STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

IN THE MATTER OF THE VERIFIED PETITION OF INDIANAPOLIS POWER & LIGHT FOR APPROVAL OF DEMAND SIDE MANAGEMENT (DSM) PLAN, INCLUDING ENERGY EFFICIENCY (EE) PROGRAMS, AND ASSOCIATED ACCOUNTING AND RATEMAKING TREATMENT, INCLUDING TIMELY RECOVERY, THROUGH IPL'S EXISTING STANDARD CONTRACT RIDER NO. 22, OF ASSOCIATED COSTS INCLUDING PROGRAM OPERATING COSTS, NET LOST REVENUE, AND FINANCIAL INCENTIVES.	)	**CAUSE NO. 45370**

PETITIONER'S SUBMISSION OF REBUTTAL TESTIMONY OF
ERIK MILLER

Indianapolis Power & Light Company ("IPL" or "Petitioner"), by counsel, hereby submits the rebuttal testimony and attachments of Erik Miller.

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing was served this 26th day of August, 2020, by email transmission, hand delivery or United States Mail, first class, postage prepaid to:

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Petitioner's Exhibit 5

VERIFIED REBUTTAL TESTIMONY

OF

ERIK K. MILLER

ON BEHALF OF

INDIANAPOLIS POWER & LIGHT COMPANY

CAUSE NO. 45370

INCLUDING IPL WITNESS EM ATTACHMENTS R1 THROUGH R2

VERIFIED REBUTTAL TESTIMONY OF ERIK K. MILLER
ON BEHALF OF
INDIANAPOLIS POWER & LIGHT COMPANY

Q1. Please state your name, employer and business address.

A1. My name is Erik Miller. I am employed by Indianapolis Power & Light Company ("IPL" or "Company"), whose business address is One Monument Circle, Indianapolis, Indiana 46204.

Q2. What is your position with IPL?

A2. I am the Manager of Resource Planning.

Q3. Please briefly describe your educational background and business experience.

A3. I hold a Bachelor's degree from Indiana University's School of Journalism and a Master of Public Affairs degree from Indiana University's School of Public and Environmental Affairs. Prior to coming to IPL, I worked as a Senior Project Manager for the energy efficiency consulting company, CLEAResult from 2012 – 2015 and prior to that as an Energy Efficiency Program Coordinator at Hoosier Energy Rural Electric Cooperative from 2009 - 2012.

Q4. What are your current duties and responsibilities at IPL?

A4. I am responsible for the economics and decision support analysis in the areas of resource planning, environmental planning, and other strategic level analysis.

Q5. Have you previously testified before this Commission?

A5. Yes. I have previously testified before the Commission in IPL's DSM Plan filings in Cause Nos. 44792 and 44945.

Q6. What is the purpose of your rebuttal testimony in this proceeding?

A6. The purpose of my rebuttal testimony is to respond to the direct testimony of John E. Haselden filed in this Cause on behalf of the Indiana Office of Utility Consumer Counselor ("OUCC") and Anna Sommer and Dan Mellinger filed on behalf of the Citizens Action Coalition ("CAC"). I will address the following:

- The basis for and reasonableness of IPL's Avoided Cost assumptions used in the benefits and cost analysis for this DSM Plan;
- The concerns raised by the CAC regarding the DSM modeling within IPL's IRP;
- The concerns raised by the CAC regarding the Market Potential Study used to inform the IRP and this DSM Plan;

Q7. Are you sponsoring any attachments?

A7. Yes. Attachment EM-R1 – End Effects Chart, Attachment EM-R2 – IPL Response to Stakeholder Comments on the 2019 IRP

Q8. Were the attachments prepared or assembled by you or under your direction or supervision?

A8. Yes.

<u>Avoided Costs</u>

Q9. Mr. Haselden (pp. 3-4) identifies concerns with two of the avoided cost inputs used to calculate the benefit and cost analysis. Please summarize those concerns.

A9. Mr. Haselden believes that IPL inflated 1) the avoided capacity costs used in the DSM Plan benefit and cost analysis; and 2) the avoided transmission and distribution capacity

costs used in the DSM Plan benefit and cost analysis. I disagree with Mr. Haselden's assessment. 1) Mr. Haselden fails to recognize the cumulative avoided capacity effects that DSM provides in resource planning and 2) IPL's estimation of avoided T&D capacity costs are reasonable and more robust compared to methodologies used by other utilities. I'll elaborate on these points later.

Q10. Do the capacity avoided costs meet the definition of avoided costs included in 170 IAC 7 – "Guidelines for Integrated Resource Planning by an Electric Utility"?

