



Indiana Michigan Power Company
2018 - 2019 Integrated Resource Plan
Stakeholder Workshop #4

May 23, 2019
12:00 p.m. – 5:00 p.m.
Muncie, IN
Meeting Minutes

Opening Remarks (slides 1 – 3) - Toby Thomas, I&M President & Chief Operating Officer;
John Torpey, Managing Director, Resource Planning

Torpey and Thomas began the meeting at 1:07pm and welcomed everyone to the meeting. I&M appreciates all the input to this point and welcomes those continued thoughts.

Torpey 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 break as well.

Meeting Access Information: Those on the phone can access via adobeconnect and call into the conference.

Today's Agenda (slide 4)

Torpey briefly reviewed the agenda for the day.

I&M's Key Priorities for the 2019 IRP (slide 5)

Torpey emphasized that I&M is looking for everyone's input. The final report may not reflect all ideas given, but will provide rationale for decisions made. In the end, the plan will meet rules/requirements. "We get a little better" each stakeholder meeting we have.

Key Points:

- Stakeholder Engagement
- Continuous Improvement of IRP Processes
- Continued DSM/EE Advancement/Deployment
- Continued Renewables Deployment
- Continued Support for CHP and DG Opportunities
- Understanding of Rockport Disposition Options
- Develop a reasonable preferred resource plan that balances multiple factors such as cost effectiveness, reliability, portfolio risk and uncertainty to meet the future energy and capacity needs of I&M's customers
- Develop an IRP that meets the requirements of 170 IAC 4-7 (IURC draft proposed rule) and MCL 460.6t(4)

Meeting Goals (slide 6)

Torpey stated that today's goals are to discuss the Integrated Resource Plan (IRP) portfolios, scenarios, sensitivities and model results. We will also review stakeholder feedback and discuss current modeling inputs.



The Michigan IRP will be filed soon after the Indiana filing. Today's feedback will be a consideration when running the final round of modeling, which will take place soon to meet the July 1 filing date.

Stakeholder Feedback Summary (slides 8 & 9) – Torpey Torpey, *Managing Director, Resource Planning*

Torpey indicated that I&M has responded to a number of comments posted to the IRP website. The model is still available to stakeholders and training sessions have been conducted. Comments can still be submitted to the website and I&M will continue to post stakeholder meeting minutes and comments on the website.

Changes in Inputs from 3rd Stakeholder Meeting (slide 9)

Torpey gave a brief overview of the changes in model inputs:

Current U.S. Fundamental Commodity Forecasts

Energy prices are lower due to lower power demand and natural gas prices.

Wind and Solar Resources

Price of wind and solar sources were lowered.

Wind and Solar capacity credit was revised to reflect PJM's recommended values.

Preferred Resource Plan Overview – (slide 10) Thomas Thomas, *I&M President & Chief Operating Officer*, Torpey Torpey, *Managing Director, Resource Planning* and Scott Fisher, *Manager of Resource Planning*,

I&M Going-In Capacity and Energy Position (slide 11)

The two units at Cook and the two units at Rockport make up the major units for the bulk of capacity. Thomas reviewed the lease/ownership arrangements for Rockport. Rockport 2 is leased and the lease expires in December, 2022. Assume lease to not be renewed. Rockport 1 is 50% owned by I&M and 50% owned by AEG (American Electric Power Generating Company). In Dec. 2022, 190 MW's of AEG's output will transfer from Kentucky Power to I&M. It is anticipated that Rockport 1 will retire at the end of 2028 per the current consent decree. That will cause I&M to be short capacity. Another IRP planning assumption is at 2038, all major units retired so generation portfolio will be transformed.

Preferred Plan Highlights (slide 12)

In summary by 2038, the Preferred Plan includes:

- 1,700MW of solar,
- 2,100MW of wind,
- 2,700MW of Natural Gas Combined Cycle and
- 180MW of Energy Efficiency and Demand Response

In addition, by 2028, the Preferred Plan includes:

- 50MW of Storage
- 50MW of "Micro/Mini-Grid" local deployment

Q&A:

- Jennifer Washburn – I&M had an 1,100 MW gas plant in the last IRP meeting, but now it's up to 2,700MW. Since then we've also had the Vectren Order rejecting their plan to move forward with a big natural gas plant. How does your proposal match with the Commission's guidance? Thomas – this is the total amount to put in; it would be done in 300-400MW chunks. And this is just based on what the model says today. May suggest different resources as we update this going forward.

