

Indiana Michigan Power Company

2018 Integrated Resource Plan Stakeholder Workshop #2

April 11, 2018
10:00 a.m. - 3:00 p.m.
Indianapolis, IN
Meeting Minutes

1. Meeting Objectives and Introductions (slides 1 – 3) - John Torpey, *Managing Director, Resource Planning*

John began the meeting at 10:05. John went over the ground rules and reminded everyone to be respectful of all views and opinions. There will be time for public comment/statements. AEP/I&M representatives will be available during lunch as well.

He introduced the role of his section and purpose of the meeting.

Meeting Access Information: Wifi is available for participants in the room. Those on the phone can access via Adobe Connect.

I&M's Key Priorities for the 2018 IRP (slide 4)

John emphasized that I&M is looking for everyone's input. The final report may not reflect all ideas given, but all IRP-related input will be considered. Today's meeting focuses on DSM/EE modeling, IRP resource assumptions, portfolios and opportunities for improvement.

I&M has been adding renewables over the years. I&M will also be considering supply resources such as combined heat and power and distributed generation. The Company is seeking a plan that balances many factors, like diversified fuel mix, new technology, and cost.

Meeting Goals (slide 5)

John stated that today's goals are to discuss how DSM/EE impacts the load forecast; discuss preliminary DSM/EE inputs into the IRP; and what assumptions should be used. We will look at how we model EE. Finally, we will look at preliminary portfolios that we would analyze plus review those stakeholders might suggest.

Preliminary Stakeholder Meeting Schedule (slide 6)

Four meetings will be held. The first meeting to kick off the IRP process was held on February 15 in Fort Wayne. The next meeting will be in South Bend on August 1. At that meeting we will have initial / preliminary modeling results for discussion and get stakeholder comments. I&M will schedule the final meeting in September/October.

I&M is open for phone conversation with various groups to discuss specific issues as they arise.

Stakeholder comments (slide 7)

A link is set up on I&M's IRP web page. Comments can be submitted there. Previous meeting minutes were posted on the I&M website. Stakeholder comments received through the website, and I&M's responses, will also be posted on the website. I&M will try to respond to written comments within 15 days.

John said that given where we are at in the process, we are looking for input on commodity price forecast and load forecast. I&M will be sharing technology options and costing along with DSM/EE and portfolios for consideration. I&M is looking for comments on these topics.

Today's Agenda (slide 8) – no discussion

2. Opening Remarks & Welcome (slides 9 & 10) - Toby Thomas, I&M President & Chief Operating Officer

Toby welcomed everyone to the meeting and expressed the desire to get input for future resource needs. He appreciates everyone's input. He commented that I&M's existing programs and underlying technologies are performing well. Achieving future incremental savings will be challenging due to increasing efficiency baselines.

This is an important process for I&M. The assets we have used for years are coming closer to retirement so we need to plan future resources. We want to consider and avoid peaks on the system. DSM/EE can help minimize those bottlenecks. New technologies are being evaluated. We are piloting a residential program with approximately 1,000 customers and a few commercial accounts for demand reduction. Energy storage is developing as a technology. We need to look at how we consider and use these future technologies. Toby encouraged everyone to participate in this process. We need a system that serves our customers 24/7/365. The grid needs to be balanced at all times, so our generation sources must support this.

Toby thanked everyone for their participation.

3. DSM Impacts on Load Forecast & Stakeholder Discussion (slides 11 & 12) – Chad Burnett, Director, Economic Forecasting

Chad indicated that the purpose of a DSM/EE program is to accelerate the adoption of an energy efficient technology. Chad shared a cooling DSM/EE program example for a family showing how replacing an inefficient system with newer, more efficient equipment can help their overall energy usage. Utility incentives can help families make those difficult decisions.

Multiple Approaches to Modeling DSM Impacts on Load Forecast (slide 13)

Chad indicated there are several models available to look at DSM/EE programs in the load forecast. Chad reviewed six different approaches that the Brattle Group has identified. I&M's modeling approach has evolved over the years. I&M uses a combination of modeling approaches including:

1. Use historical DSM embedded in sales data band adjusted for incremental DSM in forecast;
2. Using a hybrid model (Statistically Adjusted End-Use: SAE) that embeds end-use features in models.