A10. Yes. The avoided capacity costs used in IPL's analysis meet the definition included in 170 IAC 4-4.1-9 which states –

b) As used in this rule, "avoided cost" means the amount of fuel, operation, maintenance, purchased power, labor, capital, taxes, and other cost not incurred by a utility if an alternative supply or demand-side resource is included in the utility's integrated resource plan.

IPL's avoided capacity costs come from a fundamental capacity curve provided by Woods Makenzie. The capacity curve reflects a conservative market value of capacity in the near term that escalates to the net cost of entry (cost of a new unit) in 2023 which is consistent with the year IPL reaches a short position from retiring Petersburg units 1 and 2. These curves provided planning estimations of the costs IPL would not incur due to the inclusion of a demand-side resource per the Rule definition detailed above.

Q11. Are the capacity and T&D capacity avoided costs used in IPL's benefit and cost analysis consistent with those used in the Market Potential Study ("MPS") that informed the IRP?

A11. Yes. IPL used the same capacity and T&D capacity avoided costs to evaluate the economic potential of the DSM measures in the MPS and create the IRP bundle inputs (for IRP evaluation) as the avoided costs used for the benefit and cost analysis in this DSM Plan filing. Remaining consistent with the MPS and IRP planning ensures that the benefits from DSM align with those calculated in the IRP; the results of which lead to the retirement of both Petersburg units 1 and 2 by 2023. Deviating from these planning assumptions and applying Mr. Haselden's proposed methodology could result in the removal of DSM program offerings/savings from the portfolio due to cost effectiveness issues. This result would be inconsistent with the level DSM required to reach a capacity need of approximately 200 MW in 2023 after Petersburg units 1 and 2 are retired.

Q12. Did IPL use the same methodology for capturing capacity and T&D capacity avoided costs as in prior proceedings?

A12. Yes. The methodology used in this DSM plan is consistent with the methodology used in the 44945 proceedings for DSM programs from 2018 – 2020. In both proceedings, IPL used a consistent methodology of relying on third party fundamental curves for avoided cost projections. The T&D capacity avoided cost methodology and costs are the same in both filings.

Q13. Mr. Haselden (p. 16) indicates that "IPL is artificially inflating avoided generation capacity costs by including such costs when capacity is not avoided" and that the

value of capacity in years where the Company is long should be equal to zero. Do you agree with this claim?

A13. No. DSM is a unique resource in generation planning in that its effect of reducing load and thereby the need for capacity are cumulative. In other words, unlike a generator, DSM can't simply be constructed at a predefined level and turned on to achieve the capacity needed for the system. For example – in IPL's 2019 IRP preferred plan (scenario 3b), the capacity need in 2023 from retiring Petersburg units 1 & 2 is ~200MW. In order to reach this short position, the IRP model indicates that IPL must implement bundles 1 – 4 in 2021 – 2023 (or the approximate DSM identified in this plan) – which total approximately 83 MW of energy efficiency in 2023. This DSM is not a generation asset with a one-time fixed cost and nameplate capacity that can be put in service in 2023. IPL must begin incurring the costs and implementing the DSM in 2021 and continue to deliver the IRP-defined levels of DSM through 2023 in order to fulfill the planning objective. Giving the DSM kW impacts zero avoided capacity value in 2021 and 2023 as Mr. Haselden suggests, is fundamentally incorrect because the costs and kW impacts associated with this DSM implementation directly contribute to planning year 2023. Excluding these kW benefits would create a disadvantage to DSM when evaluating it against supply-side resources.

Q14. Are there other concerns with including a value of zero in the benefit and cost analysis in years when the utility is long capacity?

A14. In addition (and related) to the concern stated in Q/A 12 above, Mr. Haselden's approach does not allow for the consistent and continuous delivery of DSM programs. By zeroing the avoided capacity value of DSM in years when the utility is long, the approach creates

a possible issue of starting programs in years when they are cost effective and stopping programs in years when they are not. DSM programs are not intended to start, stop and start again in this manner. To achieve DSM targets, programs rely on continuity to develop project pipelines, market recognition and trade ally/contractor networks. Program start and stops only create market confusion, add start up and shut down costs and make achieving the kW planning targets cost-effectively a challenge if not impossible. Additionally, program starts and stops result in an implementation strategy that is contrary to IPL's fifth guiding principle (from Witness Elliot Direct Testimony, p. 20) the IPL will offer a portfolio that – "5) provides continuity from year to year."