- Jennifer Washburn – ask formally for all the underlying files. Torpey – all of the files were uploaded to the website back on Tuesday, so should already be out there (for NDA participants).
- Jennifer Washburn – with Rockport lease renewal expiring in 2022, what is near term action plan for that? Thomas – have to negotiate with lessors to see if we can work that out. Washburn – what would fill that gap? Thomas – the plan assumes it is not renewed; probably use short term purchases
- Kerwin Olson – recall at first meeting an unequivocal statement that Lease would not be renewed, now it sounds like it would. Thomas – never made unequivocal statement to that effect. Olson – disagree. Thomas – have to agree to disagree
- Pete Boerger – last meeting you touched on timeline of nuclear renewal, need to make decisions in 2019/2020 or so about that. Can you provide any more information on that process? Thomas – did talk with chief nuclear officer. Three operators going through the “beyond 60” process. Watching that process to see how it goes. Have to do equipment evaluation down to the concrete. Need to take action starting in next 4-5 years, but nothing needed much sooner than that as we want to see how the other operators go.
- Pete Boerger – is there a hard deadline by when you would need to make that decision? Thomas – By time you go through engineering analysis, NRC process, probably need to start 10 years prior to expiration. Can check with nuclear folks to get better estimate.
- Anthony Alvarez – when was last time we got the nuclear extensions? Thomas – we had original license of 40 years, got another 20-year extension. Potential is to go another 20 years. Alvarez – so LCM project will only get us to 2037? Thomas – based on what we put out, yes.
- Anthony Alvarez – Slide 12 – 1,700MW of solar – probably going to deploy that 1,700MW by 2030? Thomas – About 150MW a year.
- Anthony Alvarez – cost of solar capital that we’re seeing today, seeing \$1600/kW – quick math says we’re looking at \$2 billion for that solar in the next 10 years? Thomas – our capital costs are a little bit lower, but not sure exactly.
- Anthony Alvarez – why not PPAs instead? Thomas – levelized costs you see include estimated output of the unit – so whether owned or PPA it would be the same.
- John Haselden – Showed significant increase in solar/wind capacity – is that a change in PJM rules? Torpey – based on PJM study, stationary solar, fixed tilt solar. So this is a PJM number.
- Steve Francis (Sierra Club) – Action Plan – if you discovered that it might be better to jump in earlier for solar, would you monitor that? Torpey – this is the plan based on the parameters when we ran our optimization modeling. We’d have to look at the market to see what’s out there and as we look at the market, that will tell us whether there is as much solar as we have in the plan, if the costs are lower, etc. Plan gives us a roadmap/guideline as to an amount of different resources to add.
- Steve Francis – are you looking at using RFPs to get better market pricing? Torpey – think for solar, not sure we’d do an RFI, we’d issue an RFP. In our experience, RFI’s, you don’t always get executable information in the responses. Looking at next year or so setting the groundwork for this.
- Jennifer Washburn – Going back to the combined cycle, and seeing that the Rockport lease may get renewed, is it I&M’s plan to convert Rockport to natural gas? - No.
- Jennifer Washburn – capacity need if Rockport is not renewed – would be filled with market purchases? Torpey – planning assumption is that RP2 lease is not renewed, and RP1 is retired. That hasn’t changed.
- Anthony Alvarez – What has I&M done to look at extending Rockport 1 beyond 2028? Torpey – consent decree requires adding scrubber or retiring RP1 in 2028. We have some analysis showing the cost of scrubbing RP1 is very expensive and no one we want to pursue. So given those parameters, that’s the planning assumption we made.



- Jeffery Earl (Coal Council) – Is I&M assuming there will be any state subsidization of the Cook plant? Torpey – no.
- Pete Boerger – did not model nuclear lease extensions? Torpey – right, that’s 15 years from now, we’ll be coming back to do more IRP analyses before we have to go through that effort.

Preferred Plan New Capacity Additions – Nameplate (MW) (slide 13)

Additional wind and solar added. NGCC doesn’t come into play until other assets retire. Wind, Solar, Energy Efficiency, and Market Purchases in the short term.

Preferred Plan – Existing and New Capacity Additions (slides 14-15)

Torpey stated that when you look at this slide it may look as if more capacity that is needed is being added, but it is misleading as of our PJM requirements. Added resources line up well with the capacity needed for I&M and PJM.

Preferred Plan – Energy Position – FIRM (GWh) (slide 16)

Q&A:

- Scott Rice-Snow (Customer) – Is this a correct interpretation that the combined cycle gas through 2030 is taking us above our capacity needs and is solely for wholesale sales?
- Torpey – this is just a generation stack, doesn’t say what is serving what.
- But it wouldn’t be serving the needs of the state?
- Torpey – it serves capacity needs, which wind/solar won’t do as efficiently. Also provides energy. So we need the capacity to meet our capacity obligation. But cheapest energy would get allocated to retail customers first, and any margins from the higher cost sources would serve to offset those costs.

