

Vectren 2019 IRP
2nd Stakeholder Meeting Minutes Q&A
October 10, 2019, 9:00 a.m. – 3:00 p.m.

Lynnae Wilson (CenterPoint Energy Indiana Electric Chief Business Officer) – Welcome and Safety Message (distracted driving) and Vectren introductions

Subject Matter Experts in the room: Anna Nightingale, Justin Joiner, Ryan Wilhelmus, Matt Rice, Wayne Games, Tom Bailey, Steve Rawlinson, Rina Harris, Shane Bradford, Heather Watts, Angie Bell, Natalie Hedde, Angie Casbon-Scheller, Bob Heidorn, Cas Swiz.

Gary Vicinus (Moderator, Managing Director for Utilities, Pace Global) discussed the agenda and provided a summary of stakeholder process (last meeting and present meeting). Approximately 35 stakeholders attended in person. List of affiliations include the following:

CAC
Country Mark
Hallador Energy
IBEW Local 702
Inovateus Solar LLC
IURC
NIPSCO
Orion Renewable Energy Group LLC
OUCC
Sierra Club
Solarpack Development, Inc.
SUFG
Valley Watch

Approximately 35 registered to attend the webinar; several participated. Those registered included representatives from:

Advanced Energy Economy
AEP
Boardwalk Pipeline Partners
Development Partners Group
Ecoplexus
Energy and Policy Institute
Energy Futures Group
EQ Research
First Solar
Hoosier Energy
ICC
Indiana Distributed Energy Alliance
IPL
IURC

juwi Inc.
Lewis Kappes
MEEA
Morton Solar & Electric
NextEra
NextEra Energy Resources
OUCC
Sierra Club
Vote Solar

Matt Rice (Vectren Manager of Resource Planning) and **Gary Vicinus** (Pace Global, Managing Director for Utilities) – presented Follow-up Information Since Our Last Stakeholder Meeting - Slides 9-13

- Slide 13 Stakeholder Feedback Cont.:
 - Request for folks to introduce themselves in the room and on the phone
 - Response: We have a full agenda; maybe we can take 5 minutes if there is time.
- Slide 13 Stakeholder Feedback Cont.:
 - Question: Can we send you additional health benefits studies for your consideration?
 - Response: Yes
- Slides 17-18 Scenario Narratives:
 - Clarifying question: Can we focus more on these two slides, as I'm interested in discussing the changes?
 - Response: Yes, we can discuss at the end of this session.
- Slide 24: Feedback and Discussion:
 - Question: With regards to the uneconomic asset risk analysis, you mentioned that you would be running 200 iterations. Will you be considering an earthquake in one of those iterations when assessing a portfolio?
 - Response: We will be assessing changing market conditions; I would not say earthquakes. We will be assessing the costs of various portfolios to determine if a portfolio becomes uneconomic under various market conditions, including fuel, load, technology costs, etc.
 - Question: Last meeting, you said you would consider a carbon fee and dividend scenario. But what you've included doesn't look like what we proposed. It's apples and oranges. I'm suggesting a carbon dividend is national and would affect gas, coal, etc. right here in Indiana. By definition, a carbon dividend is Low Regulatory but it is lumped in here with High Regulatory. HR 763 is a pending bill at national level with 60+ co-sponsors that may very well become law [link: <https://www.congress.gov/bill/116th-congress/house-bill/763>]. This was recently highlighted in a January Wall Street Journal article [WSJ article link: <https://www.wsj.com/articles/economists-statement-on-carbon-dividends-11547682910>] with a letter signed by 3,500 prominent economists advocating for a carbon dividend that will happen within 20 year timeframe of IRP. You've put it in High Reg but it looks more like the 80% case. No one is talking about cap & trade anymore. Rather than generic terms, why not put in this pending legislation and why not put it in the Low Reg scenario? Use what the bill proposed: \$15/ton in first year, escalates by \$10/ton each year thereafter?
 - Response: We'll consider that feedback. We need to consider a range of carbon prices, and maybe what you've suggested will align better with another scenario.
 - Question: Why not use actual pending legislation based on Paris Accord?
 - Response: We are going to capture a very wide range of carbon prices in the analysis. We do consider the Paris Accord in our analysis; you will see the CO₂ graph that demonstrates this. You'll see very high carbon prices in one scenario,