Q15. Ms. Sommer (p.9) indicates that the IRP modeling did not account for the "Avoided T&D Benefits" when evaluating DSM. Please respond

A15. When referring to "Avoided T&D Benefits," I'm presuming Ms. Sommer is referring to the T&D capacity avoided costs. I'm making this presumption based on her description of "Avoided T&D Benefits" within her testimony. If "T&D Benefits" were "Avoided," they would serve as a cost in DSM modeling.

While IPL included the same T&D capacity avoided costs in the benefit and cost analysis performed for this filing as used in the MPS DSM screening for the IRP, IPL's PowerSimm model (IRP model used for resource selection) did not have a way to account for the avoided T&D capacity costs associated with DSM.

In her testimony, Ms. Sommer (p.9) proposes levelizing the avoided T&D capacity costs for each DSM bundle and reducing the levelized bundle cost by this amount. While IPL acknowledges Ms. Sommer's proposed methodology as a potential means to resolve this

modeling limitation, this alternative does not invalidate the rigorous approach IPL used, which I view as reasonable,

IPL did not simply making a general assumption. Rather, in IPL's analysis, distribution costs were calculated based on an equally weighted average cost to build new overhead and underground circuits to serve 10 MW which is the standard circuit capacity design. The cost per mile was divided by the circuit capacity of 10 MW or 10,000 kW to arrive at a cost per kW. Annual fixed charges were calculated based on this cost times the levelized fix charge rate in IPL's most recent Rate CGS filing. The sum of these costs is multiplied by 20% to reflect the approximate number of the distribution circuits that would likely require upgrades based on current circuit loading. Transmission costs are equal to 10% of the distribution cost calculation.

IPL was collaborative and fully transparent with the CAC during the IRP process. The CAC spent ample time reviewing the planning documents that IPL shared however, this issue was never raised by the CAC at that time. That said, IPL would like to continue to collaborate in future IRP cycles to reach a resolution should the limitation arise again.

Q16. Ms. Sommer (p.10) indicates that IPL's T&D capacity costs are "quite low" whereas Mr. Haselden (p.20) calls for a recalculation because they are too high. Considering their opposing views on the subject, do you think the T&D capacity costs that IPL included in the IRP DSM screening and the benefit and cost analysis are reasonable?

A16. Yes. Ms. Sommer cites a paper written by the Regulatory Assistance Project entitled – "Valuing the Contribution of Energy Efficiency to Avoided Marginal Line Losses and

Reserve Requirements" which indicates that EE savings often occur during peak demands resulting in much higher T&D capacity avoided costs. Ms. Sommer indicates on p.10 of her testimony that the T&D capacity avoided costs should be in the range of $30 per kW-year to $150 per kW-year according to the RAP paper.[1] On the other end of the spectrum, Mr. Haselden (p.18) indicates "IPL's calculation includes excessive T&D avoided capacity costs" stating that IPL's T&D capacity issues would have been relieved by the Great Recession of 2008. At approximately $23/kW-year in year 1, the T&D capacity cost that IPL used in this DSM Plan is a reasonable middle ground between the two opposing stakeholder views on the assumption.

Q17. Mr. Haselden claims that any of IPL's T&D capacity issues would have been greatly relieved by the Great Recession. Do you have comments regarding this claim?

A17. Yes. There's no question that the Great Recession caused a drop in load and likely relieved some local capacity issues. However, as distribution assets age over time, T&D capacity improvements eventually become necessary – even with flat load growth. IPL has been implementing DSM at a meaningful level since 2011 in part to avoid the need for additional T&D capacity. This approach has been effective, and the Company plans to continue offering DSM programs as a cost-effective means to alleviate T&D capacity issues.

[1] For comparison – IPL's capacity avoided cost in year 1 is equal to approximately $58/kW-yr. The RAP paper suggests that the T&D capacity avoided costs could be two to three times that of the capacity avoided costs. RAP's calculation certainly seems high when this comparison is made.

Modeling DSM in IPL's IRP

Q18. Ms. Sommer (p.4) indicates that DSM and the supply-side resources were not modeled on equal footing in IPL's IRP and that end effects from DSM should have been included in the analysis. Were the benefit and cost study periods for DSM and the supply-side resources equivalent?

A18. Yes. IPL only included the benefits and costs for 2020 – 2039 for both DSM and supply-side resources in the IRP analysis. Any impacts beyond the IRP period were excluded from the IRP analysis.

Q19. Does this address Ms. Sommer's issue with end effects? If not, please explain her issue and why it was not addressed in the analysis.

