25% of its energy from wind resources, had very low energy prices, while Indiana had high energy prices this year because gas is setting the marginal cost of energy in Indiana. Tony Mendoza summarized his arguments by stating converting these units to gas likely does not lead to improved reliability, rather it would expose customers to volatile gas prices, and the Sierra Club would like to see Petersburg Units 3 and 4 replaced by a portfolio of solar, wind, and storage, which do not have variable fuel costs.

Stakeholder Zachary Harbin, an AES Indiana employee at its Petersburg Station generation facility, asked whether Sierra Club believes the grid will be more reliable without gas and coal. Zachary Harbin stated that is absolutely not possible and there are and will always be maintenance issues with all types of generation, including wind and solar. Zachary Harbin asked Sierra Club to please explain how wind or solar will be more reliable or sustainable as renewable cannot be adjusted based on load demand or grid changes. AES Indiana responded AES Indiana's IRP is a process and venue for all stakeholders to present and provide feedback and positions, and it welcome all viewpoints and will take Zachary Harbin’s comments into consideration in the IRP process.

Stakeholder Wendy Bredhold then stated AES Indiana, as the utility that serves the capital city of Indiana, should be leading the energy transition, which Wendy Bredhold stated has not happened and used a report published by Sierra Club a couple years ago where it assigned letter grades to utilities across the country, in which AES Indiana received a “D,” as support for this argument. Wendy Bredhold stated AES Indiana’s 2019 IRP was a missed opportunity and disappointed stakeholders, including the Indianapolis Mayor’s Office and City Council, which asked AES Indiana to retire Petersburg and replace it within the decade to support Indianapolis’s climate goals. Wendy Bredhold then called upon AES Indiana to replace the 1,000 megawatts (“MW”) of power from Petersburg Units 3 and 4 with a clean energy portfolio defined as a solar, wind, energy efficiency, battery storage, and demand response. Wendy Bredhold stated as the utility that holds the privilege of serving Indiana’s capital city and major Renewable 100 percent (“RE100”) companies, AES Indiana should lead the clean energy transition.

Stakeholder Presentation: Faith in Place

Ray Wilson, Faith in Place
(Slides 32-39)

Stakeholder Ray Wilson began his presentation by stating in 1973 there was an Arab oil embargo, and Ray Wilson was appointed as the Energy Conversion Czar for his employer,

and during that time Ray Wilson, did very little more than get employees to manage their thermostats to try to save energy, which caused Ray Wilson to realize the magnitude of the energy humans consume on the Earth and the possible consequences of such energy consumption. Ray Wilson then provided data from 2020 study that showed the heat content of the ocean has increased steadily since 1985 and stated humanity cannot continue to increase ocean temperatures at this rate without causing significant, disastrous effects on the Earth. Ray Wilson then shared his family added a second story to their home in 1982, and Ray Wilson designed the roof to accommodate solar panels when it needed to be replaced in roughly 20 years, which did not happen. Ray Wilson stated in 2012, he was able to put solar panels on his house and AES Indiana provided a $4,000 incentive and provided him with net metering.

Stakeholder Ray Wilson then stated he has participated in three IRP sessions with AES Indiana and in 2014, AES Indiana abandoned its community solar study. Ray Wilson expressed he has maintained AES Indiana and stakeholders should start planning with the end in mind, which is the goal to stop burning fossil fuels as soon as possible, and work backwards. Ray Wilson stated AES Indiana and stakeholders have made progress as AES Indiana has closed several coal fired power generators, which reduced CO2 emissions and air pollutants. Ray Wilson stated unfortunately, AES Indiana still has several coal fired generators running and replaced coal fired plants with natural gas plants. Ray Wilson stated AES Indiana should keep the end in mind and evaluate how to completely eliminate the burning of fossil fuels in the next 20 years. Ray Wilson stated AES Indiana should close down the Petersburg coal fired generators by 2024 and replace that capacity with renewable energy and storage. He stated AES Indiana should encourage and monitor monetarily incentivized rooftop solar for all homes and businesses that have access to the sun. Ray Wilson stated his goal is to have at least 20,000 rooftop solar systems located at optimal locations to serve the community and grid. Ray Wilson also stated AES Indiana should encourage, and potentially monetize and incentivize, battery storage for the rooftop solar installations. Ray Wilson stated resiliency is important due to cybersecurity concerns.

Stakeholder Ray Wilson then described his and his organization’s desire to encourage and support community solar to provide solar generation to locations where rooftop solar is not ideal with a goal of installing 50 to 100 MW. Ray Wilson stated he lives next to a 200-acre field that would be an ideal location for a solar installation. Ray Wilson also stated full net metering should be restored and denounced the repeal of net metering by the Indiana General Assembly. Ray Wilson described his goal of converting 50% of gas furnaces and water heaters to heat pumps and close down all gas fired electric generation facilities by 2035. Ray Wilson stated he believes there is untapped potential for energy conservation that AES Indiana should utilize and claimed Ray Wilson is experiencing a 50% reduction in energy use in his home and church over the last 10 years.

Stakeholder Ray Wilson then stated humanity is facing its most dire crisis ever and we cannot conduct business as usual and compared the effort needed to combat climate change with effort the United States put toward World War II and the mission to the moon. Ray Wilson stated AES Indiana needs a vision, which Ray Wilson described as a covenant of commitment sent through the IRP that AES Indiana will stop burning fossil fuels within 20 years. Ray Wilson

stated he is pleased to see AES Indiana's purpose is accelerating the future of energy together and said there needs to be agreement on what that means, which Ray Wilson stated means AES Indiana should not burn fossil fuels within the next 20 years.

IRP Schedule & Meeting #2 Recap

Erik Miller, Manager, Resource Planning, AES Indiana
(Slides 40-45)

Erik Miller started his discussion by welcoming stakeholders to AES Indiana's Public Advisory Meeting #3, expressed AES Indiana's excitement to engage in this collaborative process, and thanked the Sierra Club and Ray Wilson for their presentations. He reminded stakeholders to ask any questions they have, which Moderator Stewart Ramsay also encouraged.

Erik then discussed the updated 2022 IRP timeline. He explained AES Indiana began the IRP process roughly a year ago and held AES Indiana's Public Advisory Meeting #1 on January 24, 2022 and AES Indiana's Public Advisory Meeting #2 on April 12, 2022. He previewed AES Indiana's Public Advisory Meeting #4 is expected to be held in August 2022, AES Indiana's Public Advisory Meeting #5 is expected to be held in October 2022, and AES Indiana will file its IRP Repot with the Indiana Utility Regulatory Commission ("Commission" or "IURC") by November 1, 2022. He summarized AES Indiana's Public Advisory Meeting #1 as an "IRP 101," which provided an overview of the IRP process and IRP modeling assumptions (including the load, electric vehicle ("EV"), and distributed generation ("DG") forecasts). He reviewed AES Indiana provided more detail on the load scenarios (e.g., high, low, and base) and other modeling assumptions, including the market potential study ("MPS") and its results, in AES Indiana's Public Advisory Meeting #2. He recalled AES Indiana also discussed replacement resource assumptions and the portfolio matrix in AES Indiana's Public Advisory Meeting #2. He previewed AES Indiana's Public Advisory Meeting #3 will have a focus on reliability, including the Reliability Analysis, which Quanta will discuss, as well as cover how AES Indiana will evaluate replacement options using the scorecard in greater detail. He shared AES Indiana expects to discuss preliminary modeling results, the risk analysis, and preliminary scorecard results in AES Indiana's Public Advisory Meeting #4. He stated AES Indiana plans to announce the Short Term Action Plan and Preferred Resource Portfolio in AES Indiana's Public Advisory Meeting #5.

Stakeholder Emily Medine, a representative of Energy Ventures Analysis, asked AES Indiana when it expects its Certificate of Public Convenience and Necessity ("CPCN") filings to occur. AES Indiana stated the timing of CPCN filings are currently unknown and will be better known when the results from the final IRP and a new Short Term Action Plan are complete later this year.

Erik then used the figure on slide 43 to describe AES Indiana's current status in the IRP process as he stated AES Indiana has nearly completed the demand side management ("DSM") MPS, AES Indiana is utilizing its All-Source Request for Proposal ("RFP") to inform its replacement resource and commodity cost assumptions. He stated he will discuss commodity cost findings and assumptions later in the presentation. He previewed Kathy Storm and Mike

Russ will discuss distribution system planning later in the presentation. He recalled AES Indiana already discussed the load forecast, which was one of the first items completed. He stated all those items are inputs AES Indiana places into the capacity expansion model to complete retirement and replacement analysis, which is where AES Indiana is currently at in terms of the IRP process overview timeline contained on slide 43. He shared AES Indiana is beginning to work heavily on modeling and evaluating portfolios by placing optimized portfolios into the production cost modeling, which is an 8,760-hour cost analysis of the portfolios that calculates the present value of the revenue requirements to measure the ultimate cost of each portfolio to customers. He stated the portfolio evaluation is especially important because it evaluates the affordability component of the scorecard. He explained the scorecard will allow AES Indiana to evaluate all portfolios to select its Short Term Action Plan, which will be identified in its IRP report to be filed on November 1, 2022. He stated AES Indiana's IRP informs multiple large filings, including its DSM and CPCN filings.