- a 2% solution, ACE, and we're also considering adding a carbon price to the Base Case.
- Question: You mentioned using global warming potential of methane. Does CO₂-e capture this?
 - Response: CO₂-e will be captured in the stochastic runs (risk analysis and included in the scorecard). But within the scenario analysis, it is CO₂.
- Question: On Slide 21, Life Cycle Green House Gas (GHG) Emissions, what it really boils down to is methane. Credible reports show 2.3% methane leakage. Math is simple. Gas isn't any better than coal in terms of GHG emissions.
 - Response: This is based on an NREL study that considers upstream and downstream emissions, which includes methane leaks.
- Statement: It's not complicated, 2.3% leakage and 87x more global warming potential. You can do it on a scratch pad.
 - Response: We are including methane leakage. We want to have quantitative measures in our scorecard. This rate includes what you're asking for.
- Question: Are there only five possible scenarios in your modeling software? Can you add more, e.g., Lani Ethridge's scenario [HR 763]?
 - Response: I would like to hold this question until we discuss the scenario inputs and show you the wide range of scenarios that we've created. Additionally, we will gather strategies to create other portfolios later today.
- Question: Please let folks on phone ask questions. Thank you for the tentative 10/24 Aurora call with Energy Exemplar. However, the \$5k cost raises incredibly grave concerns for us, particularly as this process is supposed to lessen disputes before we enter litigation phase. This cost forecloses stakeholder participation and charging us for transparency is problematic. Also, according to Indiana Administrative Code 170 IAC 4-7-2.5, Vectren doesn't comply if we can't access the model at this cost. In Michigan, a utility was granted ~10 licenses within their subscription.
 - Response: We'll talk about that during the call on 10/24.
- Question: On Slide 21, happy to see Life Cycle GHG emissions; however, the NREL study is very dated, especially on solar. Can I provide updated studies?
 - Response: Yes, please send, though what we liked about the NREL study was that it considered many other studies and multiple perspectives, even if it is a little dated.
- Question: All the closures and retirements in the 2016 IRP, is that the base case in this IRP?
 - Response: This IRP is an update, and we are re-evaluating. Wayne Games will discuss how we will be evaluating existing resources.
- Question: So, it's possible that AB Brown could stay open?
 - Response: Yes.
- Question: Can we please try again for the phone?
 - Response: Please type questions. We do not see any typed questions at the moment.

Justin Joiner (Director of Power Supply Services) – MISO Considerations – slides 25-32:

- Slide 26 MISO Summary
 - Question: Why do you attribute changing resource mix to accreditation when weather, forced outages at fossil fuels plants, etc. can also be a driver?
 - Response: We'll address in detail shortly but changing resource mix is one of the main drivers. Outages or load are other contributing factors.
 - Question: Wouldn't an increase in emergency events change accreditation?
 - Response: No, let's address shortly.
- Slide 28 Congestion
 - Question: Please explain price separation in zone 6.
 - Response: Overnight when there are low load periods and high wind output, MISO sends a negative price signal, which lowers the price that we are receiving

