Indianapolis Power & Light Company
2016 IRP Public Advisory Meeting #2
June 14, 2016

Summary

Welcome & Safety Message
Bill Henley, IPL Vice President of Regulatory & Government Affairs

Bill Henley introduced himself and welcomed participants. He thanked everyone for attending Indianapolis Power & Light Company's (IPL) second public advisory committee meeting. He also thanked Barnes and Thornburg for hosting the meeting. IPL's intentions for this meeting are to listen to stakeholders' points of view, to continue meaningful discussions with participants, and to provide information on additional topics related to the Integrated Resource Plan (IRP). These topics include proposed portfolio evaluation metrics, resource adequacy, forecasting methodology, and environmental regulations. There will also be two exercises to hear stakeholder ideas. Mr. Henley was pleased to note that four stakeholders will be sharing presentations at the meeting today. He said that IPL looks forward to continuing to plan for reasonable least cost electric service to its customers in the future.

Mr. Henley introduced IPL's new President and Chief Executive Officer, Rafael Sanchez.

Teri Tillery of IPL's community relations group gave a safety message, noting that safety is the company's number one goal. Due to the extreme heat, she asked everyone to please stay hydrated, and wear sunscreen. She pointed out the location of the rest rooms and gave directions for exiting the building in the event of an emergency evacuation.

Introductions & Meeting Objectives, Agenda Review, Guidelines
Dr. Marty Rozelle, The Rozelle Group Ltd.
(slides 3-5)

Dr. Rozelle asked participants to introduce themselves, both those in the room and on the phone. She reminded everyone who wants to speak to use the microphone. She told the group that the agenda today is very full, and said there will be time for questions after each presentation. She asked those on the phone to use the chat feature in the online meeting, and noted that the phone lines are muted during presentations.

She asked participants to send in any comments they may have after the meeting via e-mail by June 21; IPL will respond by July 5, including responses to the stakeholder presentations .

Active Cases Before the Commission
Andrew Wells, IPL/AES Attorney
(slide 6)

Mr. Wells listed IPL's cases before the Indiana Utility Regulatory Commission saying that we will avoid discussing these today, as several Commission staff are in attendance.

Summary & Feedback from IRP Public Advisory Meeting #1
Joan Soller, IPL Director of Resource Planning
(slides 7 - 17)

Joan Soller introduced herself. She reviewed the topics discussed at the first stakeholder meeting, and reminded the group that the materials from the first meeting are available on the website. IPL is in the process of modeling the scenarios and preliminary results of the Base Case will be discussed today. Ms. Soller summarized the results of the group exercise on scenarios from the last meeting, discussing how comments will be incorporated into the planning process, as noted below.

Participants at the last workshop had several comments on the Base Case. There were questions on how the Clean Power Plan (CPP) will be included in the Base Case, and Ms. Soller said that IPL will model the CPP as mass-based. Energy management will also be modeled in demand-side management (DSM) blocks. Distributed generation (DG), either customer-owned or utility-owned, will be a model input. Finally, IPL will run high/low sensitivities on commodities.

For the Robust Economy scenario, stakeholders commented that this construct may not lead to higher electricity use and could lead to increased adoption of DG. They also felt that capital costs might increase due to higher costs for materials. Ms. Soller said that, to address these ideas, IPL will model load forecast as a sensitivity. They have not yet decided how to address varying costs for supply-side resources.

For the Recession Economy scenario, stakeholders wondered whether the assumption of a shrinking industrial base was unique to this scenario. IPL will likely model high/low load forecasts in other scenarios to account for this variable.

In the Strengthened Environmental Rules scenario there will be an assumption of a 20% renewable portfolio standard (RPS) in 2022 based on the national average, as well as a higher carbon cost and more strict regulations.

In the scenario characterized as High Customer Adoption of DG, some distributed generation such as a mix of solar, wind, and combined heat and power (CHP) will be embedded in the scenario as a proxy for individual customer choices in addition to economics alone

Since the April meeting, IPL has had individual meetings with several stakeholders, and is open to continuing these types of meetings in the future. They are also coordinating planning efforts with Citizens Energy and considering how to incorporate commercial and industrial customer input into the IRP

Ms. Soller encouraged participants to fill out the comment forms for today's meeting.

A participant asked if IPL would make information publicly available about details of their quarterly meetings with large customers. Ms. Soller advised that IPL does not share customer information that is considered confidential and competitive.

Stakeholder Presentations

Ms. Rozelle told the group that there will be four stakeholder presentations of 15 minutes each, including questions. She introduced the first stakeholder presenter, Denise Abdul-Rahman, who will be giving her presentation over the phone.

Stakeholder Presentation #1 (See Ms. Abdul-Rahman's slides on IPL's IRP webpage)
Denise Abdul-Rahman, Environmental Climate Justice Chair, NAACP Indiana

Ms. Abdul-Rahman said the focus of her presentation is on why IPL should integrate electric energy equity into resource planning, and what to consider in an equity analysis and metric.

She said that according to ACEEE January 2016 Report, communities of color and low income are the most impacted by energy decisions. They tend to pay 30% more in electricity costs than white communities, because relegated to areas of historical disinvestment and lacking the accumulated wealth to relocate, often live in older homes where new insulation and electrical appliances could help cut such costs.

She presented a chart showing the low income energy burden relative to income in cities around the country. Indianapolis ranks at about 50% of U.S. cities in this factor.

Ms. Abdul-Rahman suggested that it's important for IPL to have more discussions with these customers because 71% of African Americans live in counties that are in violation of air quality standards, where childhood asthma is big problem. Unemployment and poverty are also very high in these communities. Therefore, IPL's energy decisions should consider reducing carbon dioxide (CO_2) emissions in overly-burdened communities (they have done this to some extent), use an equity analysis to determine costs versus benefits, and prioritize energy conservation and alternative sources. As well, she urged the company to support workforce training and economic development opportunities for disadvantaged communities in their service territory.