Erik then provided a more in-depth review of AES Indiana's Public Advisory Meeting #2. He recalled one of the major items covered in AES Indiana's Public Advisory Meeting #2 was the portfolio matrix, which evaluates portfolios using five strategies across four scenarios to measure the present value revenue requirement ("PVRR") or affordability of each portfolio. He noted a major addition AES Indiana made following AES Indiana's Public Advisory Meeting #2 was the inclusion of a fifth strategy, the "Clean Energy Strategy," which Kristina Lund mentioned earlier in the presentation. He then described each portfolio:

- No Early Retirement: Petersburg does not retire until the end of the planning period in 2042.
- Petersburg Refuel to 100% Gas: Petersburg is refueled to 100% gas in 2025.
- One Petersburg Unit Retires, in which one unit retires and is replaced with whatever the model selects.
- Both Petersburg Units Retire: one Petersburg units retire in 2026 and the remaining unit is retired in 2028, which is staggered to provide adequate time to procure 1,000 MW of replacement capacity, and both units are replaced using the capacity expansion model.
- Clean Energy Strategy: one Petersburg units retire in 2026 and the remaining unit is retired in 2028 and both units are replaced using a clean energy portfolio (e.g., solar, wind, storage, and storage).

Erik then shared AES Indiana will also conduct a modeling exercise that allows the EnCompass capacity expansion model to optimize its selection without predefined strategy characteristics, which will produce the portfolio EnCompass finds most cost effective; however, the portfolio could be unreasonable due to unrealistic determinations made by the model (e.g., both Petersburg units retiring in 2022, which would not allow sufficient time to procure replacement capacity).

Erik then reviewed the scenarios AES Indiana's portfolio matrix will contain, which are:

- No Environmental Action Scenario: no environmental policy assumptions (e.g., no investment tax credit ("ITC"), production tax credit ("PTC"), or carbon tax).

- Current Trends Scenario (Reference Case): best view of the future using an extension of the ITC and PTC for five years and a modest carbon tax starting in 2028 at about $5 to $6/ton and increasing at the rate of inflation through the remaining period.
- Aggressive Environmental: assumes a carbon tax starting in 2035 at $25 to $26/ton and increases through the remainder of the period as well as a 10-year extension of the ITC and PTC.
- Decarbonized Scenario: clean energy mandate where the utility has to meet a certain percentage of their energy production from renewable sources with a final target of 85% clean energy by 2042.

Erik then discussed other updates from AES Indiana's Public Advisory Meeting #2. He stated AES Indiana is modeling energy efficiency as a resource by providing selectable bundles of energy efficiency measures into the model, which the model can select against other supply side resources. He recalled AES Indiana is structuring these energy efficiency bundles using three vintages: Vintage 1 is from 2024 to 2026, which will inform AES Indiana's DSM Plan for the same years and segmented bundles, Vintage 2 is from 2027 to 2029 and planned to have one bundle for Residential customers and one bundle for Commercial and Industrial ("C&I") customers, and Vintage 3 is from 2030 to 2042 and planned to have one bundle for Residential customers and one bundle for Commercial and Industrial ("C&I") customers. He explained Income Qualified Weatherization ("IQW") program is predefined in each vintage as AES Indiana believes it will consider offering an IQW program in the future. However, Erik shared AES Indiana decided to split the Vintage 2 and Vintage 3 bundles into a higher and a lower cost bundle for Residential customers, which came after AES Indiana and its IRP Oversight Board collaborated with the Citizens Action Coalition, which suggested AES Indiana divide the bundles so there is a lower cost residential bundle. He stated AES Indiana also segmented the Residential bundles into a higher and lower cost bundles for Vintage 1. He explained segmenting these bundles will allow the model to select lower cost bundles when the model may have not selected the bundle due to cost restraints.

Stakeholder Anna Sommer, a representative of Energy Futures Group, asked Erik to clarify if the "All C&I" on slide 45 means all the items identified in the MPS. Erik stated Anna Sommer is correct and specified the bundles would include all items identified in realistic achievable potential ("RAP") of the MPS. Anna Sommer then followed up by asking if AES Indiana is doing the same for residential bundles by dividing the residential RAP into two categories, high and low. Erik stated Anna Sommer was correct and explained AES Indiana will take the residential RAP and split it in half to make a higher cost and lower cost bundle rather than using the average cost of the whole bundles as AES Indiana previously planned. Anna Sommer asked Erik if he recalled AES Indiana stated it had an issue with modeling bundles at the maximum achievable potential ("MAP") level. Erik stated AES Indiana has issues with modeling bundles at the MAP level related to achievability. Anna Sommer shared she spoke with Dan Mellinger, a representative of Energy Futures Group, about this and he raised a concern that the MAP level assumes higher incentives are paid out, and a GDS Associates analysis shows higher incentives lead to higher adoption, so there is a difference between circumstances under which the MAP potential is defined and AES Indiana's current portfolio. Anna Sommer added she talked with other individuals at Energy Futures Group who work on energy efficiency implementation and they are not seeing the struggle to meet energy savings,

and they shared this might be because the other jurisdictions have broader programs that impact more end uses and more customer types, which is one way to lean on certain programs that perform better if other programs are struggling. Anna Sommer stated since this is a 20-year look, AES Indiana is not only defining its energy efficiency potential for the next few years, it is defining what the potential will look like for 20 years, which makes her concerned about not modeling MAP at that level, which she stated could cause AES Indiana to predetermine the level the model will produce by not modeling the MAP. Erik explained AES Indiana has hesitations with MAP because it is getting harder and harder for AES Indiana to achieve its DSM and shared AES Indiana had a meeting with Dan Mellinger and its vendors to discuss ideas for achieving higher levels of DSM and plans to have another meeting. Erik suggested the utilities Anna Sommer mentioned might be on the east coast, which tend to have higher levels of achievable DSM. Anna Sommer stated the utilities are in Illinois and Michigan and offered to take that request back to Dan and ask for more insight on recommendations. Erik agreed and thanked Anna Sommer.

Erik then shared AES Indiana updated assumptions related to the Petersburg Units 3 and 4 refuel due to inflation and supply chain constraints. He stated the cost AES Indiana is now using for the refuel is still based on the refuel of Harding Street Station Units 5 through 7, but used updated inputs related to inflation and supply chain constraints. He stated the capital costs are now estimated to be $160 per kilowatt (“kW”).

2022 All-Source RFP & Replacement Resource Costs Update

Erik Miller, Manager, Resource Planning, AES Indiana
(Slides 46-49)

Erik Miller reminded stakeholders AES Indiana issued an all-source RFP on April 14, 2022 to position AES Indiana to procure replacement capacity at the conclusion of its IRP should the IRP call for generation procurement as well as inform replacement resource cost assumptions to be used in the IRP. Erik stated AES Indiana requested commercial operation dates of projects of 2025 through 2027 to coincide with the retirement of the Petersburg units. He explained AES Indiana is looking to leverage the injection rights of Petersburg Units 3 and 4, which is 1,000 MW, should Petersburg be retired through the IRP process.

Erik shared AES Indiana was aware of the United States Department of Commerce’s (“DOC”) Anti-Dumping/Countervailing Duties (“AD/CVD”) investigation the DOC initiated again in March 2022. He provided background that President Trump’s administration imposed tariffs on Chinese imports of solar generation components due to improper product disposal reasons, which caused Chinese companies to move their manufacturing to southeast Asian countries to avoid the tariffs. He explained this caused domestic solar producers to ask the DOC to clarify whether the tariff applies to those countries as well. Erik stated AES Indiana requested developers to provide any assumptions with their bids, and this issue likely contributed to solar prices being higher than AES Indiana previously experienced in its 2020 RFP. Erik explained AES Indiana is currently using the 2020 RFP and benchmarking those values against secondary sources, including Wood Mackenzie, Bloomberg, and the National Renewable Energy Laboratory (“NREL”), to compare 2020 RFP results to the current RFP results for solar, which has shown solar prices are currently increasing. He then informed stakeholders

President Biden's administration recently issued an executive order that waived the AD/CVD tariffs for two years. He stated this caused AES Indiana to ask solar developers to refresh their offers to see if the recent executive order caused the prices for solar to decrease.

Erik then provided a summary of AES Indiana's All-Source RFP. He stated AES Indiana has received 24 projects, which is less than AES Indiana's 2020 All-Source RFP in which it received 60 proposals. He stated this difference could be related to uncertainty in the solar industry. He reiterated there are 24 projects with 140 proposals, which means developers submitted multiple proposals at the same site, which could include projects with the same generation type offered with different ownership structures, such as a purchase power agreement, asset transfer, or build transfer. He described AES Indiana is seeing costs significantly higher than its 2020 All-Source RFP as solar prices are roughly 65% higher and wind prices are roughly 30% higher. He stated AES Indiana is keeping further information on wind and thermal projects confidential, such as the number of projects submitted because there were so few projects submitted. He stated AES Indiana saw four gigawatts ("GW") of projects submitted through its 2022 All-Source RFP, 2.1 GW of which were storage projects with both 4- and 6-hour durations and 1.7 GW of which were solar projects. Erik noted there were low volumes of wind capacity available potentially due to limited siting available in Indiana and uncertainty around the PTC. He noted AES Indiana will use these capacity volumes as build constraints in the EnCompass model for 2025 to 2027 as these figures demonstrate the realistic options to build, but AES Indiana assumes the number of projects will increase following 2027 to a level AES Indiana was seeing prior to supply constraints, high inflation, and solar uncertainty related to the previously mentioned tariffs. Erik also mentioned these significant price increases compared to AES Indiana's 2020 All-Source RFP is causing AES Indiana to assess using sensitivity analysis to evaluate different replacement resource costs levels, such as low, base, and high.