- there. The \$5 price difference is a simple average over the last 12 months on an hourly basis.
- Question: Do we need more transmission since we're talking about congestion?
 - Response: Yes, the next slide discusses MISO planning. MISO has two processes. (Slide 29) Interconnection queue (paid by new generators) and transmission planning process (paid for by all MISO participants, thus socialized across MISO footprint) helps to plan for new transmission needs to remedy congestion.
 - Slide 31 All MISO Considerations Need to Be Accounted for During the IRP
 - Question: Which zones saw maximum generation events?
 - Response: Most recent maximum generation event was several zones (the North Central Region), including LRZ6 but up to Minnesota. The prior maximum generation events were more in MISO-South. We can follow-up on other events, if needed.
 - Question: How, within Aurora, does Vectren intend to try to account for seasonal accreditation?
 - Response – Pace can speak to this in more detail if needed, but you can set UCAP values in Aurora and the PRM requirement monthly.
 - Question: You mentioned one event was due to non-firm gas delivery. Wasn't the gas line to supply your formerly proposed gas plant with a non-firm contract?
 - Response: We were planning on serving that plant with firm delivery to ensure that we had high priority on delivery list.
 - Question: For transmission over 345 kW you mentioned costs would be distributed across MISO participants. Would that be true if a hydro unit was installed at the Meyers dam?
 - Response: I apologize, we're talking about 345 kV, so transmission delivery, not energy. We are talking about the rating of the line (line size).
 - Question: Were you involved with Duff Coleman transmission? I was involved as a property owner. Looking at current transmission corridors, and the effect of eminent domain on property owners. I think Vectren needs to consider corridors, competitor lines. How can you consider existing corridors?
 - Response: Planning is typically to use existing corridors. Vectren is not involved in the construction of the Duff Coleman transmission line (MISO opened it up to bids). MISO must consider all of this when planning transmission Right of Ways.
 - Comment: It is premature to modify reserve margin requirement based on max gen events. There are other options besides a seasonal resource adequacy construct. Could it help to address those issues with coordinated outage/maintenance schedules? It is perfectly fine to model as a base case sensitivity but not a base case assumption.
 - Response: MISO already implemented coordinated maintenance schedule reporting, which Vectren is already complying with. On seasonal construct, this is driven by MISO and we can't ignore or avoid; Vectren is only one stakeholder among many. Four season construct is already planned for implementation in 2021 by MISO. Vectren is looking at two seasons, not four, which is a conservative assumption that could potentially limit impact.
 - Question: Will recorded NPVs be based on deterministic modeling or stochastic modeling?
 - Response: Both. We'll look at portfolio performance on an expected (probabilistic) basis (from 200 iterations in the risk analysis) as well as deterministic NPV results (from the scenario analysis).
 - Question: Can you count on MISO to fill gaps for a year or two after coal is retired but before new resources are online? It seems like that would create some flexibility in how you move forward.
 - Response: We do have the ability to account for purchases to fill in gaps. That's part of the economic analysis.
 - Question: Does MISO plan to mitigate max gen events with solar+storage or even stand-alone storage?

- Response: MISO requires four consecutive hours of output. So, if nameplate storage is 100 MW, then accreditation is 25 MW over four hours. To your question, MISO seasonal accreditation planning is meant to better align actual output with accreditation.
- Question: When is MISO planning on incorporating new technology resources into their planning?
 - Response: They try to be as responsive but given all the stakeholders they can be a little slow at times for the latest technologies. They are responsive. To get changes done in the marketplace, that process usually takes 12-18 months to implement in new tariffs, etc. They also try to make market rules (with a year lag) based on annual transmission planning process, with respect to state planning processes.

Gary Vicinus (Pace Managing Director for Utilities) - Scenario Modeling Inputs – slides 33-48:

Slide 48 Feedback and Discussion:

- Question: You're showing these inputs, but what about distributed generation? If you lift policy caps on solar, your demand would drop a lot with solar as well as behind-the-meter storage. Don't the caps limit solar DG (in schools, etc.)? We could get there at a reasonable cost because the investment comes from individuals.
 - Response: We don't cap the amount of distributed solar considered, but payback calculation within the model is affected by net metering structure. We are going to analyze a wide range for peak loads; Itron did a sensitivity on rooftop solar that falls within this range.
- Comment: I'd like to see intentional changes in policy to promote distributed energy and how would that affect the rest of your modeling (and Behind The Meter, bi-directional batteries)? I would like to see incentives.
 - Response: I would suggest that this be one of the strategies for the group breakout session.
- Comment: Under Energy Innovation and Carbon Dividend Act being considered in congress right now, in 2022 CO₂ would be \$15 but in 2039 it would be \$185. That would change the outlook considerably.
- Question: Also, why is coal price lower if costs are higher?
 - Response: Lower coal prices follow from lower coal demand. With reduced demand, only the most efficient will survive.
- Question: The peaks and valleys on these graphs would indicate to me that the same distribution is not being assumed in any given year. For example, the distribution is not always normal. For the capital costs in particular, that strikes me as a level of precision that does not actually exist. For example, why would two standard deviations give you a wider range of distributions in 2033 vs. 2036 for solar? In general, I would reiterate the feedback that we have given previously. Stochastic simulation is not a good tool for capex (just for volatile variables like gas). Will these standard deviations be applied to the bids received from the RFP?
 - Response: Distributions do vary over time, as one would expect, as uncertainty increases over time. It's correct to say the distributions are not always normal (e.g., gas wouldn't fall below \$2 because costs must be recovered). Market conditions drive the upper end. Many of our distribution are skewed to the upward side. To say that stochastic simulation is not a good test, I would say that is a point of view. We use stochastics in many jurisdictions and it is widely accepted. It is intended to reflect not only the volatility but also the uncertainty as we go forward.
- Question: Why do distributions widen, narrow, widen, etc., if uncertainty grows? And using stochastics for solar capital costs standard deviations doesn't reflect how actual capital costs move. Why not use sensitivities, which is what is typically seen in IRPs?
 - Response: A lot of these graph reflect monthly variations as opposed to annual. They tend to smooth out when you look at them on an annual basis. Ultimately, we will do some annual smoothing. I agree that the monthly variations are not easily explained, but they tend to level out on an annual basis.
 - Question: Will you apply distributions to bid prices?

- Response: We will use for the various years where we have bid information as an input at base levels. After the bid years, the stochastic distributions will be reflected.
 - Question: If a bid resource would come online in 2022, you wouldn't apply distributions there?
 - Response: In your example, we will utilize the bid information for 2022 and use the distributions going forward (beyond 2022). We will set up a follow-up conversation.
- Question: How did you come up with 2.2% inflation assumption?
 - Response: It is a projection from Moodys.com.
- Question: When do the probability distributions come into effect (after bids)?
 - Response: Bids come in in different years, then we start uncertainty shortly thereafter.

Michael Russo (Sr. Forecast Consultant, Itron) – Long term Base Energy and Demand Forecast – slides 49-60:

- Slide 57 C&I Sales Forecast:
 - Question: Can you pull out Electric Vehicle (EV) owners who have solar Distributed Generation (DG)? EV owners aren't adding to load given that they have solar DG too.
 - Response: We start with 200 registered EV owners but Itron doesn't have info on who also has solar distributed generation. The impact won't be large given the small starting number.
- Slide 60 Feedback and Discussion:
 - Question: You did the forecasts for the 2016 IRP. How accurate were those forecasts?
 - Response: We did not specifically look at the last couple of years, but in general we do look at forecasting error. We do hold out the last year of the model and compare how well the model performs, now that we have the actuals. Our Mean Absolute Percentage Errors (MAPE) on the residential and commercial side is typically around 2%. They are higher on the industrial and peak models.
 - Question: On Slide 59, you show significant drops in both energy and demand that don't seem to be reflected in residential and C&I.
 - Response: That is a large industrial customer that is modeled separately (and not included on Slide 56 C&I Sales Forecast).
 - Question: The industrial growth is very significant. Can you say more?
 - Response: We can't comment on individual load additions publicly. What we can say is that there are two public projects in Southwest Indiana that received air permits in the past two years (in public domain). We have formulated expected MWs and MWhs from potential customers that have come to us. We have signed NDAs for projects (required for all economic development opportunities), but large industrials account for the majority of industrial uptick. We have an obligation to serve this load.
 - Question: How will these load forecasts be translated into high/low load forecasts, particularly given large industrial customers? I have similar concern to the CAC.
 - Response: The answer depends upon the component. Looking at higher/lower EV forecast, we take that input in developing upper/lower boundary scenarios. Pace starts with what Vectren/Itron provides us, then we look at uncertainties around this. Even when individual components such as EV or solar, we're still within the boundaries showed earlier. We haven't finalized load, so we'll look at individual components and adjust accordingly.
 - Question: Is the coal to diesel plant reflected in to the two permits that you discussed earlier?
 - We are not going to comment on those two specific permits.
 - Question: Is Southern Indiana petrochemical facility included in industrial outlook?
 - Response: Cannot comment on specific projects.
 - Comment: The coal-to-diesel plant won't happen, so if you're considering this in the forecast, you need a new forecast. If they're already permitted, why can't you discuss them?