The Evolution of Modeling DSM Impacts in the Load Forecast (slides 14 – 16)

Chad reviewed some of the history from previous load forecasts. Early forecasts were overstated and did not fully represent DSM program reductions. Subsequent forecasts included significantly higher DSM assumptions, which caused the forecasts to be understated. Now with the current hybrid methodology, forecasts are more representative of reality (actual results).

Accounting for DSM in the Load Forecast (slide 17)

Chad stated that the way you measure historical DSM savings, is not same way you model DSM savings. Chad walked the audience through an example to demonstrate this principle.

I&M's Recipe for Including DSM Program Impacts in Load Forecast (slide 18)

For modeling, we look at historical DSM savings, current DSM saving plans, and long-term savings plan. The process starts with the SAE forecast. Each assumption shifts by a half year. This adjusted by 6 months captures the full effects of the DSM program in place.

Q. J. Washburn; CAC - What is the commitment from the Company to make the model, manual, forecasts, assumptions, etc. available so others can look at it?

A. Chad indicated that this step is done in a spreadsheet. This is not part of the Plexos model. We can provide the load forecast once it is completed prior to next meeting. He also offered to provide the most recently completed forecast if desired, but the CAC declined the offer.

Q. J. Washburn; CAC - She would like to have a meeting to go over this during the summer and invite other stakeholders.

A. Chad stated that I&M will look at the process but will not be able to provide the load forecast to the stakeholders before it is completed and made available to the Company's own Resource Planning team. John Torpey indicated that the Plexos model owner/company is willing to work with specific stakeholders to provide access to model components. There are licensing issues to work through, but Energy Exemplar (owner of the Plexos model) will communicate directly with stakeholders concerning potential options.

Q. J. Washburn; CAC - We are asking for a read only version of model inputs and outputs.

A. John restated that the model owner was going to provide non-executable version of the Plexos model for a fee. Energy Exemplar will be contacting specific stakeholders who have inquired about this. Overall discussion took place on disagreement on the fees to be paid. John explained that AEP pays a license to use the model. It is not I&M's model and not ours to give.

Matt McKenzie, I&M's internal counsel, indicated that the load forecast, when available, can be provided without a problem. For the Plexos model, I&M does not own that model to give out.

Q. When will we be getting the load forecast?

A. It has not been completed at this time. I&M will post the new forecast on its IRP webpage. Additionally, the calendar (from slide 6) identified that the model inputs including the load forecast would be covered in the next stakeholder meeting on August 1st in South Bend.

Q. Customer from Muncie indicated that he was not clear on how changes in rate structure will impact the load forecast. There is concern that higher fixed costs and lower variable costs will reduce DSM.

A. Chad indicated that the SAE forecast includes price assumptions that account for customer response. The Company will still promote DSM/EE and offer incentives. Rate design change does not mean I&M is not promoting DSM/EE.

SAE Model Approach (slide 19)

The chart shows how much change we are seeing in various energy end-use categories such a lighting. Lighting and cooling are decreasing but other energy usages are increasing.

What is Included in the SAE End-Use Categories? (slide 20)

Chad discussed how other miscellaneous appliances are causing a growth in energy usage. Many of these devices need to be charged. This category is growing and offsetting efficiency gained by reduction in lighting and cooling energy used.

Results from Residential Appliance Saturation Survey Use in SAE (slide 21)

Chad reviewed the graph and stated that in 1980, 20% of customers had central A/C. By 2016, the saturation of central A/C had increased to 80%.

Q. How do we factor in weather/climate change? There are now more days above 85 degrees and by 2050 this will increase even more compared to historical standards.

A. In the forecast I&M is using normal weather. I&M assumes normal weather in the model. The Company has studied the topic and found that some areas of AEP's territory are seeing warmer winters, but not as much in summers.

Comment - Suggest I&M use IN & MI specific weather projections. Suggest I&M use future trends as rate of change is rapidly increasing.

A. Chad indicated that I&M does use normal weather for I&M specific weather stations in I&M's territory. We would be happy to share that weather data used.

Comment - J. Perras; Sierra Club – I&M needs to look at more recent forecasts and not use historical trends.

A. Chad indicated that I&M would be willing to evaluate alternative weather forecast scenarios provided by the stakeholders.