Ms. Abdul-Rahman discussed disparate data impacts both national and within Indianapolis specific such as an;

- African American child is two to three times more likely than a white child to die of an asthma attack
- African American unemployment rate is twice that of white
- 45% of Indianapolis households are either in poverty or are "ALICE" Asset Limited, Income Constrained (but) Employed
- 63% of Indianapolis Black and 66% of Indianapolis Hispanic households are either in poverty or are "ALICE" households that are employed but with incomes falling short of meeting basic needs
- The energy sector obtains approximately $41 billion from African Americans every year, African Americans only hold 1.1% of energy jobs and gain less than 0.1% of the revenue from the energy sector
- 71% of African Americans live in counties that are in violation of air quality standards

Ms. Abdul-Rahman pointed out why IPL energy plans and decisions should be inclusive and to achieve meaningful equity there should be meaningful discussions with measureable outcomes with NAACP Indiana, who is a stakeholder advocating for environmental climate justice on behalf of communities of color and low income.

In summary, the NAACP recommends, 1) absolute CO_2 emission s reductions in overly burdened communities (this has been done to some extent), 2) equity analysis that provides in understanding to costs and benefits distributed 3) prioritization of energy conservation, energy efficiency, wind, solar and energy storage opportunities, removing incentives for combustion waste, biomass or any fuels for energy generation, 4) workforce training and economic development funding mechanism in place to support workers and communities to transition towards a clean energy future.

Stakeholder Presentation #2 (See Dr. Jay's slides on IPL's IRP webpage)
Dr. Stephen Jay, Professor, IU Fairbanks School of Public Health

Dr. Jay said that his focus will be to provide a context for the existential threat of climate change. He showed a video from the Paris 2015 meeting in which 196 nations agreed to take collective action on climate change. On April 22, 177 countries and EU signed the agreement. He noted that examples of climate stress can be seen today in the Everglades, the Mississippi Delta, and Alaskan coastal communities, along with sustained drought in the Middle East and around the world. Olympic athletes now have to find new places to practice due to lack of snow in traditional training locations. He noted that addressing climate change is a priority for President Obama.

"Paris 21" seeks to curb carbon emissions and aggressively develop mitigation and adaptation strategies. Dr. Jay showed a chart predicting consequences of various strategies including no action, current INDCs (Intended Nationally Determined Contributions), and more aggressive actions. He showed a photo of "earth's thin blue line" illustrating how fragile earth's atmosphere is. He said that our society has known about the greenhouse effect for almost 200 years. A study of industrial pollution in 1938 showed that industrial pollution with CO_2 was increasing the global temperature. In 1958, Charles Keeling raised awareness of climate change by measuring steadily increasing atmospheric CO_2 emissions on Mauna Loa, Hawaii. President Lyndon Johnson warned of global security issues from CO_2 emissions in the 1970s. Earth's CO_2 levels have never been above 300 parts per million (ppm) for millennia until recently. Major industrialized countries are emitting the most, yet suffer the fewest adverse effects. These are shouldered by the poorest countries. He provided data on earth's temperatures since 1860, showing rapid increases particularly since 1950, along with melting glaciers and permafrost. The impacts of these changes include rising sea levels, presenting risks to about 60% of the global population living within 50 kilometers of oceans.

Climate change has significant impacts including air pollution, increases in disease vectors, allergens, water-borne diseases, heat stress, severe weather with fatalities, mental health effects, and the creation of a high numbers of refugees. The good news is that things are beginning to change through linkages of science and policy. Businesses are moving quietly but rapidly. Higher education institutions are starting to be more active, as are faith communities.

Global warming also presents threats to energy supply chains, affecting profits. Dr. Jay thinks that the opportunities for clean power are enormous. Businesses in the future will require clean energy, so a challenge will be to make a transition from one energy paradigm to another without harming those who are affected. He suggested using science, moral values, and respect for life to search for common ground.

Participants had several questions and comments, as follow:

- Can you further explain the information on slide 17?
    - The CO_2 emissions in giga-tons shows that China is the highest producer, with the USA at about 14%, the European Union at 10%, and India at 6%. Growth rates in the U.S. and Europe have decreased.
- What are the negative effects in terms of allergies? This participant noted that poison ivy is proliferating her property, for example.
    - Plants grow faster with more CO_2 in the atmosphere, producing more pollen.
- A participant thanked Dr. Jay for a great presentation. She mentioned that she's heard the argument that China will continue to emit high rates of CO_2, but she believes that will decrease over time. They are "peaking" now, closing coal plants, and trying other methods to reduce emissions.

Stakeholder Presentation #3 (Mr. Kleiman spoke from notes only, no slides were provided)
Larry Kleiman, Executive Director, Hoosier Interfaith Power & Light

Mr. Kleiman said that Hoosier Interfaith Power & Light is a local chapter of a national organization involved with energy efficiency, starting with the faith community. In Indiana, many faiths have been involved in these efforts. He mentioned the Pope's call to action about energy impacts, particularly to low income people. When carbon falls over poor communities, we all need to be concerned about effects. Hoosier Interfaith Power & Light welcomed the news that IPL had decided to stop burning coal at the Harding Street plant. Mr. Kleiman said he was prompted by the first IRP workshop to question who at IPL is responsible for making "policy and moral" decisions; he still doesn't know the answer to that. He mentioned several ways that IPL benefits and invests in the community, but wondered why they have had little success in partnering on programs for low-income-community energy use and costs. His organization's goal is to improve the quality of life for all in the community. For example he challenged IPL to work with Englewood Church in the installation of solar for their assisted housing development. Action is needed, not just talk, to find creative ways to address our community problems. He mentioned Power Indy Forward as an example of this type of initiative. These issues are not just economic, but affect public health and the future for our children.

The group's comments included:

- How did IPL represent a 'roadblock', as mentioned, to assisted housing on the west side?
    - Joan Soller responded that she's not familiar with any details for this location, but that IPL will follow up and include responses in the meeting feedback.
- A participant said she has opposed utility proposals to impose fees on those who install solar on their homes. She feels we should be encouraging both private and community solar

projects. She understands that we need to maintain a grid, but we need to act now to address climate change; 10 years from now it will be too late.