Preferred Plan - DSM/Energy Efficiency (slide 17)

Torpey presented the cumulative non-degraded energy efficiency results under the preferred plan. The bundles selected under the preferred plan are Residential Behavioral, Residential Appliances, Residential Water Heating, Commercial VFD, Commercial HVAC, Com. Building Mgmt. System, Commercial Outdoor Lighting, Commercial Indoor Lighting, and Industrial Measures.

Preferred Plan – Emissions (slide 18)

Q&A:

- Jeff Earl – is this a lifecycle analysis of emissions, or just from generation? Torpey – just generation.
- Jeff Earl – have you considered doing a lifecycle analysis? Torpey – no, this is just based on output from resources themselves.
- Sierra Club – have you done an analysis of where the scenarios stand in light of the Clean Power Plan 2005 emissions for I&M, and also the 1.5 degrees Climate Change scenario? Would be useful to map that out. Torpey – this is just showing carbon intensity of each option. We have additional reductions in carbon from retiring Tanners Creek in 2014/2015 timeframe. Something we can try to dig out and mention in report.
- Jeff Earl – Are you assuming full 2,700MW of CC comes online while Rockport is online? Torpey – think it’s showing multiple scenarios. Wouldn’t need as much CC if Rockport is available.



- Dale Thomas – is the carbon intensity in 2034/37 just going up because of Cook retiring? Torpey – that’s a factor, but so is capacity factors.

Summary of Analyses (slides 19 - 20)

Q&A (slide 19):

- Rice-Snow – Appreciate you coming out to Muncie, and think that some of the higher cost of the High Renewables would be jobs, and can we have those jobs in Muncie.
- Pete Boerger – Not sure I understand how the information is presented on this slide. Usually see just PVRR comparison – what does this slide show that is missed through simple NPVRR? Torpey – yes. Even though we have some scenarios that seem to be less costly at the end of the study period, they are more expensive for the majority of the study program.
- Cindy Armstrong (OUCC) – Can anyone speak to modifications of the Consent Decree? Lewis – see Thomas testimony in rate case.
- Customer – why not build more renewables now, and take advantage of tax credits? Torpey – our plan does have us reach out and get renewables in the short term while the credits are available. And as we get requests out, we’ll see what sort of pricing and availability we see.
- Customer – so what’s holding up things? Why aren’t there developers out there with projects? Torpey – we have developers calling with projects all the time, and folks at AEP evaluating whether those are viable, and pursuing them when they are. A lot of the solicitations we’ll make are based off of market intelligence.
- Sue Errington – Why is NIPSCO able to be more aggressive on renewables? Torpey – they went out and requested lots of bids, but may find it difficult to lock in those projects. Big difference is they are in MISO, we’re in PJM, that changes some of the dynamics.
- Anthony Alvarez – This slide is confusing me too. Torpey – total cost difference is on next slide.

Q&A (slide 20):

- Jeff Earl – is it the emissions costs that causes the Rockport Unit 1 scenario to go up? Torpey – yes, based on the carbon costs we assumed. Uses a \$15/metric ton for carbon emissions starting in 2028, escalating at 3.5% per year. But also, incremental capital is about \$270 million over the preferred plan.
- Laura Arnold – Power project in Shelby County - \$1/watt, probably the lowest cost I’ve seen. Checked the MISO interconnection queue for solar and saw 9500 MW of solar in the queue; it was over 3000MW in PJM last time I checked. So there are plenty of developers willing and able to do utility-scale solar. Very dynamic area. Torpey – and that’s why we have solar in our plan in the near term.
- Steve Francis – Want to point out that the High Renewables are \$500M lower in cost compared to preferred plan. Scott – much of the value of that scenario is in the end effects stage, after Year 20. And we’ve raised some concerns with the level of renewables in that scenario. But we’ll consider that as we go out to the market and get more information.

Preferred Plan Risk Assessment (slide 21)

Q&A:

- Steve Francis – The differences in risks among the scenarios is muddled a bit by including the FGD scenario. Is it fair to say High Renewables is less risky? Scott – believe that is correct statement, with the qualification that the analysis is based on the variables on the next slide. Major risk with the High Renewables is the deliverability of that level of renewables. Don’t know how to accurately capture that risk right now.



Key Stochastic Variables (slide 22)

The key stochastic variables are 100 Sample Stochastic Gas Price, 100 Sample Stochastic Coal Price, 100 Sample Stochastic Market Price, and 100 Sample Stochastic CO2 Price.

Preliminary: IRP 5-Year Action Plan (slide 23)

- Torpey – looking at 300MW of solar; we'll see what the bids come back with.