A19. It does not. Ms. Sommer indicates that the end effect benefits were not captured in the DSM bundle levelized costs that were used as inputs in the IRP model – as such, DSM was not modeled on equal footing with supply. To help explain her issue, Attachment EM-R1 provides a graphic example of the supply-side and demand side benefits and costs associated with an IRP. Please note that this figure is for demonstration purposes only and does not necessarily represent the actuals benefits and costs in IPL's IRP (for example – the benefits and costs beyond the study period may persist for a longer or shorter timeframe than presented.) For the IRP, IPL ended the analysis in 2039 – the last year of the study – excluding all benefits and costs beyond the planning timeframe. The yellow highlighted area in Attachment EM-R1 identifies the years included in the IRP analysis; all benefits and costs in the blue highlighted area were excluded from the analysis. Her concern is that –within the blue area – there are no costs associated with the DSM benefits which persist beyond the study period. Whereas, on the supply side,

the utility would incur ongoing variable O&M costs to go along with the benefits (power produced). Her recommendation is to levelize the DSM benefits that persist beyond the planning period and capture them as a reduction to the DSM bundle levelized costs.

IPL believes that there is significant uncertainty with the DSM planning assumptions made beyond 2039 because they are so far out in the planning horizon. These very late IRP period estimates are based on DSM planning assumptions known today. It is very likely – if not certain – that DSM measures will look very different in 2039. In their critique, the CAC is assuming a false level of precision in these DSM estimates and requesting their inclusion to boost the level of DSM selected.

IPL acknowledges the CAC's issue and is certainly open to addressing this topic in the next IRP cycle. However, IPL believes the decision to exclude the years beyond the IRP planning period was reasonable given the significant amount of uncertainty in future years.

Q20. Ms. Sommer (p.7) indicates that IPL's methodology of grouping/bundling EE savings by costs for the IRP analysis is problematic because it leads to cherry picking of measures from bundles that weren't selected. Do you agree?

A20. No. While it is true that there are some measures that are in the plan that are from bundles that weren't selected, IPL doesn't see this as an issue as long as the DSM Plan remains cost effective and still reaches the IRP DSM targets – which this plans achieves both.

Rather than predefine portfolios or programs that become bundles for evaluation in the IRP model (as suggested by Ms. Summer – p.8), IPL opted to use a cost-based approach

that provides its vendors with more flexibility to create program offerings. This way – vendors are not bound by predefined portfolio or program selections from the IRP. Having this planning flexibility has become extremely important with the elimination of general service LED measures and the challenges it poses to creating cost effective programs – particularly residential programs. Additionally, IPL sees risk and uncertainty in defining portfolios or programs in a 2019 IRP to be implemented over a 20-year planning horizon.

Q21. Ms. Sommer (p.9) disagrees with IPL's point that grouping measures by something other than cost "could result in inaccurate planning and future program delivery risk." What are your thoughts on her position?

A21. Ms. Sommer mischaracterizes this statement which appeared in "IPL's Response to Stakeholder Comments on the 2019 IRP" – see Attachment EM-R2, p.7. In this document IPL states – "there was concern that **defining program bundles** in 2019 for delivery in 2021 – 2023, much less 2029 or 2039, *could result in inaccurate planning and future program delivery risk*." IPL was specifically referring to the approach of predefining programs that serve as bundle inputs into the IRP model (also discussed in Q/A 22 above). Ms. Sommer mischaracterizes the statement by referring to "grouping measures by something other than costs." This mischaracterization leads the reader to believe that IPL feels any other approach *could result in inaccurate planning and future program delivery risk.* IPL does not take this position. In its response to stakeholder comments, IPL was specifically speaking to the planning and delivery risk associated with using a "program bundles" approach.

Furthermore, predefining program bundles for IRP modeling poses risk to planning and ultimately implementation given the rapidly changing energy efficiency landscape, e.g. EISA changes and repeals. Nearly three years would elapse before the programs that were defined in the MPS and modeled in the IRP are delivered into the market. By this time, these programs may be stale and struggle with cost effectiveness or even market uptake.

Q22. Is the measure bundling approach that IPL used in the 2019 IRP the single best approach to use?

A22. Not necessarily. There are many options but not one perfect or prescribed approach. Modeling DSM as a resource is a challenge for many reasons. With every IRP round, IPL is learning of ways to improve the process – whether it be through IRP model enhancements or from stakeholder input. IPL values the feedback that the CAC and the other stakeholders provide and plans to continue to engage in meaningful collaboration before, during and at the conclusion of the planning process.

Market Potential Study

Q23. Mr. Mellinger (p.11 and 12) indicates that IPL underrepresented the savings potential in the MPS by failing to include savings from emerging technologies and unique and unknown custom program measures. Do you see this as an issue?