Stakeholder Presentation #4 (See Ms. Perras' slides on IPL's IRP webpage)
Jodi Perras, Senior Indiana Campaign Representative, Sierra Club Beyond Coal

Ms. Perras thanked IPL for helping the sky to become bluer and cleaner by reducing coal emissions in the local area. She presented an air quality index (Central Indiana ozone and PM_{25}) showing an improvement in "good" air days since 2009. As of the end of April, there have been 90 good air days in 2016. We didn't have 90 good air days in 2015 until the end of June. Another graphic illustrated U.S. CO_2 emissions from 2000 to 2014. It showed a reduction in emissions since 2005 based on reduced demand, higher efficiencies, switching to natural gas generation, and increases in wind and solar generation. Remaining Indiana coal-fired power plants include Petersburg as a significant contributor, the #10 sulfur dioxide (SO_2) polluter in the U.S. and #12 nitrogen oxide (NO_X) producer. There's still work to be done there, she said.

Indiana's goals under the CPP are to reduce emissions by about 30% by 2030 using mass-based goals. This could require retiring Petersburg units #1 & 2, so she requested that IPL include this assumption in a model for this IRP. She showed the levelized cost of primary energy resources across the country. This indicates that energy efficiency (EE) is the lowest cost resource; wind and utility-scale solar are also low. A Bloomberg analysis shows that wind power costs in Indiana are quite competitive. She read a letter from Dr. Norma Kreilein, a pediatrician, who urges IPL to transition quickly to clean energy, referencing environmental notices of violation at Petersburg, and citing several references to public health effects of air pollution, particularly for children. The letter is available as part of Ms. Perras' meeting materials on IPL's IRP webpage here: www.iplpower.com/irp.

Portfolio Comparison Based on Metrics
Megan Ottesen, IPL Regulatory Analyst
(Slides 20 – 37)

Marty Rozelle introduced Megan Ottesen and gave participants a preview of the metrics exercise to follow, saying that participants might like to take notes in preparation.

Ms. Ottesen gave an overview of how metrics fit into the IRP planning process. Risks are used to develop scenarios; IPL's five proposed scenarios were discussed at the last stakeholder meeting. Scenarios are put into a capacity expansion model to develop portfolios. Sensitivities are then applied to the portfolios, and portfolio performance metrics are calculated.

In the past IPL has primarily relied on the metric of present value revenue requirement (PVRR). This time they are also considering financial risk, environmental stewardship, and reliability attributes to compare portfolios. Ms. Ottesen explained the concept of PVRR, and said that an additional cost metric may include rate impact of the portfolios. This metric is based on what the Tennessee Valley Authority (TVA) did for its 2015 IRP. They used dollars per megawatt hour, but IPL will use cents per kilowatt hour.

A possible financial risk metric is referred to as cost variance risk ratio. This expresses how likely the cost is to be higher than the expected cost or lower than the expected cost, using a formula to calculate a ratio. A ratio of less than 1 means cost is more likely to be lower than the mean PVRR, and vice versa.

Environmental stewardship metrics may include the annual average CO_2 emissions in tons, while the CO_2 intensity of the portfolio may be measured in tons per megawatt hour over the study period. Ms. Ottesen speculated how this metric may fare under the various scenarios.

The fourth category of reliability may include planning reserves or megawatts of supply over the peak forecast, and flexibility, which indicates how quickly IPL's generation can respond to load swings.

Stakeholder comments were:

- Another utility included bar graphs that showed a change in emissions over time; it would be helpful to see CO_2 changes over time as well.
    - Yes, we can incorporate this.
- A participant asked IPL to please include the word "clean" in its mission statement to provide safe and affordable energy.

Metrics Exercise

Dr. Rozelle gave the group instructions on the exercise and asked participants to move to the work table with the corresponding colored dot on their name badge. People on the phone were invited to complete the exercise and use the chat feature through the WebEx meeting.

Participants at the four tables were asked to indicate the three risk factors they thought were most important to be considered in evaluating portfolios. IPL staff did not participate in the ratings. After discussion, representatives from each table reported on the metrics that their group thought were most important. The following chart indicates the results of discussions. Metrics listed in *italics* are those suggested by workshop participants, in addition to the ones proposed by IPL (not in italics). Some of these received numerical ratings from discussion participants, while some were suggested but were not rated among the top choices. The numbers presented in the chart indicate how many participants thought this factor was a priority and is a summation of the ratings suggested by the four individual groups.

CATEGORIES & METRICS (proposed by IPL)	CATEGORIES & METRICS (proposed by stakeholders)	TOTAL
Cost		
PVRR		10
Rate impact in 10 year increment	*Rate impact in 5 year increment*	6
	Bill impact / energy burden	2
Financial		
Cost variance risk ratio		5
	Sunk costs	
Environmental		
Annual average CO_2 emissions		3
CO_2 intensity		8
CO_2 *emissions over time*		5
	Air quality - other pollutants including particulate matter, NO_x, SO_2, methane emissions	10
	Development of clean energy	
	Community education	
	Workforce retraining	1
	Resource mix over time	2
Reliability		
Planning reserves		7
Flexibility - Quick start vs. peak load		3
	Flexibility - Portfolio diversity (fuel)	2
	Risk - Concentration of resources geographically	
	Risk - Concentration of resources by type	
	Severe weather events / weather resiliency	
	% of generation controlled by utility v. other parties	
	Customer flexibility in choice	1
	Portfolio modification / "exit strategy" (qualitative)	
Other		
	Social Equity	*2*
	% low income DSM	
	Geographic air quality measurements	
	Respiratory conditions incidence	
	External Health Benefits & Costs	*2*
	Innovation/ Continuous Improvement	

Resource Adequacy
Ted Leffler, IPL Senior Risk Management Analyst
(Slides 39 - 51)

Ted Leffler introduced himself, and offered to take questions as he presents. The IRP plans to meet both energy and peak needs; resource adequacy focuses on the peak needs. He noted that MISO (Midcontinent Independent System Operator) has a short-term resource adequacy construct, while the IRP resource adequacy analysis looks at the long term to make sure that IPL has sufficient resources to meet the peak demand plus an appropriate reserve. He showed a slide indicating peak demand on a typical summer day, which tends to occur at around 3 PM. This also represents the peak for the year, since IPL is a summer-peaking utility. He provided an "Indy car" analogy for how much power is required to meet this demand. He showed typical load shapes for the four seasons.