- Response: We have signed NDAs with perspective customers at their request. and so, we can't discuss their load for competitive reasons.
- Comment: I've been having a moment at these meetings. It struck me when we looked the slide about trended normal weather. It feels to me like we're rearranging deck chairs on the Titanic. I think that the issue that we need to be basing our decisions on is around that exact fact. Climate crisis demands we act, not because we're forced to by any rule, but because we need to act for our children. I feel like what we're talking about is not what is important.
 - We're basing off historical weather trends, which is used by government and others.

Wayne Games (Vice President power Generation Operations) – Existing Resource Overview – slides 61-75:

- Slide 75 Feedback and Discussion:
 - Question: (Clarification on solar resources) Do you plan to build 54 MWs of solar or over 100 MWs (referring to slides 64 Summary of Current Resource UCAP Accreditation for Summer Peak and 66 Renewables)?
 - Response: We have two 2 MW projects and plan to build an additional 50 MWs.
 - Comment: These options for AB Brown, etc....these plants are obsolete now. It seems awkward to invest more in dying technologies.
 - Response: I'm not saying we should or shouldn't. We're required to look at all options and some stakeholders have asked us to look at these options.
 - Comment: Even when you show 80% carbon reduction by Paris Treaty, that doesn't reflect what we face now. Right now, there is a lake in Siberia that is bubbling up methane because we under-projected. We need a Greta Thunberg portfolio, which means we put everything possible into cutting carbon emissions. We need a crisis scenario.
 - Comment: On carbon, Vectren should be looking into technology to sequester carbon. Where can Vectren use science, like Duke Energy, to get today's youth involved in STEM classes. You need to look at the bigger environmental picture.
 - Comment: There were a lot of numbers and analysis. We'd like to work with you to get access to your numbers, including Slide 74 A.B. Brown FGD Options, derived from outside engineering studies.
 - Question: Where will 50 MW solar plant be built?
 - Response: East side of Spencer County.
 - Question: I don't understand why you use historical weather when Purdue University. uses different projections? I don't understand why your projections don't look like their projections.
 - Response: What we use is consistent with what EIA uses. We did not use the Purdue data set.
 - Question: So, you're saying you should use historical approach because you expect nothing out of the usual?
 - Response: Our forecast is different than what we've done in the past to address the trended weather concern.
 - Comment: Have you looked at Purdue report?
 - Response: We attended the talk the other night and looked at the website. If you'd like to send me the report, we'll look. We will reach out to Purdue to understand their dataset.

Matt Lind (Resource Planning & Market Assessments Business Lead, Burns and McDonnell) Potential New Resources and MISO Accreditation – slides 76-92:

- Question (Slide 81 Technology Details): Can you explain difference between estimated potential capacity and estimate feasible capacity and estimated optimal capacity?

- Response: We would need to look more closely, but I believe that the Estimated Potential Capacity is the technical potential, not necessarily the most economic option.
 - Question: On slide 84 & 80, does solar+storage mean exclusively charged by solar or charged by grid?
 - Response: The former (exclusively supplied by the sun) is generally the case, depending on the bids.
 - Question: On slide 84 Proposal Location Review, what is the difference between proposal installed and project installed capacities?
 - Response: Proposal includes double- and triple-counting.
 - Question: On Slide 85 Participating Companies, is Duke Energy a participant?
 - Response: Yes
- Slide 87 MISO Renewable Penetration Trends
 - Question: Counterintuitive – Your credit to solar shouldn't go down as installed capacity goes up. It's counterintuitive to me.
 - Response: As more solar, a non-dispatchable resource, is added to the system accreditation goes down. As you add more solar, the risk of being deficient from a resource perspective shifts to the evening hours. ELCC is a calculation that MISO has been using for wind resources for several years.
 - Question: Is the ELCC based on fixed or tracking solar?
 - Response: Orientation, geography, etc. are all considered, but accreditation (the amount of credit MISO is projected to provide for resource) will still decline over time.
 - Question: Prices are higher than I've seen. Are these prices typical or representative of actual bids?
 - Response: This is technology assessment data, not bid data.
 - Question: Wouldn't MISO accreditation change with storage?
 - Response: Yes, though even standalone storage would be affected given the duration of storage. To be eligible for full accreditation for storage, you need more than 4 hours of storage. This reinforces the diversity of resources and the location of resources.
- Slide 89 Wind Seasonal Differences
 - Question: So, you're making changes for Southern Indiana based on MISO which encompasses Canada to Gulf of Mexico. Doesn't this skew things?
 - Response: MISO provides a unique geographic accreditation to each Local Resource Zone, though it is still tied to the MISO peak.