I&M-IN DSM/EE Program Mapping (slide 22)

Chad reviewed DSM/EE program usage mapping by end-use class and end users.

Q. Distribution of program savings for school energy education is 75% of commercial. Is that reasonable?

A. Jon Walter discussed that school aged children would receive energy efficiency kits. Those kits are not provided for school consumption, but for the residential sector.

Q. Are these EE programs in place now?

A. This list reflects those since 2008. Those shaded in red are still active. The percentages show how they are mapped.

Q. C&I break out is shown, what is the industrial breakout? How is opt out effecting programs? What is the mix of commercial vs industrial savings?

A. Jon Walter indicated that opt out customers have mostly been industrial with a few commercials. Large use customers are those opting out. Some very large commercial customers have not opted out.

Q. J. Perras; Sierra Club – Would like to see mapping for MI DSM/EE program. Are those programs no longer being offered somehow included? The Sierra Club would like to see those program re-offered.

A. Chad indicated that we use the same process for modeling MI DSM/EE programs and still account for the lingering effects of programs that are no longer offered. The IRP model will determine longer term assumptions.

Q. Would like to see comparison of IN & MI DSM programs and costs.

A. Jon indicated that we will be discussing market potential study later in today's presentation. We do model both states differently. I&M would eventually like programs to be consistent between both states.

Why Apply Degradation to DSM/EE Program Savings? (slide 23)

Chad reviewed model forecasts that do and do not account for EE. Overall, the SAE forecasts account for changing market conditions where new appliances and electronics are improving their efficiency. Therefore, we need to degrade the savings over future time-periods so the model does not double count the impact of EE in the load forecast.

Degradation Matrix - Residential Heating Example (slide 24)

Chad discussed how each of these programs cumulatively degrades over the years. The example he reviewed was for residential heat.

Declining Residential Load Growth (slide 25)

Chad reviewed the slide covering declining residential load growth by various technologies for a typical customer and the impact on total EE.

Q. What is the information source for the projected efficiency trend?

A. Chad indicated that the forecasted load is in the SAE model and is derived from Department of Energy. Historical data is from actual filings.

Q. Please explain the source of the degradation.

A. Much of it has to do with market. For example, consider lighting. When programs began, lighting was based on cfl bulbs. Now the market has caught up with that since some choices of lighting are already energy efficient. Therefore, the SAE model already has that market condition baked into it. We do not want to double count it. Over time, older inefficient appliances will be replaced. When a customer goes to a store, they cannot buy old inefficient appliances. They will buy new appliances with already improved energy efficiency, even if the customer buys appliances outside of our EE programs. That is the reason for the degradation.

Comment; IPL – Made the observation that SAE data captures naturally occurring energy efficiency in the market and that the Company has to calibrate or adjust for that.

A. That is what I&M is trying to do.

DSM Assumptions Used in I&M's Load Forecast (slide 26)

Load forecast for the near term comes from the most recently filed/approved DSM/EE plan. What we hand off to IRP modeling in Plexos are those programs which are approved. Long-term programs will come from IRP modeling.

15 MINUTE BREAK

4. Developing DSM Inputs for the IRP (slides 27 and 28) – Jon Walter, I&M EE & Consumer Programs Manager & Dylan Drugan, Resource Planning Analyst

I&M is developing DSM/EE forecast over the next 20 years and these all have an impact on I&M's load shape. Jon reviewed the customer example on slide 12 to illustrate and highlight the importance of the customer decision making in the EE program participation process. Through EE programs, I&M seeks to and guide customer decision points to become more energy efficient. When customers upgrade to more efficient technologies, their energy consumption decreases. How can I&M move customers to upgrade to more efficient technologies sooner rather than later while also considering cost? How can I&M move a customer to upgrade to an even more efficient technology than what they're even considering? I&M has to consider how our customers make decisions, even if it means their equipment is not at end of life. We need to understand customer behaviors and make projections into the future. Also, we have to project new technologies and how customers may endorse those.

2016 Market Potential Study – Highlights (slide 29)

Jon explained the market potential study process. I&M used a consultant (AEG) and did a market study in 2016. This looked at all technologies and how customers used them. For example, how many customers are putting in smart, WiFi enabled thermostats? We have to look at which technologies are economic for both I&M and its customers along with how we incentivize adoption. This is used for input to the IRP process for each EE measure. The study identified multiple tiers of EE potential including technical, economic, maximum achievable and realistic achievable by year over the 20 year horizon of the study.