Commodity Forecasts

Erik Miller, Manager, Resource Planning, AES Indiana
(Slides 50-57)

Erik Miller recalled commodity prices inform Horizon Energy's fundamental forecast, which uses the commodity prices and runs a capacity expansion model for all of MISO to determine the generation mix within MISO to produce the power price forecast for use in AES Indiana's model. He noted AES Indiana originally used commodity prices from fall 2021; however, gas and coal prices released by Horizon Energy in spring 2022 increased roughly a dollar per metric million British thermal unit ("MMBtu"). He explained this caused AES Indiana to rerun the fundamentals with these higher prices to ensure AES Indiana is capturing the most current information available.

Erik then described the figure on slide 52 as providing an overview of the commodity assumptions AES Indiana is using for each scenario. He stated AES Indiana is using a low gas assumption for its No Environmental Action scenario, base gas assumption for its Current Trends scenario, high gas assumption for Aggressive Environmental scenario because gas is expected to act as a transitional fuel to get to a renewable energy future, and base for the decarbonized economy scenario. Erik stated AES Indiana is using a base case for coal across

all scenarios and custom prices across all scenarios, the latter of which is developed using Horizon Energy's EnCompass model that develops power prices based on commodity assumptions across MISO. He explained AES Indiana will use base capacity prices across all scenarios. He stated AES Indiana will use base NOx prices in the No Environmental Action and Current Trends scenarios and high NOx prices for the Aggressive Environmental and Decarbonized Economy scenarios. He stated AES Indiana will not use CO2 prices for the No Environmental Action or the Decarbonized Economy scenarios, base for the current trends scenario, and high for the Aggressive Environmental scenario.

Erik then described AES Indiana's methodology to develop its power price curve using a weighted average for 2023 through 2025 (2023: 40% Horizon Energy curve, 60% forward curve; 2024: 65% Horizon Energy curve, 35% forward curve; and 2025: 85% Horizon Energy curve, 15% forward curve) and Horizon Energy's custom fundamental curve for 2026 through 2042. Erik then explained AES Indiana will utilize a blended approach for natural gas price forecast utilizing the Intercontinental Exchange, Inc.'s ("ICE") Gas Forward Curve (published on May 31, 2022) and Horizon Energy's 2022 Spring case for 2023 through 2025 and Horizon Energy's 2022 Spring Case for 2026 through 2042. Erik explained AES Indiana will utilize a lower gas price forecast for its No Environmental Action scenario and a higher gas price forecast for its Aggressive Environmental scenario. Erik stated AES Indiana took its most recent coal purchase prices and prices contained in its RFP to inform the prices for 2023 through 2025, and AES Indiana applied the growth rate from the Illinois Basin to the 2025 forecast value to obtain a forecast for 2026 through 2042. He then explained AES Indiana's power price forecast methodology, which utilizes a blend of ICE Power Forward Curves from May 31, 2022 and Horizon Energy Custom Fundamental Forecasts for 2023 through 2025 and Horizon Energy Custom Fundamental Forecast for 2026 through 2042. Erik explained the Decarbonized Economy scenario had some of the lowest power prices because the clean energy mandate forced the resource mix to increase renewable energy penetration, which drove power prices down.

Stakeholder Emily Medine asked AES Indiana what model Horizon Energy uses to develop its power price forecasts. Erik Miller responded Horizon Energy uses an EnCompass model for its power price forecasts, which models the entre MISO system using commodity price inputs to model the generation mix selected by MISO. Erik added AES Indiana uses the EnCompass model for its capacity expansion and production cost modeling.

Stakeholder Ben Inskeep, a representative of the Citizens Action Coalition asked Erik why AES Indiana is not using a base, high, and low forecast for coal prices. Erik shared AES Indiana believes coal prices have hit a floor and does not believe any of the scenarios would impact the price of coal as the Aggressive Environmental scenario would cause more coal to retire, therefore the demand for coal would decrease and the coal market is not as volatile as other commodities. Ben Inskeep stated he believes AES Indiana might be conflating prices it is seeing in RFPs because he stated the Illinois Coal Basin prices have increased roughly 300% over the past year and have been very volatile and added the price AES Indiana included for coal seems considerably lower than current coal prices in the market, which he asked AES Indiana if it agrees. Erik responded and asked Ben Inskeep to confirm he is looking at dollar per MMBtu prices. Ben Inskeep stated yes and elaborated the prices he is seeing are in the $5

per MMBtu range. Erik stated that Ben Inskeep could be correct, and AES Indiana would be interested in looking at the data Ben Inskeep is referencing to inform AES Indiana's analysis, but Erik acknowledged other stakeholders feel the price of coal AES Indiana is including is too high, so there is a balance that has to occur. Erik reiterated AES Indiana is interested in collaborating with Ben Inskeep to look at the data he is referencing.

Stakeholder Emily Medine referenced a conversation Emily Medine had with AES Indiana in its Technical Meeting the week before Public Advisory Meeting #3 and reiterated the belief the current coal market is significantly higher than usual, due to many factors such as high gas prices, so Emily Medine believes the methodology of starting with a high price and escalating it with historical numbers is not appropriate. Emily Medine asked if Erik had a specific comment on the issue or could propose an alternative that would move away from starting at a high coal price and escalating it and further asked if the prices were free on board ("FOB") mine price or if they were delivered prices. AES Indiana stated the coal prices are delivered coal prices. Erik stated AES Indiana will consider Emily Medine's suggestions.

Erik shared the cost of capacity forecast will utilize the cost of new entry modeled on a four-season basis based on MISO's Seasonal Capacity Construct, which he will discuss later in the presentation. Erik stated the near-term NOx prices are confidential but provided the base and high forecasts for 2029 through 2042, which will keep prices flat at $1,70 per ton and $8,500 per ton, respectively.

RTO Reliability Planning: Resource Adequacy & Seasonal Construct

Lynn Hecker, Senior Manager, Resource Adequacy Policy and Analytics, MISO
(Slides 58-69)

Lynn Hecker began her presentation by introducing herself and sharing she will discuss MISO's current, ongoing resource adequacy reforms and activities, including resource adequacy construct changes and non-thermal resource accreditation reforms currently underway. She provided a high-level overview of the resource adequacy construct. She reminded stakeholders the responsibility of achieving resource adequacy in the MISO system rests with load serving entities ("LSE") with oversight by states as applicable by jurisdiction. She stated the support of the resource adequacy efforts can be segmented into three broad areas: requirements, accreditation, and visibility. She explained requirements identify what is needed to address reliability, such as regional or local requirements for planning (e.g., planning reserve margin requirement ("PRMR")). She stated accreditation measures how the resources are counted and has an aim of identifying how much capacity a given resource can confidently produce when needed based on the resource's attributes. She stated the third component is to provide visibility on portfolio trends in both the short- and long-term to help stakeholders understand potential local and regional capacity sufficiency or gaps and identify future needs in terms of requirements and accreditation methodologies. She shared the planning resource auction is currently conducted for the prompt planning year and allows LSEs to procure capacity to satisfy their load requirements, and MISO engages in the Organization of MISO States ("OMS") MISO Survey that provides a forward-looking resource adequacy

outlook in light of the changing resource mix, which raises awareness of longer-term resource adequacy needs.

Lynn shared historically the summer peak focused construct has been adequate under the current annual planning process, which assumes the summer peak period is more indicative of risks over all hours of the year with one annual requirement established based on the summer peak assumptions. She shared the changing resource mix and the risk periods moving outside the typical summer periods are forcing MISO to rethink resource adequacy going forward. She highlighted the changing resource mix with increasing amounts of renewable energy, particularly solar energy, will continue to shift risk periods outside the typical summer period, as illustrated by the figure on slide 61 that shows the number of emergency declarations in non-summer seasons is increasing. She stated renewable reliability contributions vary with penetration levels and portfolio mix as the reliability benefits of renewable resources decreases as renewable penetration increases. She explained all these characteristics have caused MISO to rethink how to identify and measure reliability to account for non-summer risks and risks related to the changing resource mix, which caused MISO to look at all resource adequacy items holistically, not just the planning resource auction, and develop a system that is complementary and fits together collectively.

Lynn shared slide 62 addresses the resource adequacy reforms MISO filed with the Federal Energy Regulatory Commission (“FERC”) in November 2021 with proposed implementation for the 2023/24 Planning Year. She stated MISO is proposing to move from the annual summer peak-focused construct to a sub-annual construct with four distinct seasons. She stated the proposal recognizes the evolving nature of the risk she discussed earlier and utilizes probabilistic analysis to determine a one day in 10-year outage reserve requirement for each season, which will include modeling the hourly profiles of wind and solar and utilizing seasonal outage rates for thermal resources to establish a more probabilistic accreditation methodology. She stated the second component of MISO’s resource adequacy filing is to modify its thermal resource accreditation rules to accredit based on a resource’s historical availability over the past three years during tight conditions, which is intended to evaluate individual resource contribution to the system risk across the year so resources will be credited based on their availability during the tightest operating conditions across the year to ensure sufficient resources will be available during the times of need in each season. She stated the third component of MISO’s resource adequacy filing is conducting four independent auctions for all seasons at one time to meet seasonal resource adequacy requirements and require a minimum capacity obligation prior to the auction. She explained the minimum capacity obligation will require LSEs to procure at least 50% of their capacity obligation prior to the planning resource auction, which is intended to prevent overreliance on the planning resource auction.