Feedback and Discussion slide 92:

- Comment: I noticed a combination that may be cost effective. We worked on this during the prior CCGT case. That is repowering one of the Brown units coupled with the smaller CCGT. The new gas pipeline doesn't need to be double-counted. You could use one pipeline to serve both units.
- Question: When does wind and solar become dispatchable (with sufficient storage)?
 - Response: Storage round-trip efficiency is a net load to the system. Today's technology is not there yet. You'd have to add a lot of storage, but there would still be a net load. It depends on technology, consumer behavior, etc. Battery experts are researching this. I don't see it in the near term.
- Question: Would bigger installations of PV panels or turbines lead to less need for storage?
 - Response: That is a strategy people are looking at, particularly to take advantage of tax credits.
- Question: Why does solar capacity credit start at 50% and not 60% on Slide 87 MISO Renewable Penetration Trends? Also, can you show us specific data showing forecast for renewable and storage penetration?
 - Response: We took the average across the MISO Transmission Expansion Plan (MTEP) futures. The average installation grows from 6,000 MW in 2023 to about 25,000 MW by 2033. We extrapolated that trend line beyond 2033. On slide 91 Zone

6 Seasonal Accreditation, we used 50% during the first year of operation, per MISO ELCC figures.

- Question: What is the basis for 0% capacity accreditation in winter?
 - Response: Peak hours are in the H20-H22 range when there is no solar production.

Jeffrey Huber (Managing Director, GDS Associates) - DSM Modeling in the IRP – Slides 93-103:

Slide 103 Feedback and Discussion:

- Comment: Thank you Vectren and Jeff for working with the CAC on this through the Oversight Board. We look forward to seeing how this all works through the IRP process.
- Question: About interruptible tariff (not part of this DSM analysis), will we continue that process?
 - Response: We're in the process of truing up our interruptible tariff with MISO in mid-to late-November, which would true up notification times.
- Question: I'm interested in economic curtailment.
 - Response: We're working on language changes (ongoing) and we'll get back to you on that.

Gary Vicinus (Pace Managing Director of Utilities) – Stakeholder Breakout Session Strategy Development – Slides 104-107:

- Instructions given: Examples: Impose an Renewable Portfolio Standard (RPS) of X% by X year, or a portfolio with no coal by X year, etc.
- See Slide 106 Portfolio Strategy Worksheet – use this for strategies and timeframes
- Group 1: Six strategies:
 1. Plants scheduled in 2016 IRP – Do that by 2024 and replace closures with renewable energy capacity
 2. Culley 3 be closed by 2030, also replaced by renewable energy
 3. Lobby to extend net metering at 1-to-1 ratio, no cap, by 2022
 4. Close gas-fired plants by 2030 and replace with renewable energy (solar)
 5. Maximize Energy Efficiency efforts immediately (by 2020) through incentives
 6. Increase storage in timeframes to accommodate bringing on renewable energy (~5 years, timed to retirements, focused on Behind the Meter solar)
- Group 2:
 1. Do what NIPSCO is doing. As resources retire, replace with renewable energy. (Clarification from stakeholder – NIPSCO in 2026 is adding a price on carbon, whereas Vectren Base Case is \$0 for 20 years)
 2. Go for 100% renewable energy by end of 2030
 3. Have 100% reduction in CO₂ and equivalents at the end of 20 years
 4. Have other experts review how you're using our recommendations (to ensure it is being treated fairly in the modeling)
- Group 3:
 1. We want to access all the runs under the Nondisclosure Agreement (NDA).