Analysis Framework (slide 30)

Jon reviewed how the market potential study addressed the history of I&M's EE programs, customer participation levels in those programs, the resulting load shape impact, how the load forecast used in the study recognized past program performance, the annual potential for customer participation, and the expected impact of new technologies.

Defining Energy Efficiency Potentials & Scenarios (slide 31)

Jon indicated that AEG helped define different future annual potential for EE measure uptake. He reviewed technical potential and economic potential definitions on slide 31.

Q. For the universe of all measures, which database are we using to measure data?

A. The consultant uses their own universe of end use measures. They have a library of measures from many utilities. We use subsets of that data for IN & MI. This accounts for differences in climate, usage, etc. for our states.

Comment- J. Washburn; CAC – Assuming how I&M uses the IRP, we argue to use technical potential vs economic potential and hope that I&M will entertain using technical potential. Other utilities have used economic potential.

A. Technical potential does not address economics. I&M's IRP modeling calculates future resources allocations and includes cost for each resource. I&M's position is that measure and program costs need to be addressed and accounted for. Economic potential assumes all economic measures are adopted by all customers, There is no discount in the adoption rates for customer preference, economics, etc. The Company supports using the two potential levels identified in the presentation. Furthermore, the Company may consider raising the potential if any of the yet to be defined bundles are selected by the IRP model at their maximum level.

Comment – J. Washburn; CAC – there is a standard that economic and technical potential should be looked at equally. That is frustrating. It seems like I&M is pre-screening out options by looking at only one potential. The economics should come out during the IRP modeling.

A. All resources included in the IRP model are screened, not just EE resources. The goal for all resources is to develop reasonable cost and performance characteristics that can be included in the IRP model

Summary of MPS Results (slide 32)

The results of the Market Potential Study are included in the IRP. This slide shows potential results (usage reduction) over 20 years.

Q. Is this data for IN?

A. This for I&M at the system level.

Comment – There is no way to capture all potentials over 20 years. I&M could survey current customers on their plans. Costs associated with EE levels are important. 50% of incremental costs need to be paid in order to achieve potential. Suggest using technical potential vs economic potential.

A. We think we have a way of structuring a bundle looking at technical and economic potential. Need to consider a lot of factors such as how many customers participate in that. We would be happy to consider other proposals. See response above, if a bundle is maxed out the Company may consider raising its potential to the economic level.

Q. Is system supply needed on peak demand or average demand? What does DSM/EE mean for peak demand reduction?

A. EE bundles reduce both energy and capacity (demand) and these amounts are included in the IRP model, as well as, the cost to achieve these savings. The IRP will model Demand Response programs that focus on demand reduction but include some energy reductions as well (such as WiFi enabled thermostats control programs). These type of measures and programs help to reduce demand during peak periods. Other programs primarily focus on energy reduction with less focus on peak demand periods. The market potential study considers both demand and energy.

Q. Stakeholder– What is the forecasted load growth rate?

A. We look at forecasted load growth over 20 years. The growth rate was approximately 0.2%, but will need to verify.

Comment – Non-profit groups are available to partner with in order to promote programs. A lot of groups would be happy to work with I&M.

A. Jon stated we would like to grow those relationships to help customers understand and be aware of programs. Toby Thomas indicated that we recently hired a resource to help with low-income outreach. I&M recognized that was a gap.

IRP EE Resource Development Overview (slide 33)

Dylan discussed the measures identified in the MPS. The MPS helped us develop a top 20 list of measures for savings. The IRP will then bundle measures into end-use tiers as to their achievability. Bundling helps the IRP model performance.

Energy Efficiency (slides 34 – 36)

Dylan showed the top 20 measures that provide EE. Interior lighting remains high on the list for residential customers. For commercial and industrial customers, lighting also remains at the top of the list.

I&M's Applicable Load Shapes (slide 37)

Each bundle has its own load shape. Dylan reviewed the various load shapes. He discussed the seasonality with some of the measures like cooling.

Example of Planned “EE Supply Stack” for IRP Modeling (slide 38)

Dylan reviewed the graph of the EE Supply Stack. He stated that this illustrates the idea of the bundles associated with savings. This graph compares potential energy savings with costs.