A23. No. IPL sees significant uncertainty and delivery risk with including measures that have not yet been identified. New and emerging technologies will certainly be developed in the future; however, there is tremendous uncertainty as to the savings and costs to associate with these measures. Additionally, since these measures are unknown and unidentified, it is very difficult to identify an adoption rate/uptake in IPL's market.

Random assumptions would need to be made for savings, cost and adoption rates/uptake for these placeholder measures. As such, IPL sees unreasonable risk in relying on these assumptions to come to bear in future planning years.

Also – looking back historically – as emerging technologies have been developed, another efficient technology has typically been displaced. For example, as LEDs (emerging tech when introduced) continued to come down in cost, the potential for CFLs – the alternate efficient option – went to zero. It is reasonable to assume that when an emerging technology is developed in the future, the savings potential for another known technology in the MPS would be reduced or eliminated. This is just another risk to including unknown technologies in the MPS analysis.

It is worth noting that IPL's DSM Plan contains a special budget for spending flexibility. These funds are available for incentives for new and emerging cost-effective technologies as they arise during implementation. So rather than commit to achieving emerging technology measure savings that don't exist yet but were included as placeholders in the MPS, IPL earmarks funds that can be used as the technology becomes available in the market.

Q24. Mr. Mellinger identifies some residential (p.19, Table 4) and C&I (p.20, Table 5) measure savings that were included in the MPS Realistic Achievable Potential but excluded from the DSM Plan. Mr. Mellinger indicates that the UCT cost effectiveness scores would improve if these additional measures were included in the plan. Do you see possible issues with his assessment?

A24. Yes. The cost effectiveness presented in the figures and referenced by Mr. Mellinger were calculated in the MPS measure-level economic screening. There are some very important caveats to this analysis. Consistent with EPA's guidelines in the National Action Plan for Energy Efficiency, the MPS economic screen does not include any programmatic costs or NTG impacts. This becomes an issue for the HVAC-related measures (duct sealing and smart t-stats) referenced by Mr. Mellinger; the majority of which are assumed to occur in the income-qualified segment. The cost effectiveness presented for these measures excludes the high cost for direct installation and 100% income-qualified incentive. It is worth noting – the MPS found significant income-qualified potential in IPL's territory; and while IPL is committed to bringing its income-qualified customers meaningful offerings to help manage energy use, the company is also cognizant of cross-subsidization issues that may arise from extreme funding.

Mr. Mellinger also identifies efficient TVs in the table. While there may be significant market potential for this measure, it may not be possible to realize these savings within the next three years due to market transformation and low NTG concerns. Therefore, this measure may not be appropriate for the IPL DSM plan.

Q25. Does this conclude your prepared verified rebuttal testimony?

A25. Yes, at this time.

VERIFICATION

I, Erik Miller, Senior Research Analyst, affirm under penalties of perjury that the foregoing representations are true and correct to the best of my knowledge, information and belief.

_____

Erik Miller

Dated: August 26, 2020

Indianapolis Power & Light Company
Cause No. 45370
Attachment EM-R1

Supply

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Benefits	B	B	B	B	B	B	B	B	B	B	B	B
Costs	C	C	C	C	C	C	C	C	C	C	C	C

Demand

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Benefits	B	B	B	B	B	B	B	B	B	B	B	B
Costs	C	C	C	C	C	C	C	C	C	C	C	C

2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
B	B	B	B	B	B	B	B	B	B	B	B	B
C	C	C	C	C	C	C	C	C	C	C	C	C

2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
B	B	B	B	B	B	B	B	B	B	B	B	B
C	C	C	C	C	C	C	C					

June 16, 2020

Dr. Bradley K. Borum
Director of Research, Policy and Planning
Indiana Utility Regulatory Commission
101 W. Washington Street, Suite 1500 E
Indianapolis, IN 46204

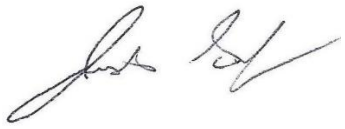
Electronically delivered

Dr. Borum,

IPL appreciates the opportunity to respond to stakeholder comments submitted in response to the 2019 Integrated Resource Plan. The attached response addresses some of the key topics raised.

We look forward to reviewing the IURC Director's Report upon its release. In the meantime, please let me know if you have any questions.