Mr. Leffler noted that 2017 planning reserves for IPL represent 26% of operating capacity to meet and exceed that peak demand.

When planning for the long term, utilities typically develop target reserve margins based on a "loss of load expectation study" (assuming loss of load once every 10 years), and the long term target reserve margins typically are about 14% or 15%.

IPL plans to meet peak demand plus reserves with DSM, IPL's generating assets, contracted generation, and market purchases. He showed a graph indicating that in 2017 peak demand will be met with a mix of natural gas, coal, solar generating resources, and DSM.

He explained the MISO resource adequacy process is separate from the IRP process. Resource adequacy is the responsibility of the regulated utilities. MISO's resource adequacy construct process is primarily focused on short-term resources (i.e. next summer), and MISO acts as an administrator of a reserve sharing pool from which utilities can buy and sell resources as needed. This is done by developing and using capacity credits in a MISO capacity accounting system (much like the EPA's accounting system for emission allowances).

The group's questions and comments were as follows:

- Does IPL spend some money to "change the need" through communication with customers?
    - If you mean do we try to mitigate the peak through decreasing customer use, the answer is yes. We will discuss this demand-side management more this afternoon. Distributed generation is also factored into the analysis.
- Is there a dose/response relationship?
    - It's more complicated than that. We do cost-benefit analyses through a market potential study, and look at cost effectiveness of all programs in the system. For this IRP, we will be adding DSM bundles into the models as a selectable resources.
- Regarding capacity factors at Petersburg, it's been running at 65-70% of capacity; in February it was only 28%. Recently, the capacity factors have been lower than they have been historically.

  Before answering the question, that question begs another question first.
  What is capacity.

Capacity relates to the need at time at peak.
What we focus on is resources available at the time of peak, we look at the unit's capability to produce. Each year we test the units to determine how much they are capable of producing when they are at full performance.
No unit operates at full performance all the time. Some are better than others. For instance over the course of a year a 100 MW unit typically can only perform at 90 MWs, we call only count 90 MWs when we are planning to meet our peak needs.
So capacity is like a car with 5 seats. Its capacity is 5 seats whether there are 5 people or 2 people in the car. The capacity is 5 seats.
What you've asked about is akin to how many people are typically in those seats as opposed to the capacity of the car. So your question is about energy and not capacity.

With that being said, you have an excellent question about the utilization of our units. Our units have been running less than historically because of low market prices throughout the Midwest including at Petersburg. MISO dispatches those units based on market prices and they have been called on less frequently than in the past. That is very new. It used to be that coal fired units were typically 'in the money' meaning their costs were typically below the market price and they would run most of the time. Recently, due in part to low gas prices, increased wind production in the system, and other market factors, the market prices have more often been below coal prices and the units have run less than historic. So the reason Pete has run less is related to market prices.

  - Capacity factors are used to measure unit utilization. The Resource Adequacy process is about a unit's potential to operate at peak. So capacity factors are historic use or utilization, and are part of IRP analysis that focuses on energy.
  - Resource Adequacy is about capacity and the ability or capability to produce MWs to meet peak demand. He used the example of a car. A car with 5 seats, has a capacity of 5, even if on a typical day the utilization is the only 1 occupant.
  - So when looking at Resource Adequacy as part of the IRP, we look at Pete's ability to produce and not its average level of use.
  - The capacity of generating units doesn't change as utilization changes.
  - Utilization does change commodity costs and market prices. So, yes, recently low market prices for coal have contributed to reduced generation at Petersburg, so while that is an important consideration in developing IRP plans, that is not a Resource Adequacy issue.
- Will this IRP look at the risk of this situation continuing, and evaluate the risk of putting more money into resources that are not as productive or competitive as they once were?
  - IPL will look at this through scenario analysis; for example, by varying natural gas prices as sensitivities.
- Illinois utilities have announced that they may be leaving MISO. What impact will this have on the MISO market? Have these utilities been historic contributors or users of MISO energy?

IPL is aware of the Illinois issues and is working through MISO committees on these issues. As far as the question of how much energy we import from Illinois, that cannot be determined because of the way MISO dispatches units – it does not match buyers and sellers, so there is not a contract path and we can't determine how much IPL relies on any specific resource of energy. As far as the potential impact on capacity, much of Illinois capacity has been offered

into recent auctions at such high prices they didn't clear the auction, so we haven't been relying on Illinois for capacity. Illinois has been an importer not exporter of capacity for the last couple of years.

LUNCH

Transmission & Distribution
Mike Holtsclaw, Director of Engineering, IPL
(Slides 53 - 67)

Mike Holtsclaw introduced himself, saying that he has 38 years of experience with IPL. He will discuss transmission planning and how it's integrated with MISO, distribution planning, and the "smart grid". Transmission planning is conducted for the short term (1-5 years) and long term (10 years). IPL runs reliability studies for peak and off-peak loads as well as sensitivity cases to evaluate deficiencies in the transmission system. Steady-state power flow studies also show thermal and voltage dynamics of the system. Results are shared with MISO, which looks at their entire area including three planning regions. MISO identifies market efficiency projects for possible inclusion in their MISO Transmission Expansion Plan (MTEP). Mr. Holtsclaw described a number of IPL projects planned for this year to ensure reliability of the transmission system including a new 138kV line to support the Eagle Valley CCGT under construction.