Example: Steps to Making a Bundle a Plexos Resource (slide 39)

Dylan reviewed a particular example for a residential bundle over 5 years and what the potential savings are and how it feeds into the model. The items highlighted in yellow are inputs into the model.

Q. On slide 32, you discussed load growth rates. Is load growth a byproduct of DSM savings?

A. No. In the early years, the load growth is inclusive of the company's programs. Overtime, the IRP selects programs. This is not reflected in the MPS.

Q. The Build Cost \$/kw is declining over time. Why?

A. As a result of the Degradation profile, the Units available to be built per year increases. Initially the calculation is $2,977 \text{ MWh}/1,000 \text{ MWh} = 3$ when rounded. As degradation occurs looking at Year 3 where degradation is 53.79%, the calculation changes to $2,977 \text{ MWh}/(1,000 \times 53.79\%) = 5.53$ or 6 when rounded. Next, looking at implementation cost, it grows with inflation or in year 3 it is $\$0.3044/\text{kWh}$, applying this at the unit level and converting to dollars. The following equation is utilized: $\$0.3044/\text{kWh} \times (1000\text{MWh} \times 53.79\%) \times 1000 \text{ kWh}/1 \text{ MWh} = \$163,725$ per unit built. Now this value is divided by the Max Capacity of 0.297 MW, which equals $\$163,725/0.297 \text{ MW} = \$552/\text{kW}$. So as the level of savings degrades the Implementation cost is lowered by the amount of savings.

Q. The degradation factor is being used to balance what is embedded in the forecast. Why do you need to apply a degradation profile to going forward bundles? How is I&M applying a degradation profile to the EE model?

A. Dylan stated we are trying to model available potential. The incremental EE bundles available in the model need to be treated the same as the approved programs reflected in the load forecast, as discussed by Chad Burnett on slides 17, 23, 24 and 25. If stakeholder identify further discussion is needed the Company will address on a conference call.

Q. What are the implementation costs? That is cost for 1,000MW implementation for a year.

A. Implementation costs are the cost for the Company to provide an incentive to the customers and administration and management costs for the various EE programs. Implementation cost as shown is equivalent to the number that can be modeled in Plexos.

Q. What is the decision Plexos is making?

A. Plexos looks at bundle costs and savings, both energy and capacity. The model also shows number of MW's. The decision is comparing costs and benefits and selected best cost profile of all resources, not just energy efficiency.

Demand Response Resources (slide 40)

Jon Walter reviewed the desire for peak time consumption reduction. For example, programs to reduce residential A/C during peak times. We have to forecast when that peak time may happen and then have resources and programs to reduce that peak. We have pricing and control based products to reduce the peak when we need to. We model demand reduction tools in the IRP. Jon reviewed current interruptible contractual commitments in aggregate.

We launched a thermostat program late last year and have approximately 1,000 customers signed up in IN. I&M has offered a similar program in MI. Customers get incentives for reducing that usage. We are actively engaged in controlling commercial demand.

Q. J. Washburn; CAC – A recent study was done by Demand Side Analytics on DR resources. Are we incorporating that or reaching out to them?

A. We are open to new studies. We can look at it. We feel our program is on par with other utilities, but are certainly open for discussion.

Q. A. Sommer; Sommer Energy – Are you forecasting 13,000 participants in direct load control? It seems low. Is there a way to model the value of getting more participants?

A. Yes, I&M is looking at both states. We are open to how many participants to expect.

Q – How significant are industrial customers to peak demands? Are industrials similar to NIPSCO's in terms of DR programs? They have different compensation mechanisms.

A. I&M is different from NIPSCO's; they are part of a different RTO. Our programs are modeled after PJM's markets, rules and programs. We are developing products that work within the PJM system.

Q. Does I&M or PJM call the event?

A. It could be either. Right now, PJM calls most events.

Volt VAR Optimization Resources (slide 41)

Jon discussed the volt var optimization (VVO) program which is an EE and DSM program built into one. This uses voltage levels to control energy on a distribution circuit. I&M has this technology on 33 circuits in IN and three in MI. We measure energy reduction and savings when we control system voltage. We will be modeling this in the IRP. Jon indicated that you typically see a 3% energy savings when we apply volt var.