Moderator Stewart Ramsay asked Lynn to clarify the auction MISO proposed under its resource adequacy filing is going to remain an annual auction. Lynn stated yes, it is an annual auction in which four independent auctions will occur to create four independent auction clearing prices for each season. Stewart thanked Lynn for her response.

Lynn Hecker then explained MISO received a deficiency letter related to its resource adequacy filing with 41 questions related to the seasonal construct and thermal accreditation reforms and 10 questions related to the minimum capacity obligation requirement. She stated MISO responded to the deficiency letter and stakeholder comments in May and currently expects a decision from FERC regarding its resource adequacy filing around July 2022.

Lynn Hecker then provided a system level view of MISO's sample seasonal capacity PRMRs and excess capacity values for each season on slide 63 and noted there is variation in both the PRMRs and excess capacity amount in each season. She also noted although there are larger PRMR percentages (as a percent of the seasonal peak demand forecast) for the non-summer seasons, the amount of the capacity required is lower for the non-summer seasons.

Lynn Hecker then provided background on effective load carrying capability ("ELCC"), which is the amount of the incremental load a resource can reliably serve based on probabilistic settlements and accounts for the variability and uncertainty of the resource's generation and the load. She explained the general use of ELCC is to assess and measure the capacity value or reliability contribution for a resource generation type (e.g., wind). She stated MISO currently conducts an annual ELCC analysis to determine the capacity values for wind resources using probabilistic modeling and an hourly Monte Carlo loss of load expectation simulation that accounts for both the load and resource variability and certainty. She noted MISO models hourly wind and solar profiles and load profiles based on historical 30-year weather years as well as the generation forced outage rate and planned minus scheduled outage rates to identify the variability in the certainty of generation availability throughout the model. She explained to measure the ELCC of a particular resource generation type, MISO conducts two probabilistic simulations to isolate the reliability effects of the studied resource type, one simulation that includes the studied resource type and one simulation without the studied resource type in which both cases will drive to one day in 10-year loss of load expectation risk target and the difference between those simulations would produce the ELCC values for each resource generation type.

Lynn Hecker then described MISO's current effort to reform non-thermal resource accreditation. She explained MISO filed to align its current annual capacity accreditation approach for non-thermal resources with MISO's proposed seasonal construct in its November 2021 resource adequacy reform filing. However, she stated MISO is currently evaluating reforming its non-thermal resource accreditation methodology, which is largely being done to better manage the increase in uncertainty and variability associated with the rapid expansion of renewable resource penetration in the MISO system to ensure renewable resource contribution is properly measured, especially during times of greatest need. She stated MISO is currently performing comprehensive analysis of both qualitative and quantitative issues to help evaluate and stress test the different proposed instrument options, including probabilistic ELCC or availability-based methods similar to the thermal resource seasonal accredited capacity methodology MISO filed with FERC in its November 2021 filing. She explained MISO began this initiative in January 2022 in its Resource Adequacy Sub-Committee ("RASC") and is currently in its evaluation phase, which will conclude in July and enter the design phase for the next few months. She stated MISO anticipates sharing its final recommendations by the end of 2022.

Modeling Reliability Assumptions

Erik Miller, Manager, Resource Planning, AES Indiana
(Slides 70-75)

Erik Miller explained reliability has become an important issue in Indiana and across the MISO footprint as more dispatchable resources are being retired and replaced with intermittent resources, which has garnered the concern of both the Indiana General Assembly and the Commission. He stated to address these reliability concerns, AES Indiana is placing larger focus on reliability in its 2022 IRP and previewed this section would focus on the planning assumptions AES Indiana is utilizing for reliability in its 2022 IRP. He explained MISO conducted its Renewable Integration and Impact Assessment ("RIIA") in February 2021, which evaluates the performance of the electric system with the integration of renewables on the MISO system when renewables account for 30% or 50% of MISO's total portfolio. Erik stated MISO identified three key areas of focus in its RIIA: resource adequacy, which ensures there are sufficient resources to reliably serve peak load; energy adequacy, which is the ability to provide energy in all operating hours continuously throughout the year; and operating reliability, which is the ability to withstand unanticipated component losses or disturbances.

Erik Miller then provided greater detail on resource adequacy in AES Indiana's 2022 IRP. He acknowledged Lynn Hecker already discussed MISO's resource adequacy reform filing in November 2021, which contained a seasonal capacity construct. He stated MISO is proposing to utilize this seasonal construct for the 2023/24 planning year, which caused AES Indiana to model a seasonal construct within its IRP using four seasons. He then provided the PRMRs for each of the seasons under MISO's proposed seasonal capacity construct (summer 7.51%, fall 11.82%, winter 21.35%, and spring 26.27%) and noted AES Indiana tends to be a summer peaking utility, though AES Indiana has peaked a small number of times in the winter; however, under MISO's updated seasonal PRMRs, AES Indiana's load obligation could shift to the winter. He noted AES Indiana is monitoring the loss of load probability shifting to later in the evening due to the increasing amount of solar energy in MISO system, which will push the loss of load risk to later in the evening when solar begins to decrease its output. He explained AES Indiana is capturing ELCC in its planning model completed by Horizon Energy to capture the changing availability of wind and solar through ELCC. He shared AES Indiana also consulted with MISO to understand the ELCC values for seasonal planning.

Erik Miller then described AES Indiana's energy adequacy analysis in its 2022 IRP in greater detail. He explained AES Indiana will address energy adequacy in two manners, production cost modeling and System Reliability Analysis. He explained AES Indiana's production cost model evaluates every hour of the year (8,760 hours) and measures AES Indiana's energy output each hour and identifies whether AES Indiana is purchasing or selling energy during a given hour. He then explained AES Indiana is also working with Quanta Services, Inc. ("Quanta"), which assisted with the Northern Indiana Public Service Company's ("NIPSCO") most recent IRP, to perform a System Reliability Analysis as part of the IRP Scorecard evaluation with the objective of evaluating how well the candidate portfolios deliver sufficient energy and system stability in every hour.

Reliability Analysis

Hisham Othman, VP Transmission and Regulatory Consulting, Quanta
(Slides 76-96)

Hisham Othman began his presentation by thanking AES Indiana and stakeholders for the opportunity to present about the methodology Quanta and AES Indiana will use to assess the ability of the system to operate reliably under each of the IRP portfolio options. He explained the North American Electric Reliability Corporation ("NERC") and its working group defined the elements for essential reliability service, which are requirements that any system must meet to operate reliably and deliver quality electricity to customers. He previewed his discussion will focus on whether each portfolio proposed in AES Indiana's IRP will have sufficient reliability attributes to operate the system reliably and define mitigation strategies to address any shortcomings identified in Quanta's System Reliability Analysis, such as requiring certain inverters (e.g., grid forming inverters), adding storage to the portfolio, adding synchronous condensers, or geographically dispersing certain resources. He noted MISO is facing a capacity shortfall in the North and Central regions of the system that may cause energy emergencies during peak summer conditions, especially due to more extreme temperatures, higher generation outages, or low wind conditions. He noted PJM's recent report, Grid of the Future, discusses the proliferation of inverter-based resources and their ability to significantly impact reactive control stability, short circuit strength, current inertia, and frequency control. He reiterated with this framework in mind, the intent of Quanta's System Reliability Analysis is to assess each portfolio to ensure the system can operate reliably in the event of a shortfall.

Hisham then explained resources have different attributes and contribute differently to system reliability, and the System Reliability Analysis will evaluate reliability and resiliency attributes, such as dispatchability, predictability, flexibility, and intermittency. He specified this analysis does not evaluate individual resources; rather, it evaluates entire portfolios to ensure reliability requirements are met. He described system reliability was traditionally assessed by having centralized generation plants for dispatchable resources, predictable flow paths, and secured transmission. He explained the proliferation of newer generation resources, namely renewable resources, forced this traditional analysis to be supplemented to ensure system reliability. He described traditional planning methods are now evolving, including utilizing ELCC and a seasonal capacity construct to ensure resource adequacy, analyzing transmission security using 8,760-hour models rather than summer or winter peaks, utilizing stochastics for production cost simulations, integrating transmission and distribution ("T&D") planning with resource planning, and utilizing scenario planning. He detailed to properly measure reliability, essential reliability services must be analyzed for each portfolio, which consists of nine items: energy adequacy, operational flexibility and frequency support, short circuit strength requirements, power quality, blackstart, dynamic volt-ampere reactive ("VAR") deliverability, dispatchability and automatic generation control, predictability and firmness of supply, and geographic location relative to load. He explained Quanta is working with AES Indiana to use those nine essential reliability services to develop nine quantitative measures, one for each reliability service. He explained Quanta is currently assembling the data required to configure the analysis tools. He described once portfolios become available, Quanta will then apply the nine analysis metrics consistently across each portfolio in a neutral manner to score each portfolio relative to its ability to operate the system reliably. He explained Quanta will identify

any mitigating actions that can be taken to improve a portfolio's reliability performance and provide a final analysis for AES Indiana to consider when evaluating portfolios.