For distribution planning, the load on the distribution system is relatively flat but upgrading and additions are needed to support neighborhood and commercial revitalization. Distributed generation is incorporated into distribution planning. Also, more than 95% of IPL's system is now supported through "smart grid" technologies. As a result of DOE $20M grant toward $52M in 2010-2013. Some of these programs include metering web-based customer tools and electric vehicle chargers for homes, businesses, and the public. He explained that a number of distribution automation devices are used daily (slides 63, 64, 65). Smart energy project successes include increased reliability, improved personnel safety, better data and information for management and planning, and avoided "truck rolls" (dispatches) of more than 91,000 trips in 2015.

Load Forecast
Erik Fox, Director of Forecast Solutions, Itron Inc.
(Slides 68 - 95)

Erik Fox said that he's been working in the energy forecasting field for more than 30 years. IPL hired Itron to complete its IRP 20 year load forecast. He provided an overview of energy trends as a function of economic activity. He showed a chart indicating that there was a relatively consistent relationship between electricity demand and gross domestic product (GDP) until the recession of 2008. Since 2010 GDP has increased while Indiana state electricity demand has remained flat. This probably indicates better equipment efficiency, increased EE program activity, loss of energy-intensive industries from the region, changing demographics, and smaller homes with slower household income growth. He illustrated appliance efficiencies with an example of refrigerators.

He noted that a challenge in using GDP as a primary forecast model is that GDP no longer closely tracks energy consumption. Instead, Itron now uses a causation approach rather than a correlation approach. He described the forecast modeling framework they now use, which incorporates historic class sales, economic forecasts, weather, and efficiency trends. The forecasts are based on monthly regression models using 10 years of billed sales and customer data.

Residential models incorporate thermal efficiencies, home size, saturation for heating and cooling, other electricity uses, and the efficiencies of these. Residential end-use intensity trends have been going down somewhat in this century. Residential economic drivers include households, income, and electricity prices. The residential forecast based on this shows average use, customers, and sales. The commercial model is similar to the residential one. Commercial economic drivers include non-manufacturing employment, non-manufacturing GDP a weighted economic variable. The industrial model is a generalized econometric model. Industrial economic drivers are manufacturing employment and GDP.

Itron is using a blended economic outlook forecast now that includes data from both Woods & Poole and Moody Analytics. In the past, IPL used Moody's only which includes a large spike in GDP. The blended approach shows more reasonable incremental growth. This approach shows average annual growth rate projections over the IRP period of 0.8% for residential, 0.5% for commercial, and -0.4% for industrial sectors.

Mr. Fox then described the approach to modeling for the peak. The major contributors are residential and commercial heating and cooling as well as other energy uses. The peak use is forecast to increase 0.4% over the planning period.

He explained the sensitivities for the strong economy and weak economy, both based on data from Moody Analytics. This showed a relatively strong economic growth in Indianapolis 1.2% per year in the strong economy scenario and a small (-0.1%) decrease in demand in the weak economy scenario, compared to a projected 0.5% growth for the base case.

Participants had the following questions and comments:

- Why is there a decrease in household income? Is it true that assumptions equate household income with energy use?
    - Yes, this is true, in general.
- A stakeholder noted that the income shown on the residential economic drivers slide is misleading. She said the Marion County median income was $42,600 last year, and suggested narrowing these data down to Marion County for accuracy.
    - This is probably the MSA(Metropolitan Statistical Area), but Mr. Fox wasn't sure of this. He will check. He pointed out that it's not the actual numbers that are used that's important, but the trends.

Post meeting follow up:
A stakeholder mentioned concern around the data regarding household income. Upon revisiting the Moody's income data used in the load forecast, IPL discovered that the Moody's data is indeed for Marion County but unusually high based on Marion County census data which aligns with the estimate provided by the stakeholder at the meeting of $42,600 in 2015. While IPL does not have a complete data set from the Census, it scaled the forecast down to the Census data level and applied the Moody's growth rates through 2037.

- Where do electric cars fit into this picture? This participant thinks he will double his electricity use by driving his new electric car 50 miles per day.
    - Itron tracks electric vehicle sales, which have been very low over the last two years with low gasoline prices. Since there are so few of these vehicles, it's worth tracking but is not a significant factor at this time.
    - IPL said they also track electric vehicle sales, and might consider including a higher level of use in the scenario/sensitivity analysis.
- A participant said she wished there was someone here from the City of Indianapolis who is knowledgeable about trends. She feels that denser land uses will create higher demand. She recommended to IPL that governmental agencies should be partners in this planning process.
    - IPL responded that they have reached out to the city for consultation. Most of the new development is multi-family with less single-family home development.

Environmental Risks
Angelique Collier, IPL Director of Environmental Policy
(Slides 96 - 112)

Ms. Collier said she has been with IPL for about 8 years. She will talk about the many environmental regulations that IPL does or will comply with. She started with an overview of the current coal-fired fleet. Of the original 11 coal-fired units operating a year ago, there are now only 4 coal-fired units which are at Petersburg. These are all equipped with air pollution controls including scrubbers for SO_2 control. These use a limestone slurry to scrub the SO_2 from the gas coming out of the stacks. For NO_x controls, low NO_x burners (LNB) and selective catalytic reduction (SCR) are used for pollution controls. For particulate matter (PM) there are electrostatic precipitators (ESP) and baghouses. Mercury controls include activated carbon injection (ACI) and sorbent injection (SI) systems.

She outlined the recent environmental regulations. Mercury and Air Toxics Standard (MATS) compliance was required in April 2016. In order to comply with this regulation IPL installed $450 million in air quality controls at Petersburg.

The National Pollutant Discharge Elimination System (NPDES) regulations involve wastewater permits for Harding Street and Petersburg, which were renewed in 2012. Compliance with the more stringent limits in those permits is required in September 2017. These limits also resulted in the decision to convert Harding Street Unit 7 to natural gas . At Petersburg, a scrubber

wastewater treatment system will be installed as well as a dry fly ash handling system and a new treatment system for other wastewaters. The only remaining untreated wastewater will be for bottom ash.