Customer Comments

I&M allotted 15 minutes on the agenda for stakeholders to present IRP-related comments/topics to the group.

Stakeholder Speaker #1 –Indivisible IN2Enviro (South Bend) – She appreciates the work shop and desire to collaborate. The group hopes I&M realizes that its choices affect Hoosier livelihood. They seek 100% renewables and good reliability. In other words, “be fossil free”. We would like to see I&M be the first utility in IN to be 100% fossil free and advocate for cost. What dollar amount is being modeled for dealing with coal ash? Controlling coal pollution is expensive. She went on to discuss their vision for a fossil free future.

Stakeholder Speaker #2 – (Customer from Fort Wayne and a small business owner) - When will I&M become more efficient as evidenced by I&M ending support of Energizing IN? She encourages attendees to read the recent weather trend report from Purdue University. Why should IN and MI have different goals? The forecast should not be based upon on what legislators want. We want one good plan. As a business owner, she should not pay for bad decisions. Rockport U-2 scrubber costs should not be passed on. She would like to see an energy provider provide solar panels and make the renewable process easier. She would like to see fresh ideas and actions on changing the future for the better.

Stakeholder Speaker #3 (Muncie customer) – She is concerned about renters living in old, drafty places. Low income tenants cannot afford to fix them up and do not necessarily consider energy costs when renting. This is an area of low EE. She would like to see 1) programmable thermostats placed in low income homes with customer education; 2) install big solar on subsidized housing in Muncie. These could hold a lot of solar panels; 3) please come to Muncie for one of these meetings.

45 Minute Lunch Break

Next Steps for DSM Input Development (slides 42 – 43)

Dylan went over the next steps for DSM input and hopes to post DSM/EE IRP inputs by July 1.

Comment - J. Washburn; CAC – Jennifer stated that she cannot participate anymore until she gets the data.

5. Preliminary IRP Assumptions and Portfolios (slide 44), Scott Fisher, Manager of Resource Planning & JohnTorpey, Managing Director - Resource Planning

Overview slide

Supply Side Resource Costs – Preliminary (slide 45)

Scott discussed the various supply side resources being considered as inputs.

Supply Side Resource Option Assumptions (slide 46)

Scott stated that the screening is in progress for the supply side resource option. Jon reviewed base and peaking options.

Q. How are costs handled? And how are they ramped up?

A. Costs are levelized over 40 years. Modeling is in nominal dollars for each year in the planning period.

Q. Are you looking at an ultra-super critical plant?

A. No, we do not see it as a feasibility technology due to permitting issues.

Q. A. Sommer; Sommer Energy - Does Plexos have the ability to put in partial units?

A. Yes, we could add in and may do so, as percent share of a unit.

Q. How are PPA's being addressed?

A. The preferred approach is to use an "H" class machine. This would be a proxy for cost either as a PPA or to build. The IRP chooses a technology, it does not determine whether or not the resource will be owned or a PPA.

Preliminary Wind Resources for the IRP (slide 47)

Scott reviewed the slide which shows initial cost for wind resources, including Production Tax Credits (PTC). This shows we would get more wind on line in 2021.

Q. There 10 active wind proposals in our service territory. Why are we showing an increase in the price of wind generation?

A. This graph shows the price of a product in any given year, levelized over its 20 year life.

Q. What is the source of these prices?

A. Bloomberg New Energy Finances, the Department of Energy and internal knowledge are the sources of the wind pricing assumptions.

Q. A. Sommer; Sommer Energy – She is similarly surprised in the wind cost increase. Can you share wind the cost forecast?

A. We will need to check as some of the data is proprietary. These are nominal dollars.

Q. J. Perras; Sierra Club – Why is the model restricted to 300MW of wind in a given year?

A. We feel this is a practical level over the planning horizon given the time needed for regulatory approval and for construction. Any recommendations for choosing a higher or lower number can be looked at. John talked about the model selecting various generation resources. From a business standpoint and based upon market conditions and availability we would not limit ourselves to 300MW if it makes sense to procure a large block of wind generation.

Preliminary Solar Resources for the IRP (slide 48)

Scott indicated that the model includes two tranches of solar. Each will be 150MW and uses a 24.4% capacity factor.