Hisham then provided greater detail on reliability studies, which measures each of the nine areas of reliability under three load situations: normal conditions with connection to MISO's grid ("50/50 load forecast"), maximum-generation with limited import capability ("90/10 load forecast"), and islanded ("critical load forecast"). He explained this analysis will be completed for each portfolio and will complement Quanta's resource adequacy, energy adequacy, and transmission adequacy analyses.

Hisham next provided a description of each reliability metric and the rationale for its inclusion in the System Reliability Analysis. He stated energy adequacy ensures each portfolio generates sufficient energy to meet the load requirements each hour with different variations, such as using different amounts of storage to complement a portfolio, and Quanta stress tests each portfolio to examine the degree to which each portfolio can meet the load obligation. He clarified frequency support is important and the system assumes these services will be provided locally, which requires inertia response, such as primary frequency response, and must be provided innately by the portfolios and not procured by the market. He detailed short circuit strength is extremely important as the industry retires synchronous thermal assets that provided short circuit current as inverters have warranties that do not allow them to operate below a certain threshold of short circuit ratio, so it is vital to ensure the strength of the system to enable the stable integration of all inverter-based resources within a portfolio. He explained power quality, or flicker, evaluates the sensitivity of grid voltages to the intermittency of renewable resources and identify any mitigating action that can be taken. He then detailed blackstart ensures resources can be started without support from the wider system and is important in the event of a black out event to allow the utility to restore its local electric system. He explained dynamic VAR support is important because it allows utilities to prevent induction motors from stalling due to a grid fault. He described dispatchability measures a portfolio's ability to provide generation that can be dispatched under the control of a control center. He stated predictability measures a portfolio's ability to predict the output of resources and counteract forecast errors. He explained the geographic location relative to load metric evaluates each portfolio's location on the system relative to the load being served to ensure the ability to have redundant power evacuation or deliverability paths from resources.

Stakeholder Devika Manish Kumar asked AES Indiana if it will make the recordings of Public Advisory Meeting #3 accessible after the meeting. AES Indiana stated meeting minutes will be posted to AES Indiana's website (https://www.aesindiana.com/integrated-resource-plan) following the meeting, but it does not make the recording publicly available.

Hisham then provided a sample analysis completed for the system in general that is not specific to the AES Indiana system or any of its portfolios as Quanta does not have the portfolios yet. He explained the 50/50 load forecast and nominal profiles for solar and wind provide one view of the system that can be evaluated for all 8,760 hours to develop a monthly snapshot of generation import hours for each portfolio, as seen in the figure on the right on slide 86. He explained some level of import is acceptable, but it poses risks, especially during market emergencies when there is insufficient energy in the market to support imports. He

stated this analysis can be completed using the 90/10 load forecast and the critical load forecast. He then stated Quanta will utilize scenario and stochastic study approaches to evaluate energy adequacy, which will include scenarios that stress test the system using historical events, such as a scenario where there is no wind generation for a few days. He elaborated the scenario analysis is taken a step further by using stochastic analysis to evaluate correlated data, such as solar and wind data, and blends it with different profiles of load to develop different variations of how the future might materialize to assess the system to ensure it produces adequate energy to supply the load hour by hour. He stated the example of short circuit strength is relatively straightforward to evaluate as each inverter requires a certain level of short circuit strength, but if there are too many resources close to each other, there is interaction between the resources, which causes the need to analyze portfolios with high levels of renewable energy using an equivalent short circuit ratio. He then provided greater detail on the equivalent short circuit ratio, which can be found on slide 89 and stated anything above 5 in the SCR column is considered acceptable and stated these values can help identify mitigating actions to bolster short circuit strength, such as adding synchronous condensers or mandating grid forming inverters. He explained the blackstart analysis will evaluate each portfolio's ability to energize the cranking path and evaluate mitigating actions to provide blackstart capabilities to portfolios. He described resource predictability and firmness will utilize variability analysis to characterize the variability associated with the increasing amounts of solar and wind generation in the MISO system. He explained Quanta will also identify how the generation profiles align with the load profiles and stress test the profiles for uncommon, real-world situations, such as a few days without solar or wind output, to ensure load can be met over all intervals. He noted Quanta evaluates the "duck curve" of the system to identify net load and any ramping that is required. He explained Quanta also evaluates resource predictability and firmness under the different load forecast scenarios (e.g., 50/50 load forecast and 90/10 load forecast) to analyze the portfolio under different grid conditions.

Stakeholder Anna Sommer asked Hisham how the dispatch of storage will be determined. Hisham explained Quanta is trying to avoid economic analysis in its System Reliability Analysis to allow Quanta to maximize the reliability benefits of storage resources in its dispatch assumptions. He stated storage will be dispatched in times of need to strengthen reliability and recharge itself during periods when the system can accommodate recharging, without regard to economic characteristics, such as arbitrage opportunities. Anna Sommer stated Hisham's response was helpful, but she had a few follow-up questions. Anna Sommer asked Hisham to clarify Quanta is not using EnCompass for this analysis. Hisham confirmed Quanta is not using EnCompass for this analysis. Anna Sommer asked Hisham if it would be fair to characterize the goal of the dispatch assumptions Quanta is using as essentially minimizing loss of load in a deterministic model instead of a stochastic model. Hisham said that would be a fair characterization as Quanta will develop roughly 100 deterministic samples for each portfolio to evaluate the level of risk in the portfolio. Anna Sommer then asked Hisham for the source of the profiles Quanta is using for its System Reliability Analysis. Hisham stated Quanta obtained proprietary profiles from AES Indiana that contain measurements it collected over 10 years across its system and the MISO system and is blending this with System Advisor Model data from NREL. Anna Sommer thanked Hisham for his responses.

Hisham Othman then described the figures on slide 93 as illustrative representations of the characteristics Quanta will evaluate over time to ensure the system is reliable. He stated in addition to evaluating net load, Quanta will evaluate the ramping capability for the other dispatchable resources in the portfolio, which may not be a direct concern for AES Indiana, but when other utilities begin to have larger renewable energy output, there will be an aggregate impact, so Quanta is attempting to evaluate this risk to ensure the portfolios have sufficient resources to counteract this risk. Hisham then summarized Quanta will be evaluating the nine essential reliability services at various point in time with different load forecasts and will determine acceptable thresholds for each metric to evaluate each portfolio's reliability performance, which is ultimately a component of the IRP portfolio matrix AES Indiana will utilize to compare all portfolios.

Stakeholder Emily Medine asked given NIPSCO's recent announcement that it will delay the retirement dates of the Schahfer units, what changes would AES Indiana have made in its System Reliability Analysis to capture this exposure. Emily Medine added other utilities have also announced changes in their retirement plans, including WEC Energy Group, Inc. and Omaha Public Power. Hisham Othman explained these decisions will impact inputs into Quanta's analysis as the decisions will impact system-wide reliability criteria, such as short circuit strength, and could impact the mitigating actions taken in certain portfolios, such as the addition of synchronous condensers or grid forming inverters. Moderator Stewart Ramsay asked Hisham to confirm the delay in retirements of rotating machines would increase the short circuit current available and reduce the need for incremental increases in that particular component. Hisham agreed with Stewart's summary and stated the actual decision to construct and implement reliability devices is a decision that AES Indiana will make that balances reliability attributes and economics, but the delay in retirements of the thermal units will impact the inputs in the System Reliability Analysis.

Portfolio Metrics & Scorecard

Erik Miller, Manager, Resource Planning, AES Indiana
(Slides 97-108)

Erik Miller previewed the next section will address the portfolio metrics and scorecard that will be used to select AES Indiana's Preferred Resource Portfolio and Short Term Action Plan. He stated before discussing the guiding framework for the portfolio, he wanted to provide background on the 21st Century Policy Development Task Force, which was created by House Enrolled Act 1278 (2019) and directed the Commission to do a comprehensive study on statewide impacts of the fuel transition considering emerging technologies. He stated the 21st Century Policy Development Task Force submitted its initial report last year, but its work is on-going. He explained the 21st Century Policy Development Task Force framework consists of five attributes or "pillars" of electric utility service: reliability, resilience, stability, affordability, and environmental sustainability. Erik elaborated AES Indiana is using the five pillars of electric utility service identified by the 21st Century Policy Development Task Force as scorecard items and specified the first three pillars of electric utility service fit under Quanta's System Reliability Analysis. He stated AES Indiana will evaluate two additional items in its scorecard analysis: risks and opportunities, which AES Indiana will complete stochastic analyses to address, and social and economic impact.

Stakeholder Ben Inskeep asked AES Indiana what stability measures that is not captured by reliability and resilience. Erik stated stability encompasses VAR support and frequency metrics, which will be included as part of the System Reliability Analysis. Moderator Stewart Ramsay asked Erik to clarify that stability would include steady state and transient stability, meaning evaluating whether the system or all units remain in sync, or whether they drift apart and effectively break up the system, which requires a separate analysis. Erik agreed with Stewart's characterization of stability and its components.