The Cross-State Air Pollution Rule (CSAPR) essentially establishes a cap-and-trade system to reduce interstate transport from upwind states to downwind states. Phase I was effective in January 2015.

Future expected environmental regulations relate to air and water. Standards were recently lowered for $PM_{2.5}$ and ozone under the National Ambient Air Quality Standards (NAAQS). The areas in which IPL operates have been designated as attainment and are expected to be in attainment for ozone.

The CSAPR Ozone Update Rule was proposed last year. It would address the lowered 2008 ozone standards; EPA is proposing to lower the allowances for upwind states, and IPL would continue to comply.

Revised water quality rules include cooling water intake structures Final Rule published in 2014. This looks at both impingement and entrainment of aquatic species. The Indiana Department of Environmental Management (IDEM) will decide the best technology available based on the results of ongoing studies, which may be a closed cycle cooling system. Compliance will be required in 2020 or later.

The Office of Surface Mining may propose rules regulating the placement of ash in mines. They have not yet issued a proposal rule so impacts are very difficult to predict. If placement of ash in mines is prohibited or becomes cost prohibitive, IPL may need to expand the landfill at Petersburg at an approximate cost of $15 million.

The Clean Power Plan establishes carbon emissions limitations and has been stayed by the Supreme Court., States not implementing a State Plan would become subject to the proposed federal plan. The State of Indiana will not develop its State Implementation Plan until legal challenges have been resolved. IPL expects that Harding Street will comply by combusting natural gas, and allowances may need to be purchased for Petersburg. As a new facility, Eagle Valley is not subject to these rules. Ms. Collier showed estimates of what IPL allocations could be for affected units under the Clean Power Plan.

A summary of several assumptions about future compliance for other regulations was provided.

Upcoming environmental regulations include the Coal Combustion Residuals (CCR) Rule published about one year ago. This regulates ash, as a non-hazardous waste and establishes minimum criteria for ash ponds including closure and post closure requirements. Because of this a dry bottom ash handling system is being proposed at Petersburg.

Another new requirement is the Effluent Limitations Guidelines (ELG) Rule. This applies technology-based standards for regulating wastewater. This would have no impact at Harding Street or Eagle Valley, and Petersburg will comply due to NPDES and CCR modifications.

A revised SO_2 NAAQS standard will impose more stringent limits at Petersburg, requiring enhancement to improve the reliability of SO_2 control systems.

Questions were as follows:

- Is purchasing allowances the only compliance strategy for CO_2 reductions at Petersburg?
  - The base plan to be discussed today does include some allowance purchases and renewable generation.
- What is the break-even price for carbon that would force changes at Petersburg? It would be helpful to see break-even points for CO_2 costs, as some other utilities have done.
  - IPL will analyze CO_2 costs as part of the IRP
- Is it true that the US EPA rejected the 2008 ozone standards in the Indiana State Implementation Plan? How would this affect IPL?
  - These areas are attainment for ozone so we wouldn't expect any impact to to IPL facilities.
- Do you care to comment on pending enforcement action with EPA?
  - We can't discuss these active cases, but we have included additional controls in our modeling to act as a proxy for higher regulation.
- Are costs for these already included in these slides and assumptions here?
  - Yes.

Modeling Update
Joan Soller
(Slides 114-131)

Ms. Soller said that modeling work is continuing. She highlighted some of the model inputs including natural gas prices, coal cost, market prices, capacity costs, emissions costs based on ABB reference costs, and carbon cost assumptions from ICF as a proxy for what might occur with carbon in the short term[1]. She described the DSM bundles from the Market Potential Study. The average cost of programs is about $30 per megawatt hour, but IPL is also using programs that are under $30 and over $60.

She presented a draft of the initial base model run results. These showed selection of annual blocks of DSM over the planning period, but these did not include any existing demand response programs which are included in the model. IPL's wind contracts will expire in 2029 and 2031, but were assumed to be renewed. Retirements include Harding Street gas turbines in 2022, Harding Street units 5, 6, and 7, and Petersburg units 1 and 2 later in the study period. Solar PV would be installed in 2033 followed by installation of batteries, which were modeled as peaking units.

In summary, Ms. Soller said that base costs include environmental compliance capital expenditures at Petersburg, incremental DSM additions each year starting at about 1% of

[1] ABB and ICP are vendors that assist IPL with modeling efforts.

forecasted sales, supply side additions of batteries and solar at about the same time as unit retirements, and CCGT additions near the end of the planning period.

In upcoming weeks, additional modeling will include finalizing the base case, running capacity expansion models for the other four scenarios, running production cost models for all scenarios, and calculating PVRR and other metrics.

IPL expects to add another, shorter stakeholder meeting between now and September to share model results and seek stakeholder feedback

Group comments and questions included the following;

- Have you converted the base case portfolio into megawatt hours yet?
    - No. The Production Cost Model phase will indicate capacity factors and megawatt hour breakdown
- There seems to be lot of variation in the units of DSM.
    - Selection starts out at about 1% of sales in the beginning of the study period.
- What's the difference in capacity costs between 2017 and 2018. How will this affect different types of resources?
    - This is due to the difference between known data and estimated future unknown costs. IPL needs to estimate the costs of purchasing from the market. Other purchases, e.g. wind and solar, from existing assets have more reliable capacity costs. Mr. Leffler added that this only applies to the residual market, i.e. a market that reflects the value of existing capacity.
- How does IPL interpret what DSM programs are "consistent with the IRP"?
    - These are based on inputs from the Market Potential Study, and we assume the next round of DSM programs through 2018 would be consistent with the IRP.
- Can you explain more about DSM assumptions?
    - The megawatts projected are cumulative over the study period, assuming that some measures come on line and others go offline at any given point in time.
- Please confirm that baseload is still being handled by coal plants. The capacity factor of these plants is about 50%. Are there any gas plants that can handle baseload generation?
    - Harding Street Units 5, 6, 7 are being used for baseload. Coal units were forecasted to run more in 2016 and are not being used as much due to market prices. In the third quarter, IPL will most likely be resuming generation as market prices are projected to rise. We don't have excess capacity this year until Eagle Valley comes on line next year.