Comment – AEP OH has an RFP for a 400MW solar project. At that level it is big enough to attract manufacturing. It is transformational. She had a concern that I&M's 300MW proposal is too constraining.

A. At this time for this IRP the Company assumption of 300MW per year of solar is reasonable. If in the initial model runs we see solar maxing out at 300MW per year the Company may consider alternatives to this assumption. Additionally, I&M would consider larger projects based on responses to RFP's.

Preliminary Energy Storage – 10MW/40MWh Resource (slide 49)

Scott reviewed the battery storage option. There is declining nominal cost associated with these. This is a high cost option and we will need to see how the model selects it.

Q. OUCC – For assumed capacity factors, will battery storage be associated with other generation options?

A. The cost per KWh over time is included in the model. Plexos will look at price over hours and compare to end energy storage products and will decide if the battery discharges or charges. The capacity contribution of battery storage is considered. PJM rules apply to intermittent sources and need to be considered for those sources.

Q. J. Washburn; CAC – For storage costs, why is I&M not using DMES for storage costs?

A. The costs estimate for energy storage is based on internal estimates, storage vendors and information from external consultants. If Stakeholder would like to provide other sources of storage costs and performance data the Company is happy to review it.

IRP Inputs and Assumptions (slide 50)

Scott discussed the Distributed Generation forecast. The growth rate is quite strong.

Q – J. Washburn; Sierra Club - What is the size threshold?

A. For Distributed Generation the assumption is a 5kW system.

Portfolio Assumptions – I&M Going In Capacity Position (slide 51)

John discussed the chart which shows PJM's obligation for peak capacity. In 2022, we start with an approximate 800 MW gap with the Rockport U2 lease expiring. Currently, I&M has some excess capacity. We are also assuming Rockport U1 retires at the end of 2028. At that point I&M has a 2,000MW need. In 2034, that increases to 3,000 MW's as Cook U1 retires.

Q. Why is there a dip in the capacity requirement in 2020?

A. PJM gives I&M its obligation over the next three years. There could also be some wholesale effects as wholesale load shifts.

Portfolio Assumptions – I&M Going In Energy Position (slide 52)

John discussed how I&M has enough energy to meet internal needs even after the Rockport U2 lease expires. Based on the current forecast, we have adequate energy through 2028.

Preliminary IRP Portfolios (slide 53)

John reviewed four preliminary portfolio models. The first three portfolios are mostly different based upon peaking needs. The fourth portfolio is stakeholder defined and could be a carbon free portfolio. We are open for input.

Q. J. Perras; Sierra Club – Please explain the asterisk at the bottom of the slide.

A. I&M's intention is to not renew the Rockport U2 lease and retire U1 in 2028. We must perform economic due diligence to support those assumptions.

Q. J. Perras; Sierra Club – She supports the idea to not build NGCC through 2022. Why are we not considering that?

A – No CPCN filing is needed for the Rockport U2 retirement since capacity is expected to be available in the market at that time. A peaking solution can be done quickly. The real decision to be made is in 2028 when U1 goes away.

Q. OUCC – Why are there three options vs. letting the model run and see what it chooses?

A. We plan to let the model run and see what it chooses as well. It could choose a scenario that adds an NGCC. But short term, the likely scenario is to go to market for energy needs.

Q. S. Francis; Sierra Club – What are the assumptions on carbon prices? Also, when you develop a portfolio, please don't name it after the group that proposes it.

A. We do assume a future carbon tax/fee will be part of future.

Comment - J. Washburn; CAC – She reiterated that she wants their experts to be able to review portfolios and would like access to the data, model, and manual.

Comment - J. Perras; Sierra Club – She would like a conference call on the portfolios sooner than later.

A – John indicated that by July 1st we should have most data and forecasts ready.

Wrap-Up (slides 54 - 57) – John Torpey, Managing Director – Resource Planning

John discussed next steps. He stated that the IRP is very important to the Company. We invite everyone to continue participation as the process moves forward. The next stakeholder meeting will focus on final inputs, portfolios, scenarios, and initial modeling results and will be held on August 1 in South Bend. The final meeting will be held in the September/October time frame and will review modeling results and conduct a preferred portfolio discussion.

Toby closed the meeting at 3:23pm. He stated that we look forward to everyone's suggestions as we work to finalize this plan by November.