Erik then provided greater detail on the IRP Scorecard for portfolio evaluation. He explained the scorecard items have metrics that serve as the categorical framework to measure each portfolio's performance in each scorecard criterion. He explained the metric used to evaluate affordability is a 20-year PVRR analysis, while environmental sustainability will be measured by the total portfolio CO2, SO2, and NOx emissions as well as water use and coal ash. He stated AES Indiana will use each portfolio's composite score from Quanta's System Reliability Analysis, which includes reliability, stability, and resilience evaluation, to evaluate resource adequacy. He explained the cost and risk scorecard item will include stochastic analysis to evaluate environmental and cost risks and opportunities as well as market exposure, which measures the exposure to the market for sales and purchases. He stated an additional metric to evaluate risk and opportunity is renewable capital cost risk, which is still being developed because AES Indiana is considering completing sensitivity analysis around the replacement resource costs for renewable resources due to the significant renewable resource price increases AES Indiana has seen in its 2022 All-Source RFP compared to its 2020 All-Source RFP. He explained the metrics to evaluate the economic impact of portfolios are the change in the number of AES Indiana generation employees and the total amount of property tax paid from AES Indiana assets. He explained AES Indiana will take the strategies and evaluate each portfolio under the different scenarios using the IRP Scorecard to form the Preferred Resource Portfolio and Short Term Action Plan.

Erik then provided greater detail on the affordability metric. He stated AES Indiana will use a 20-year PVRR metric to measure affordability, which is the sum of the operating expenses, including energy purchases, fuel, variable O&M, fixed O&M, and emissions and recover of and return on new capital, including book depreciation, return on rate base, and property taxes minus market revenues, including MISO energy and capacity revenues. He explained many stakeholders have asked AES Indiana to provide the PVRR on an annual basis, which AES agreed to do in upcoming meetings.

Erik then explained the environmental sustainability metrics will evaluate the total portfolio CO2, SO2, and NOx emissions over the 20-year period. He stated AES Indiana is also developing a metric to measure other emissions and byproducts, which will include water use and coal ash, which could be measured using binary factors, such as if a portfolio has coal generation past 2028, the portfolio receives a zero and the portfolio would receive a one if it does not have coal. Erik noted these metrics not only measure environmental sustainability but also identify risks and costs associated with environmental compliance.

Stakeholder Emily Medine asked whether AES Indiana will consider gas in its other emissions and byproducts metric. Erik replied AES Indiana can consider that as well. Emily Medine

followed up by asking if AES Indiana will consider upstream emission as well as inside the fence emissions. Erik stated AES Indiana is considering including outside the fence emissions, but it is difficult to quantify outside the fence emissions. Erik stated AES Indiana will consider using outside the fence emissions in its analysis but will likely only evaluate inside the fence emissions.

Erik then provided additional detail on the reliability, resilience, and stability metrics, which will be measured using a composite score calculated using Quanta's Reliability Analysis. He noted AES Indiana is still working to determine the best approach to score and weight these different metrics, which is why Quanta did not present that information. Erik explained Quanta's Reliability Analysis will produce a composite score for each portfolio. Moderator Stewart Ramsay asked Erik to clarify whether the reliability metric scoring of the portfolios will measure the degree of risk any given portfolios produces across the metrics, which Erik confirmed. Stewart asked Erik to clarify whether each portfolio will be measured uniformly using the same criteria to identify the degree to which portfolios support the grid. Erik stated Stewart was correct that there will be a level playing field for all portfolios.

Erik explained one of the risk and opportunity metrics AES Indiana will complete is an environmental policy sensitivity analysis, in which AES Indiana will model environmental policy sensitivities on the optimized capacity expansion results from the Reference Case and apply those results to the different scenarios to identify PVRRs for each strategy across all scenarios. He stated the portfolios with the highest PVRRs will present the greatest risks while the portfolio with the lowest PVRRs will present the greatest opportunities. Erik explained AES Indiana will also use a cost stochastic analysis to vary the gas prices, energy prices, load volatility, and renewable generation volatility to identify 100 different potential outcomes and evaluate how the portfolio PVRRs differ across the potential outcomes. He stated, as illustrated on slide 105, AES Indiana will use the difference of P95 minus the mean for its risk metric and the difference of the mean minus P5 for its opportunity metric. Erik then stated the next metric for risk and opportunities is the market exposure calculation. He explained the general principle of this metric is larger amounts of sales or purchases will increase the cost risk of the portfolio. He elaborated if AES Indiana evaluates a portfolio with a relatively large amount of wind, and the wind resources are generating when load is low, AES Indiana would have large amounts of market energy sales as a result, which would increase the market exposure risk as futures where market energy prices are lower would cause the revenues AES Indiana receives from the sale of energy to decrease. Erik elaborated market exposure risk would also increase if a portfolio is reliant on market purchases of energy as it would be exposed to risk when market prices increase. He explained the overarching concept is market exposure presents risk to customers, and to capture this, AES Indiana will calculate the sum of the of the absolute values of the 20-year average annual sales and purchases for each strategy.

Erik then provided greater detail on the economic impact metrics AES Indiana will use for each scenario. He stated the first metric is the number of AES Indiana generation employees, which is the total number of employees associated with AES Indiana's generation assets, including both existing assets and the assets that are built or selected in the capacity expansion that AES Indiana will own or will indirectly influence through a different ownership structure, such

as PPAs. He explained the next economic metric is the total amount of property taxes paid for AES Indiana generation assets, which are beneficial to communities across Indiana.

Erik explained the assembly of all the metrics he discussed will be produce the IRP scorecard. He stated AES Indiana will likely have some scorecard results to present in the Public Advisory Meeting #4, and when it has those results, AES Indiana and stakeholders will look closer into specifics, such as the box and whisker plots from the opportunity and risk stochastic cost analysis. Erik explained preliminary scorecard results will also provide stakeholders the opportunity to provide input into the process.

AES Indiana Distribution System Planning

Kathy Storm, Vice President, US Smart Grid, AES Indiana
Mike Russ, Senior Manager, T&D Forecasting, AES Indiana
(Slides 109-123)

Mike Russ began his presentation by introducing himself and expressing his excitement to share AES Indiana's smart grid vision and provide information related to AES Indiana's distribution system planning. He explained AES Indiana is working to transform a one-way, largely predictable power system into a two-way system that is much more dynamic and connected than ever before as utilities are seeing resources merge at different locations on the grid. He described the diagram on slide 111 provides an illustration of an ultra-connected network where devices, such as EVs, intelligent customer devices, and generation resources are all controlled and operated from the central smart grid command center. He explained the goal of the smart grid is to think of the grid as interconnected, where resources and loads can connect anywhere to deliver safe, reliable service and solve issues and challenges the grid future is going to present.

Mike explained AES Indiana believes it plays a key role in transitioning to a clean energy future, and while T&D planning is not involved in the generation planning directly, the T&D planning group is responsible for allowing the grid to integrate more intermittent resources by determining the necessary grid upgrades needed to achieve AES Smart Grid's strategy, which is composed of four elements: customer, smart growth, innovation, and resiliency. He elaborated the first element is the customer as everything AES Indiana does is for the customer, which AES Smart Grid is achieving by engaging customers directly, utilizing more data than ever before to develop solutions, and strategically placing systems to communicate differently with its customers. He provided greater detail on the second element of AES Smart Grid's vision, smart growth, which is the vision to build a distribution system that attracts new customers through innovative clean energy products and services. He explained the third element is innovation, which is especially important as achieving its other visions will require developing new technologies and solutions. He stated the fourth and final element of AES Smart Grid's vision is resiliency, which will be pivotal as the industry transitions to more intermittent resources and extreme weather becoming the norm, which requires AES Smart Grid to think about planning differently.

Mike then provided an overview of the future state of its smart grid operations using the figure on slide 113. He explained the complexity of devices in the future state will require AES Indiana to modernize its enterprise systems, such as customer information systems ("CIS"), geographic information systems ("GIS"), or metering services. He explained the items listed in the middle of the figure on slide 113 are a part of AES Indiana's advanced distribution management system ("ADMS"), which is a complex system that allows AES Indiana to operate the grid. He explained all the components of the ADMS, including the distributed energy resource management system ("DERMS"), distribution management system ("DMS"), and the outage management system ("OMS"), communicate and operate together to allow AES Indiana to monitor complex situations and make adjustments in real time. Moderator Stewart Ramsay asked Mike to clarify the items in light blue and green boxes on slide 113 are items that have been the foundation of distribution system planning for a long period of time, while the items in dark blue are items that are more recent developments, such as DERMS integration. Mike stated Stewart was correct. Stewart stated most utilities are just starting to get involved in many of these items, so it is impressive that AES Indiana is beginning to integrate all these items.