Portfolio Exercise

Ms. Soller asked stakeholders to compare the draft IPL base case portfolio to their own "ideal" portfolio. She asked participants to consider that enough resources are needed to meet a peak demand of about 3000 MW. She reminded participants of the representative costs presented at the last workshop, and showed a slide with these. She showed a graphic of the IPL base case portfolio, showing a mix of 32% coal, 31% natural gas, 18% batteries, 9% wind, 7% DSM and

DR, and 3% solar. Participants were asked to have a short discussion at their tables about their suggestions.

After the exercise was completed, the groups summarized the discussions at their tables. In general, the trend was for a general reduction of coal with increased wind, solar, and DSM. In one group, two participants suggested zero coal and about 20% battery storage. In another, coal and natural gas remained at the base levels; the participant who suggested this was not as optimistic about battery technology. At another group, everyone agreed there would be increased battery use and continued DSM; an extreme case showed no coal and no natural gas. Another table suggested about 20-30% coal, and gas and wind at 10-25%, solar at 10-15%, and DSM at about 15%. This group felt that different assumptions could drive very different outcomes, but they felt that there would be increased government scrutiny of portfolios showing more than 30% coal.

In a general group discussion, a participant noted that he thinks zero coal is a realistic marketplace assumption, based on a 30% reduction in coal use in Indiana in the last 20 years. He thinks that a portfolio of 30% coal in 20 years is "short-sighted and fighting against time". Ted Leffler pointed out that the exercise is focused on peaks and capacity as opposed to energy and unit utilization. The participant responded that this is all the more reason to cease spending public money on coal-fired generation plants that are not even producing at capacity now.

Portfolio Exercise Results

Resource	IPL Base Case (%)	Participant suggestions (%)							
Coal	32	0	22	32	20	20	30	0	20
Gas	31	10	35	31	31	20	30	0	20
Battery	18	20	18	15	18	20	5	20	10
Wind	9	20	10	9	10	15	15	30	10
DSM	7	20	7	7	10	10	10	20	15
Solar	3	20	8	6	6	15	10	30	15
Oil	0	10	0	0	5	0	0	0	0

Concluding Remarks and Next Steps
Dr. Marty Rozelle, Facilitator
(Slides 134 - 135)

Dr. Rozelle reminded participants to please send questions and/or comments by June 21 via e-mail to ipl.irp@aes.com and IPL will provide responses by July 5. The next scheduled meeting is Friday, September 16, but IPL may have an additional update meeting of some kind in August. She thanked everyone in the room and on the phone for attending.

Post meeting follow up:
IPL will host a meeting in August to provide stakeholders with further modeling updates.

Indianapolis Power & Light Company
2016 IRP Public Advisory Meeting #2 Feedback
July 5, 2016

Response to Stakeholder Presentations, Comments & Questions

IPL offers these comments in response to four individual stakeholder presentations at the IRP Public Advisory Meeting on June 14, 2016.

Stakeholder Presentation #1
Denise Abdul-Rahman, Environmental Climate Justice Chair, NAACP Indiana

Ms. Abdul Rahman suggested IPL integrate energy burden and social equity into its IRP process. IPL recognizes costs as part of the IRP objective, as was shared in the first public advisory meeting in April 2016: "To identify a portfolio to provide safe, reliable, reasonable least cost energy service to IPL customers from 2017-2036 measured in terms of Present Value Revenue Requirement ("PVRR") giving due consideration to potential risks and stakeholder input." Energy burden and social equity, while important issues, have not historically been addressed within integrated resource plans that deal with an aggregate view of system requirements. Social policy issues such as these are more appropriately discussed and addressed at the legislature where policy is set. However, IPL is considering the use of metrics such as CO_2 impacts to enhance its evaluation of alternative resources within the 2016 IRP.

Ms. Abdul-Rahman suggested IPL engage with the African American community to also discuss CO_2 impacts, energy efficiency programs, work force training and economic development opportunities. IPL cares about its customers and continues to look at a variety of ways to communicate programs and services available to manage energy usage, pay bills and stay engaged in community efforts. IPL continues to enhance media and community group outreach to better connect with local minority communities including the African American community. Here are a few examples:

- IPL has increased its media presence for its energy efficiency programs with stations with higher viewership and listeners in minority communities including the Indianapolis Recorder and Radio One.
- IPL proudly supports many diverse organizations and events, such as the NAACP, Indianapolis Urban League, Indiana Black Expo, La Plaza, Center for Leadership Development, Mid-States Supplier Diversity Council, Indiana Latino Institute, Indiana Latino Expo and the Mayor's Celebration of Diversity Awards, just to name a few.
- IPL has placed special emphasis on communicating with customers that have a difficult time paying their utility bill. We partnered with Engaging Solutions, a local, minority-owned business, and identified areas where we have the highest number of disconnect notices. During 2015 IPL conducted over 30 face-to-face meetings with residents and community leaders in those neighborhoods to provide them with information on how to best manage their electric bills and be more energy efficient.
- IPL partnered with Minority and Women-Owned Business Enterprises (MWBEs) on nearly $45 million of spend in 2015, an increase of $13 million over 2014.

IPL acknowledges there is more work to do and is in the process of devising key engagement strategies with all of the diverse communities that we serve. As part of that process, we continue to explore ways to be responsive to the challenges of increasing utility rates for low-income customers. Our outreach efforts will continue in 2016 and beyond. We look forward to discussing key issues with minority stakeholder groups including the NAACP in the coming months.

Stakeholder Presentation #2
Dr. Stephen Jay, Professor, IU Fairbanks School of Public Health

IPL appreciates Dr. Jay providing context for the threat of climate change. IPL will include a range of costs for carbon reductions in the IRP scenarios.