Sincerely,



Justin Sufan
Director, Regulatory & RTO Policy
Indianapolis Power & Light Company

Indianapolis Power & Light Company Reply to Stakeholder Comments IPL's 2019 Integrated Resource Plan

June 16, 2020

Introduction

Indianapolis Power & Light Company ("IPL") submitted its 2019 Integrated Resource Plan ("IRP") on December 16, 2019. The City of Indianapolis, Indiana Office of Utility Consumer Counselor ("OUCC"), Indiana Coal Council ("ICC"), Advanced Energy Economy ("AEE"), Sierra Club and jointly the Citizens Action Coalition and Environmental Justice Center ("CAC EJ") submitted comments to the Indiana Utility Regulatory Commission ("IURC") regarding IPL's IRP. IPL thanks these stakeholders for their review and feedback and recognizes there are opportunities for continuous improvement. IPL plans to continue to incorporate stakeholder feedback and best practices in its future IRP processes. Data and modeling assumptions were shared early and throughout the IRP process, which led to collaborative dialogue ultimately shaping IPL's preferred resource portfolio.

While not exhaustive, IPL would like to provide clarity or correction on certain topics, as well as key insights in the following areas:

1. Petersburg retirement decisions
    a) Petersburg Units 1 & 2 early retirement
    b) Petersburg Units 3 & 4 retirement

2. Environmental investment at Petersburg

3. Modeling and model optimization
    a) Overall approach
    b) Modeling assumptions and constraints
    c) Forecasting
    d) Demand side management ("DSM") modeling methodology

4. All Source RFP process and results

IPL is dedicated to serving customers' energy needs. As part of serving that need, the IRP analysis provides the Company with a mechanism to model market economics and risks across a wide range of futures while evaluating resource plan choices and alternatives. IPL's 2019 IRP process and preferred resource portfolio meets four core company objectives and areas of focus: *Customer Centricity*, *Economics*, *Flexibility & Balance*, and a *Greener Energy Future*. The preferred resource portfolio identified in the IRP also maintains optionality and a gradual movement toward a more diverse and balanced generation mix that is cost-effective for IPL customers. IPL will continue to optimize the tools and capabilities to shape its long-term resource plans.

Section 1: Petersburg retirement decisions

OUCC stated "IPL's 2019 preferred resource plan is a significant departure from its 2016 plan."[1] Significant changes in the industry over the past three years have contributed to changes from IPL's 2016

[1] OUCC Public Report on IPL 2019 IRP, 4_15_20, pg. 1

IRP. Notably, the cost of renewables has declined as well as the forward curves for natural gas and power. These forward curves were provided to stakeholders with a non-disclosure agreement ("NDA") as early as April 2019.

To further respond, IPL's 2019 IRP closes with these thoughts on pg. 206 of the IPL IRP Public Report Volume 1:

> *The Preferred Portfolio provides a reasonable and balanced transition pathway that provides clear off-ramps for remaining coal units. The probabilistic assessment of risk and uncertainty that was embedded in the modeling and decision process provides a data-driven framework to build upon through the passage of time.*

The selected dates for the Petersburg units are noted on pg. 122 of IPL IRP Public Report Volume 1. Those reasons include: (1) fixed cost allocation (2) capacity valuation and reserve margin constraints and (3) stakeholder input. The retirement dates also are driven by unit age, timing of renewable tax credits, balance of plant scale, and timing of securing available replacement capacity. The decision to input Petersburg retirement dates as a modeling assumption is discussed further in sections below.

1a. Petersburg Units 1 & 2 early retirement

Due to the age of Petersburg Units 1 and 2, refueling is not a viable option. As noted on page 122 of the IRP, IPL notes:

> *Unit Age: Petersburg Units 1 and 2 are 52 and 49 years old, respectively, and have age-based retirement dates of 2033 and 2035. Costly unit overhauls and maintenance are required on the units to maintain performance and safety targets, so IPL wanted to evaluate the economics of the ongoing, all-in costs and net benefits of operating those units through the early 2030s compared to alternatives.*

As an additional insight, IPL's NAAQs compliance analysis included a real option analysis that included early retirement of the Petersburg units in retrofit scenarios.[2] In those results, retrofitting Petersburg Units 1 & 2 with the necessary environmental compliance equipment resulted in a lower probabilistic PVRR than to refuel the units even considering early retirement possibilities.

In contrast, the analysis to refuel Harding Street Station Unit 7 was driven in large part due to its location. As referenced in IURC Cause No. 44540 Order (page 32), "HS-7 is of particular importance to the reliability of the IPL system due to its location. While supplying energy to serve IPL's retail load, it also serves as an important component in meeting system reliability needs. HS-7 offsets the need for import capability and provides critical voltage and dynamic reactive power support to the IPL transmission system under normal conditions and during system disturbances."