Stakeholder Anthony Alvarez, a representative of the Indiana Office of Consumer Counselor ("OUCC"), asked Mike why slide 113 mentions dispatchable generators when the section is addressing distribution. Mike confirmed the section he was presenting was specifically directed at distribution, but AES Indiana is focused on the generators that are connected to the distribution system to ensure if it receives dispatch signals or needs to control the generator, AES Indiana is able to do so in a safe manner. Mike stated situations could occur where it receives a dispatch signal from a generator, but AES Indiana knows it has crews working on lines nearby, AES Indiana is able to lock out that signal, and other safety items. Anthony Alvarez stated he would like to back up and stated the discussion is about the distribution system, but Mike is discussing dispatchable generators and asked Mike if he is referring to DG. Moderator Stewart Ramsay stated DG could be a dispatchable generator, but dispatchable generators could also include storage, or rotating machineries, but since the distribution system is starting to look more like the transmission system, AES Indiana has to ensure switching and tagging orders are aligned. Anthony Alvarez stated he understood a dispatchable generator could be an item on the distribution system, such as the battery device at Harding Street station, and asked AES Indiana if it is lumping all dispatchable generators together or if it identifies which assets are owned by customers. Mike explained AES Indiana will split the devices into the different groups identified on slide 113, some of which are dispatchable while others are not, and AES Indiana will be able utilize its DMS to dispatch the dispatchable items safely in real time. Stewart added utilities on the west coast are not only focused on dispatchable qualities but also curtailable qualities because the complexities presented by community choice aggregators and other distributed resource aggregators create the need for curtailment due to distribution system overloading concerns.

Stakeholder Anna Sommer asked Mike if AES Indiana withholds some level of renewables and stated if it uses an automatic generation control ("AGC") system, AES Indiana could operate renewables as dispatchable and added there are more sophisticated approaches being used elsewhere, such as Hawaii, to make solar paired with storage dispatchable. Moderator Stewart

Ramsay stated he has experience working with solar operators in Hawaii and they are faced with the same issues and operations as listed on slide 112. Mike agreed with Stewart's input.

Mike then discussed planning considering the changes AES Indiana is experiencing. He explained the figure on slide 114 illustrates the changes happening on AES Indiana's system. He descried distributed energy resources ("DER"), battery storage, and EVs coming online will materially modify the system, and AES Indiana must bring those items onto the grid and meet their technical needs in safe, reliable manner while monitoring them with the proper devices and meters. Mike noted smart grid devices allow AES Indiana to receive information from the sensors and meters to learn from the connected devices as they come online to measure the changes for use in its demand forecasting tool to specifically model the impacts related to DERs, EVs, and other devices. He stated the next part of the planning process places the outputs from the demand forecasting tool into the network model analysis tool to study what is occurring on the system using power flow study models to potentially identify upgrades necessary for grid interconnection, capacity, and reliability needs. He stated the final step is to carry the T&D planning into operations.

Mike explained AES Indiana must ensure it has the correct organization alignment to accomplish the planning workflow. He stated AES Indiana places a tremendous amount of effort around aligning its processes across the resource planning, T&D demand forecasting, T&D power system modeling, and T&D power system analysis groups to coordinate the grid update process holistically. He explained the resource planning group is tasked with developing the load forecast on a top-down basis, which is roughly 3,000 MW per year for AES Indiana. He stated the T&D demand forecast group has a dedicated engineer to help build the forecast of 3,000 MW back up from the bottom-up by breaking down the 3,000 MW of load to each substation, transformer, feeder, and so on, which is growing more complex due to changing customer loads and EVs. He stated once the bottom-up forecast is completed, the T&D power system modeling group and T&D power systems analysis group conduct their modeling and analysis activities. He explained this process is done holistically to ensure forward looking projections are treated in the same way for top-down and bottom-up analysis.

Stakeholder Anthony Alvarez asked if AES Indiana's power system modeling and analysis is completed by AES employees or if AES Indiana is contracting this work out to third-parties. Mike stated it is a combination of both. Mike stated the bottom-up forecasting uses software called LoadSEER provided by Integral Analytics, but AES Indiana is developing in-house expertise with a dedicated engineer to build those forecasts. Mike stated AES currently uses LoadSEER but supplies the data to build out the forecast. Anthony Alvarez asked if this is what AES Indiana is currently doing or if it is what it is planning to do. Mike stated AES Indiana is in implementation for LoadSEER and are currently working through the initial data requests with Integral Analytics, an industry leader, to get the model built up, which is a data-intensive process. Anthony Alvarez asked if AES Indiana is partnering with any third parties on the modeling and analysis in addition to the forecasting. Mike stated AES Indiana has a dedicated demand forecasting engineer as well as T&D planning engineers who conduct the modeling and analysis who work together with the demand forecasting engineer. Anthony Alvarez asked Mike to clarify this meant the modeling and analysis is completed in-house. Mike confirmed

power systems modeling and analysis is completed in-house. Anthony Alvarez thanked Mike for his responses.

Mike then presented the T&D forecasting tool at a high level. He explained AES Indiana partnered with LoadSEER and are using the smart grid device inputs, such as advanced metering infrastructure ("AMI"), supervisory control and data acquisition ("SCADA"), or GIS, to enter the load data into LoadSEER and take actions, such as weather normalizing the load, cleaning the data sets to ensure assumptions and variables are consistent between the bottom-up and top-down approaches. He stated the T&D group then completes spatial analysis, in which it geo-references future projections at the parcel level to differentiate between developing and saturated geographic locations, conducts econometric analysis, and monitors demographic and transportation data, and develops probabilities of load growth and DER penetration. He stated AES Indiana then uses multi-scenario analysis across short-, mid-, and long-term scenarios using low, medium, and high growth rates, DER/EV sensitivities, and weather sensitivities. He stated once the demand forecasts are produced using LoadSEER, AES Indiana completes its system modeling and analysis. Mike stated AES Indiana uses CYME for distribution system modeling and analysis, which uses the forecasts/scenarios produced by LoadSEER to develop power flows of the system on an 8,760-hour basis, which can be visualized, and identifies any issues as seen in the figure on slide 117. He stated the power flow models developed by CYME will allow AES Indiana to incorporate reliability assessments, identify optimal recloser placements, time series, and hosting capacity.

Stakeholder Anthony Alvarez asked Mike if CYME is an Eaton product. Mike stated yes, CYME is an Eaton product. Anthony Alvarez asked Mike to confirm that CYME is used for network planning for low voltage distribution system modeling and analysis. Mike stated yes, it is, and AES Indiana used PSLF in the past and noted Synergi and CYME are essentially the same power flow tools. Anthony Alvarez asked Mike to provide background on how AES Indiana is using its AMI data, which provides 15-minute granular data. Mike shared AES Indiana is using AMI data for several items, including studying EV charging. Mike stated when AES Indiana moves to time series analysis, which is not at full deployment yet, AES Indiana will need to have great granularity of detail. Mike stated AES Indiana expects AMI to play a large role in transitioning it to time series models to allow AES Indiana to utilize the data to create intelligent insights and forecasts. Anthony Alvarez asked if he understood that AES Indiana's AMI is not fully deployed yet. Mike stated AES Indiana does not have full AMI deployment yet, but it is working towards it and has made significant progress. Anthony Alvarez stated the OUCC has been dealing with AES Indiana's AMI program for roughly a decade now, and he finds it sad to hear AMI meters are not fully deployed. Anthony Alvarez asked if AES Indiana has the capability to utilize this AMI data because Anthony Alvarez was participating in a performance metric conference and an AES Indiana engineer stated the content was similar to drinking from a firehose, and asked Mike Russ if AES Indiana now has the ability to drink from a firehose. Mike stated AMI data can be overwhelming, and while AES Indiana cannot input all its AMI data into models today, there are steps AES Indiana completes to use this data, and AES Indiana is advancing forward so it will be able to input all the data into the models. Moderator Stewart Ramsay stated the flowchart on slide 116 addresses Anthony Alvarez's question as it addresses how AMI data is being used, and he referenced the AMI rollout schedule was discussed in a recent technical meeting.

Stakeholder Ben Inskeep asked Mike if AES Indiana plans to provide AES Indiana customers with access to 15-minute granular data, which is achievable with AMI meters. Mike stated he works in T&D planning and is not involved in that process and requested a member of the AES Indiana back office to respond to the question. Stakeholder Laura Ann Arnold, a representative of Indiana Distributed Energy Alliance Inc. stated she agreed with Ben Inskeep and stated as an AES Indiana customer, she wants access to her residential data and asked AES Indiana when that was coming back. AES Indiana responded to both Ben Inskeep and Laura Ann Arnold by stating AES Indiana is working towards integrating interval usage information for residential customers, such that the interval data will show graphically on Powerview®. AES Indiana stated residential customers who have an AMR meter will be able to graphically view daily usage information (in addition to monthly information that is currently available) and customers with an AMI meter will have access to hourly interval data (in addition to daily and monthly information, which is currently available). AES Indiana added residential customers with an AMI meter will have access to this information once the interval usage integration between AES Indiana's systems is complete.

Stakeholder Ben Inskeep asked Mike if AES Indiana is forecasting customer DG exports on a daily basis or a more granular basis to ensure customer-provided generation is accounted for when AES Indiana is forecasting MISO purchases. Mike stated from a planning perspective, AMI meter data masks customer DG export data, which is why it is important to track DG device information when registering DG devices to allow AES Indiana to track that information individually to be able to differentiate between a DG resource's generation and a customer's load for planning purposes. Ben Inskeep followed up his question by asking whether AES Indiana is currently able to differentiate between DG generation and a customer's native load or is it something AES Indiana is currently working on. Mike stated that AES Indiana is currently implementing this ability with LoadSEER. Moderator Stewart Ramsay added LoadSEER helps differentiate between native load and a DER's behind the meter generation, but it takes time for the software to learn because it is learning what the exports look like given weather and other factors, such as time and day of the week. Stewart asked Mike to confirm his understanding. Mike stated Stewart is correct. AES Indiana noted as it relates to the practice currently in place, AES Indiana does not forecast DG customer generation and exports to the grid for purposes of its Day-Ahead generation and load estimates. AES Indiana stated it looks to Indianapolis load history to project the Day-Ahead forecast, which includes historical DG customer generation on the AES Indiana system and is already net of DG resource production. AES Indiana added for the IRP longer-term horizon, AES Indiana is including DG customer generation and exports in its forecast in Itron's load forecast.