Stakeholder Presentation #3
Larry Kleiman, Executive Director, Hoosier Interfaith Power & Light (HIPL)

Mr. Kleiman asked who at IPL is responsible for making "policy and moral" decisions at IPL. While IPL and AES leaders provide policy direction, our people are guided by a core set of values which includes the expectation and responsibility of all employees to act ethically and with integrity. It is also important to note that the communities where our employees work are also the same communities where they and their families live. Naturally, they care about their community as much as anyone. Our people work 24/7 to not just provide power, but also to make this a better place for all of us to live, work, and play.

Since 2012, IPL has completed more than 20,000 Home Energy Assessment and Income Qualified Weatherization audits as a result of 501(c)(3) non-profit organizations' partnership in our Community Outreach and Enrichment (COE) initiative.IPL welcomes discussions with non-profit entities and other organizations to foster support for demand side management (DSM) programs. In fact, IPL is working with a number of community organizations to qualify and enroll participants the Income Qualified Weatherization program. IPL has reviewed notes from prior meetings with Mr. Kleiman and HIPL regarding working together on low-income DSM programs and we are working with HIPL to set another meeting to discuss further actions.

In response to Mr. Kleiman's questions about the status of a specific multi-family rooftop solar project, IPL has discussed options with representatives associated with the project that comply with IPL's approved tariff and IURC rules. We are currently awaiting a decision from the developer regarding how to move forward.

Stakeholder Presentation #4
Jodi Perras, Senior Indiana Campaign Representative, Sierra Club Beyond Coal

Ms. Perras recognized IPL's conversion from coal-fired generation to natural gas at Harding Street station. IPL determined this as the least cost reasonable option for HSS following analysis. While improving air quality, this also diversifies the IPL resource mix.

Ms. Perras recited a letter addressed to IPL's President from Dr. Kreilein.

IPL is committed to public health and safety in all communities that we serve. We share a common goal for a future with smarter, cleaner and more reliable energy to serve the energy needs of our customers. We are implementing an all-of-the-above approach of integrating clean and renewable resources with traditional energy sources.

Additionally, IPL complies with all EPA requirements at all of our generation locations. We will work to meet the future needs of our customers with a conscious effort to balance the impact on the environment and affordability.

Sustainability is an active part of our business. Sustainability is not only environmental considerations, but encompasses other areas also. IPL ensures a sustainable future by reducing air emissions, improving technologically and supporting resource conservation and protection.

Our internal guiding principles regarding environmental stewardship include meeting or exceeding the requirements of environmental rules and regulations imposed by local, regional, and national governments and by participating financial institutions. When defining "environment" we broadly define that as the external surroundings or conditions within which people live — including ecological, economic, social and all other factors that determine quality of life and standard of living.

Post Meeting Stakeholder Engagement

IPL received 2 emails following the Public Advisory Meeting on June 14, 2016. These messages and IPL's responses to them follow.

Post Meeting email 1 (Attachment 1)

IPL Response:
IPL evaluates future resources based upon the results of econometric modeling. The draft base case scenario results indicate selecting DSM/energy efficiency resources annually throughout the study period. In addition, renewable resources were selected. The model includes forecasted future resource costs, as well as commodity and market prices to identify resource portfolios. IPL will model at least 4 additional scenarios to identify potential resource portfolios for different future worlds.

Post meeting email 2 (Attachment 2)

IPL Response:

(1) IPL engaged the consulting firm, AEG, to develop the DSM Market Potential Study (MPS). AEG's Loadmap model was used to "price" the modeled DSM bundles.
(2) IPL does not expect the 3 year action plan filing to "exactly match IRP results". IPL expects the filing to be ***consistent*** with IRP results in terms of

annual kWh targets and average portfolio $/kWh. IPL will build DSM programs from the measures that were modeled.

Conclusion

AES/IPL sincerely appreciates input from stakeholders and remains committed to its mission of improving lives by providing safe, reliable and affordable/sustainable energy solutions in the communities we serve.

The next two IRP stakeholder meetings will be held in August and on September 16, 2016. The August meeting will be added to provide model results.

Post meeting email 1 (Attachment 1)

From: mallory holmes
To: IPL IRP
Subject: IRP Comments
Date: Monday, June 20, 2016 10:27:20 PM

As a customer of Indianapolis Power and Light, I find it delusional of the company to estimate 30 percent coal dependence in 20 years. Furthermore, the blatant refusal to acknowledge the power available from robust energy efficiency programs is disappointing to say the least.

It is clear that the models being used continue to utilize out modded data. Acting as if the energy environment will be the same in twenty years as it is today is a waste of resources, time and effort on the part of the company and those who spent the time voicing their opinions at the meeting.

IPL has the opportunity to set the gold or platinum standard for energy generation in the State of Indiana, by investing in renewable energy and energy efficiency. The conversations held here show that IPL has no interest in this and simply wishes to pay lip service to advancement while protecting their profits and the current state of affairs.

Please give efficiency and renewable energy the respect they deserve. Include them, adequately and truly competitively. Yes this means your profits will change. Yes, this means that you will have to adjust your strategy but it is what it best for your customers, and your bottom line in the long term.

Thank you for your time,

Mallory Holmes
5312 W Mooresville Road
Indianapolis Indiana 46221

Post meeting email 2 (Attachment 2)

From: Jennifer Washburn
To: IPL IRP
Subject: A few questions from CAC
Date: Tuesday, June 21, 2016 2:33:14 PM

Good afternoon,

CAC would like to ask a few questions based off of the last IRP stakeholder meeting:

1. Could you please provide the model used to price energy efficiency in future years?
2. Is IPL interpreting Senate Enrolled Act 412 and the NIPSCO Order (44634) to mean that the amount of energy efficiency selected in the IRP will exactly match the filed 3-year plan (2018-2020)?

We appreciate your help!

Thanks so much,
Jennifer

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Mission Statement: To initiate, facilitate and coordinate citizen action directed to improving the quality of life of all inhabitants of the State of Indiana through principled advocacy of public policies to preserve democracy, conserve natural resources, protect the environment, and provide affordable access to essential human services.