1b. Petersburg Units 3 & 4 retirement

The Sierra Club states that "…IPL's customers would likely save money if IPL retired Petersburg units 3 and 4 and replaced those units with a diverse portfolio of clean energy resources."[3] At this time and supported by the IRP analysis, the continued operation of safe, reliable and cost effective generation at

[2] IURC Cause No. 44794
[3] Sierra Club Comments on IPL 2020 IRP – FINAL, pg. 1

Petersburg Units 3 & 4 is a prudent option for IPL customers. Page xx of the Executive Summary of the IRP Public Report further describes this position:

> *IPL conducted a holistic evaluation of the economics of each coal unit in our fleet. While systemic changes in wholesale power markets are impacting the viability of coal in MISO, Pete 3 and 4 provide firm, dispatchable capacity and maintaining those units preserves optionality in the face of uncertainty over the next five years. The IRP process is every three years, and IPL has established a robust and transparent process for evaluating the future cost effectiveness of the remaining coal units through time. IPL will closely monitor market forces, federal and state regulation, and other industry trends that could impact the future economics of our remaining coal units.*

Section 2: Environmental investment at Petersburg

"OUCC is concerned with the costs assumed for 316(b) compliance."[4] The referenced cost estimates were provided by Environmental Consulting and Technology, Inc. ("ECT") based on their expertise and knowledge of IPL's specific facilities. ECT is a reputable industry leader and has worked with large, multi-faceted organizations while developing water resource compliance solutions. The 316(b) compliance cost estimates for Petersburg Station were preliminary in nature based on the need to retrofit the cooling water intake structure's six bays. These estimates were not based on an engineering evaluation because the evaluation of 316(b) Best Technology Available for impingement and entrainment had not (and has not) yet been completed pursuant to 40 CFR 122.21. Furthermore, the engineering evaluation requirement is not required to be completed until June 2021 and will subsequently be determined by the Indianapolis Department of Environmental Management ("IDEM"). Still, IPL expects these cost estimates are reasonable based on the expertise of ECT. Specific to the OUCC's concern, IPL notes these estimates are reasonable and were relied on for modeling purposes. IPL will seek refreshed estimates closer to the compliance date.

The OUCC goes on to note "…that ACE Rule costs assumed are preliminary and are not based on any detailed engineering studies."[5] This is a result of the status of the rulemaking process and the uncertainty around potential compliance requirements absent a State Plan implementing the ACE Rule. In fact, at the time of IPL's IRP filing, Indiana had not yet initiated the rulemaking process. Subsequently, on February 19, 2020, Indiana published a First Notice for the Indiana ACE Rule indicating that IDEM intends to determine the best system of emissions reductions and CO_2 standards for affected units. This is the first step in that rulemaking process. Impacts remain largely uncertain because Indiana's State Plan has not yet been developed. Engineering studies along with refined cost information will be completed as part of the compliance planning process as the rule is further developed.

Section 3: Modeling and model optimization

IPL utilized the PowerSimm production cost model and Automatic Resource Selection ("ARS") for the IRP. The CAC EJ commenters requested additional transparency into input and output model files.[6] IPL appreciates this feedback and will continue to find ways to present information in a meaningful format. Ahead of the next IRP, IPL will work to improve reporting functionality for data sharing to maintain and

[4] OUCC Public Report on IPL 2019 IRP, 4_15_20, pg. 6
[5] Id
[6] CAC EJ Public Report on IPL 2019 IRP, 4-16-2020, FINAL, pg. 6

continue a thorough and transparent process for stakeholder input and review of the IRP and associated models.

Another topic of stakeholder feedback is related to why a placeholder natural gas combined cycle gas turbine ("CCGT") resource was hardcoded in the IRP ARS model.[7] This is largely addressed in page 156 of the IPL Public IRP Report Volume 1:

> *A 1x1, 325 MW (ICAP) combined cycle was added to all portfolios in 2034 to provide firm, dispatchable capacity on the IPL 138 kV transmission system after the Harding Street steam units retire. IPL has not performed a detailed engineering or reliability study to determine if a combined cycle is the required solution. This combined cycle addition is a placeholder to represent the firm capacity needed for the IPL distribution system, a need that is currently fulfilled by a combination of natural gas units (Eagle Valley, Harding Street, Georgetown).*

The analysis for future replacement firm system capacity will be evaluated more fully as the needs are better known in future IRPs.