Stakeholder Will Kenworthy, a representative of Vote Solar, asked AES Indiana if the integration of distribution and resource planning was going to be covered in its IRP. AES Indiana replied it will cover the integration of its current state distribution system planning and resource planning in more detail in the IRP report; however, the use of LoadSEER is a work in progress/future state and will be more fully integrated into the next IRP.

Stakeholder Ray Wilson stated the demand forecasting and system modeling and analysis is important and exciting and asked if this will be part of the IRP or how does this informs the IRP. Ray Wilson also asked for a timeline for the system modeling and analysis activities and

asked if this work will consider driving the market for residential and community solar or residential batteries. AES Indiana replied it is looking to more fully incorporate LoadSEER in the next IRP as it is in the very early pilot stages of using this product and elaborated this work will help identify the areas of the distribution grid that would benefit from distributed generation.

Mike explained the grid will present non-traditional challenges, and once the models are built, AES Indiana will have to consider both traditional and non-traditional solutions to address these issues. He explained the figure on slide 118 represents a circuit with three issues, voltage, thermal loading/overload, and reliability issues. He explained each of the five triangles on the figure on slide 118 represents an outage to a device. He described a voltage issue would traditionally be solved by installing a capacitor bank, the loading issue would be solved by installing a larger wire, and the reliability issue would be solved by fixing whatever is causing the outage. Mike explained AES Indiana could also consider placing a battery strategically to solve all three issues and create a form of a small microgrid. He stated this example is just one way AES Indiana is thinking about developing non-traditional, holistic solutions.

Stakeholder Anthony Alvarez asked Mike to clarify whether the circuit diagram on slides 117 and 118 are indicative of what is actually occurring on an AES Indiana distribution circuit or if it is just illustrative. Mike stated the circuit diagrams are illustrative to demonstrate challenges presented to AES Indiana distribution system planners and the tools the model allows AES Indiana to utilize to develop solutions. Anthony Alvarez stated AES Indiana's distribution system is compact, so none of the issues exist in isolation as another circuit is probably a few blocks away, it would not make sense to install batteries. Anthony Alvarez asked Mike if he was familiar with AES Indiana's transmission, distribution, and storage system improvement charge ("TDSIC") plan. Mike stated he was aware of AES Indiana's TDSIC plan. Anthony Alvarez asked Mike what capability AES Indiana has to actually address this issue given it has a TDSIC plan in place and added he is apprehensive about a utility with AES Indiana's system footprint putting batteries on its distribution lines. Mike stated AES Indiana is installing reclosers as part of its TDSIC plan and Mike would consider to possibly switch the circuit if the situation on the figure on slide 118 were to actually occur. Mike stated the discussion around adding a battery is just a possibility AES Indiana is discussing, which will not always make sense, but could be the correct solution under the right circumstances. Moderator Stewart Ramsay added the figure on slide 118 also illustrates the need for tighter coordination between distribution system planning and resource planning because, in the past, distribution system planning only provided insights on the amount of load needed to be supplied, but now distribution system planning will provide information on native load, the amount of generation in the form of batteries, and other grid concerns. Stewart added it is not only a two-way flow of energy, but also a two-way flow of drivers for different kinds of resources, which is important for IRP stakeholders to see. Anthony Alvarez stated he is looking at the solution proposed on slide 118 in the context of an IRP as an item AES Indiana is evaluating for future use. Anthony Alvarez added AES Indiana is not including the alternatives to installing batteries AES Indiana currently has on slide 118, such as its TDSIC plan. Anthony Alvarez stated he does not agree with AES Indiana's proposal to solve a low voltage issue by installing a battery unless AES Indiana identifies scenarios where its TDSIC plan might not be able to address the issue. Mike stated he understands Anthony Alvarez's concern and reiterated AES Indiana is only

presenting on a future state possibility, and AES Indiana will identify the correct solution to the application and installing a small battery will not always make sense.

Mike stated AES Indiana has seen a large influx in new DERs coming onto its system and has captured these at the front end of its process, which is important because DERs translate into AES Indiana's models and analysis. He explained it is important for AES Indiana to evaluate inverter settings of DERs because AES Indiana could use them for voltage control and other applications to solve grid issues in addition to their load modifying contributions.

Mike next discussed EVs. He stated when evaluating AMI meter data, level 1 and 2 charging are generally manageable for capacity planning assuming the use of time of use ("TOU") rates. Mike explained TOU rates push the peaks into non-grid peaking hours of the day. He shared he has a plug-in electric hybrid minivan, and the charger allows him to program the hours he charges his minivan, which makes responding to the price signals created by TOU rates simple. He explained the figure on slide 120 has three curves that illustrate level 1 and 3 charging load profiles as well as a load curve from a distribution transformer. He described level 3 charging has similar peak periods as the distribution transformer, which is problematic because the addition of level 3 chargers could exacerbate peak conditions. He added all forms of EV charging, especially fleet charging and level 3 charging, are variables AES Indiana will have to forecast and bolster its planning around to ensure it accurately accounts for those items going forward.

Stakeholder Anthony Alvarez asked AES Indiana if it is looking at having level 2 charging in only residential settings or is AES Indiana anticipating level 2 charging in commercial spaces. Mike stated AES Indiana continues to monitor EV charging, but he is currently seeing level 1 or 2 charging occur both residentially and in non-residential areas, such as grocery stores or office building parking lots. Anthony Alvarez asked if a customer approaches AES Indiana to install a level 2 or level 3 charging system, would AES Indiana complete an analysis to identify any required line or transformer upgrades. Mike sated yes, AES Indiana reviews the request, evaluates load, the grid, and whether there is adequate capacity and identifies any necessary equipment that would be needed to serve the customer. Anthony Alvarez asked if there are any lessons learned or any information from the Blue Indy program that will help address the issues being discussed. Mike responded he can follow up on any lessons learned from the Blue Indy program, but his primary focus in this analysis is to understand the chargers that are on the system, understanding charging behavior, and develop methods to model actual EV charging currently on the system. Moderator Stewart Ramsay added there are also lessons learned from other utilities that are facing the same level 3 charging challenges, and in some situations, the most cost-effective alternative is a high-capacity discharge battery rather than reinforcing substations and taking other steps, so there are lessons learned that are dependent on-site location, behavior, and other innate characteristics of the facility. Stewart stated this highlights the need for stronger integration between resource planning and T&D planning groups, which AES Indiana is already fostering.

Mike then discussed FERC Order 2222. He explained there are a lot of acronyms associated with Order 2222, but he is going to focus on DER aggregation ("DERA"), which is aggregation of one or more DER/demand response ("DR") resources participating together in wholesale

markets, and DER aggregators, which is the market participant for the DERA. Mike stated Order 222 is going to add another level of complexity to the distribution system as the type of resources that can participate in an aggregation under Order 2222 includes battery storage, solar demand response, energy efficiency, electric vehicles, and many more items. He explained the key takeaway with this discussion is distribution system planning is going to become much more complex as it will require collecting and analyzing smart grid data to ensure the system is operating safely and reliably while there are all these DER resources coming online and offline based on market signals. He stated this complexity will require AES Indiana to build out its DMS tool and integrate advanced GIS mapping to obtain detailed mapping of the grid. He explained Order 2222 implementation is going to be a major challenge AES Indiana will work through in the future.

Mike concluded his presentation by discussing the four pillars AES Indiana is utilizing for its T&D planning efforts. He explained the first pillar is ensuring strategic organizational alignment between resource planning and T&D planning for top-down and bottom-up modeling and analysis. He stated the second pillar is utilizing advanced demand forecasting with connected top-down and bottom-up forecasting, which AES Indiana is working toward with its implementation of LoadSEER. He described the third pillar is advanced modeling and analysis with the utilization of advanced power flow tools. He stated the fourth pillar is the use of cutting-edge grid operations by utilizing ADMS to be the grid of the future and elaborated ADMS will allow AES Indiana to visually control dispatch and identify resources coming online and offline to maintain safe operations while continuing to deliver reliable service. Mike shared AES Indiana is moving in the right direction by implementing these foundational platforms that will allow AES Indiana to deliver innovative solutions to its customers while ensuring the grid remains safe and reliable. Mike concluded his presentation by thanking stakeholders for their time and input.

Final Q&A and Next Steps

Erik Miller, Manager, Resource Planning, AES Indiana
(Slides 124-126)

Erik Miller shared the next events in AES Indiana's IRP process, which include Public Advisory Meeting #4 in August 2022 and Public Advisory Meeting #5 in October 2022. He stated AES Indiana will present preliminary scorecard results in Public Advisory Meeting #4. He previewed AES Indiana will then announce its Preferred Resource Portfolio and Short Term Action Plan in Public Advisory Meeting #5. He stated AES Indiana Public Advisory Meeting materials can be accessed at www.aesindianacom/integrated-resource-plan or by typing AES Indiana IRP into a search engine. Erik then thanked all the stakeholders for their time and collaboration.