1. Final IRP Inputs, Scenarios & Modeling Results- John Torpey, *Managing Director, Resource Planning* and Scott Fisher, *Manager of Resource Planning*, Connie Trecuzzi, *Economic Forecast Analyst Staff*

Scenarios & Portfolios Considered (slide 25)

Case 1 is the base plan

Case 9 is Transitional/Preferred Plan

The MW of the solar and wind in the High renewables is doubled

Q&A:

- What is the annual constraint in relation to the annual capacity needs? Are you saying the model will incredibly overshoot on renewables?
- Anna Sommer – Couldn't you use constraints on the reserve margin so as to keep the model from over-selecting resources? That's what IPL is doing for their modeling. Scott – the 20% was the maximum reserve margin.
- Anna Sommer – how is Scenario 12a the lowest cost, yet Scenario 1 is your base optimization plan? Scott – Scenario 12a does not have constraints that we think are reasonable with respect to solar/wind.
- Laura Arnold – How are you defining "mini grid" vs. "micro grid"? Scott – for the IRP, there hasn't been a lot of discussion. Our definition is a resource that is located on distribution grid, perhaps at distribution voltage levels that would not be a facility with multiple units, but rather single unit. Not to say the Company couldn't pair that with solar, or storage. But what we modeled was single natural gas resource with capacity value that can be located on the distribution grid.
- Laura Arnold – so mini-grid not associated with a specific customer? Not at this time, just modeling as a potential resource we want to pursue.
- Jennifer Washburn – what are the assumed lives for wind/solar in the model? Scott – 30 years.

Updated Load Forecast (slide 26)

Yellow is 2018 forecast

Red is updated forecast which is slightly lower due to weaker economic outlook

Fundamentals (slide 27) & Commodity Process (2019 Forecast – Nominal \$) (slides 28-29)

Coal prices are slightly higher but lower on a transportation basis

Q&A:

- Kerwin Olson – evolving state of carbon mitigation – is that just carbon capture and storage? Connie – that plus evolving state regulations. Included national CO2 prices, but will follow state changes.



- Kerwin Olson – plant retirement – cost recovery issues with Cook in Michigan? Connie – we’re modeling fundamental prices, it’s nationwide, not just Cook. Will there be a license extension, economic situation associated with operating those plants.
- Steve Francis – What is basis for \$15/metric ton and starting date for carbon? Based on our environmental experts. Think there will be some burden on carbon.
- Steve Francis – is the 2028 date based on retiring Rockport? Connie – this is a national assumption, nothing to do specifically with I&M or I&M’s units.
Steve Francis – inquired about documentation regarding national basis for forecasting

IRP Inputs and Assumptions (slide 30)

In 2023 when I&M has capacity shortfall it allows for it to pick something short term for a bridge to a low cost solution.

Q&A:

- Pete Boerger – Are you expecting PJM capacity prices to stay below cost to build new CT? Scott – this is cost to keep an existing resource online.

Updated IRP Inputs and Assumptions (slides 31-32)

Updated wind pricing and capacity credit has increased

Updated solar sources – 2022&2023 – lowest cost per watt in forecast -\$50/MWh

Updated IRP Inputs and Assumptions – EE Bundles (slides 33-34) Appendix (slides 37 - 69)

2. Stakeholder Presentation (slides 60 - 66), Jennifer Rice-Snow, Wesley Rice-Snow, Anna Sommer

- Jennifer Rice-Snow – Appreciate you coming out to Muncie. Want to talk about climate change projections – expect electric vehicle demand to increase. Expect increased use of air conditioning due to rising temperatures. Expect fossil fuels to be linked to climate change and health costs. Don’t want fear-based, science-denying tactics used. Want clean energy jobs, innovations, solar fields. Would be amazing to put large solar project here in Muncie.
- Wesley Rice-Snow – incorporating renewable energy slowly is not consistent with what our environment need, or what your Indiana customers need. Want to see more wind and solar in your 5-year plan.
- Anna Sommer – Compared savings goals in Indiana/Michigan vs. realistic and max savings. Bottom line is neither realistic nor max savings would result in the same level of savings as is already in Indiana and Michigan.
 - Anna Sommer – slide 2 – compared market potential study to IRP bundles. You can see the savings in the market potential study much higher than in the current modeling. Concerned EE is being disadvantaged due to degradation factors.
 - Anna Sommer – slide 3 – IRP bundle costs are much higher than the 2019 total budget. I&M’s 2019 budget, which has higher level of savings, is lower than the IRP modeled bundle

3. Closing – Marc Lewis, VP Regulatory & External Affairs



Marc closed the meeting at 5:12 pm and thanked everyone for their time so we can have better IRP at the end of the process. The step will focus on finalizing the IRP on July 1st.

Conference Meeting Summary

Meeting Details

Start Time:	05/23/2019 12:05 pm (Eastern Time)
End Time:	05/23/2019 5:12 pm (Eastern Time)
Participants:	49
Total Minutes:	5550