3a. Overall approach

The ICC noted that "IPL considered five scenarios with multiple portfolios in each. The Preferred Resource Portfolio was close in cost to the Reference Case in the first five years. IPL did not include costs related to the incremental transmission and distribution revenue requirements in the Preferred Resource Portfolio, which is often significant for renewables".[8] The 2019 IPL IRP addressed this concern by considering the potential need for incremental transmission investment for new wind, solar, and energy storage by performing capital cost sensitivities. Page 190 IRP Volume 1, Figure 8.44 shows that even with a significant increase in capital costs (associated with transmission investment, for example), the PVRR for Portfolio 3 is lower than the mean PVRR for Portfolio 1 using base cost assumptions.

3b. Modeling assumptions and constraints

<u>Petersburg modeling assumption</u>

The "OUCC is concerned with the high level of forced outage rates modeled for Petersburg Unit 2."[9] In IRP modeling, IPL recognized that the Petersburg Unit 2 forced outage rate trended higher than the other Plant Units. That acknowledged, Petersburg Unit 2 achieving a forced outage rate more closely aligned with the other Plant Units did not have a material impact on the PVRR or change the rankings of the portfolios. Moreover, the forced outage rates modeled were derived from actual historical data and used consistently in all Portfolios/Scenarios.

<u>Renewable capacity</u>

CAC EJ states "IPL placed annual and cumulative constraints on the amount of solar, wind, and energy storage that could be selected in the PowerSimm model"[10] and questioned why "…solar was first available to pick in 2023, and wind was first available in 2022".[11] IPL intentionally made this distinction for solar and wind. IPL is not expected to be short capacity until 2023 in Portfolios 3-5 (or later for

[7] CAC EJ Public Report on IPL 2019 IRP, 4-16-2020, FINAL, pg. 22
[8] IPL IRP_ICC Comments on IRP_041520, pg. 2
[9] OUCC Public Report on IPL 2019 IRP, 4_15_20, pg. 2
[10] CAC EJ Public Report on IPL 2019 IRP, 4-16-2020, FINAL, pg. 12
[11] CAC EJ Public Report on IPL 2019 IRP, 4-16-2020, FINAL, pg. 14

Portfolios 1-2). The modeling recognizes the phase-out of the PTC for wind (as of the time of submitting the IRP). Since the filing of the IRP, the PTC has been extended one additional year, which we expect would reduce the cost of wind in 2024. Figure 7.23 in the 2019 IRP shows wind is most attractive in 2021, but IPL expects the earliest it could obtain capacity due to project development and approvals is 2022.[12] Solar is expected to be most attractive in 2023 coinciding with IPL's short capacity position as can be seen in Figure 7.24 of the 2019 IRP, so there was less value to make solar available earlier.

CAC EJ and the City of Indianapolis questioned why there was a cumulative total MW constraint for total selection of solar and wind MWs in the model.[13] As noted above, the constraint is based on IPL's expected needs and the impracticality of procuring that much wind generation in such a short timeframe. To further support the use of this constraint, in preliminary review of responses to IPL's recently issued All-Source RFP, IPL received zero wind bids in Indiana.

IPL constrained the capacity expansion model to select 1,500 MW (ICAP) of wind and solar each, for a total of 3,000 MW of additional renewable capacity. The additions of this much replacement capacity would have to coincide with retirements of thermal dispatchable capacity such as Petersburg Unit 1 and Petersburg Unit 2. In this hypothetical resource mix, nearly 50% of IPL's annual energy would come from intermittent resources. MISO's Renewable Integration Impact Assessment ("RIIA") study indicates there is an inflection point in integration complexity as the grid moves from 30% to 40% renewable energy penetration.[14] In light of this complexity and uncertainty, IPL currently considers a future with such high levels of intermittent resources to increase risk. IPL recognizes that future solutions to handle increasing renewable penetration levels will arise and will consider the economics and practicality of those solutions in future IRP cycles.

For IRP modeling purposes, hybrid resources are an emergent technology type requiring several unknown assumptions in order to adequately model a generic hybrid asset. For example, the ratio of generation to storage, or even the type of generation or storage technologies deployed is not standard. Hybrid proposals from the IPL's All-Source RFP will be modeled for evaluation since their configurations and technologies are specified.

Energy storage modeling

Four (4) hour duration batteries were available for selection in the capacity expansion model. IPL did not model ancillary service revenues for selectable storage assets because storage participation models are still being developed in MISO and it is difficult to confidently forecast ancillary value. However, energy storage modeling continues to advance and evolve. IPL plans to continue work in this area to include more energy storage modeling configurations, which is further explained and discussed in the IRP Public report on pg. 205.

> *Hourly and sub-hourly modeling allows IPL to evaluate its ability to meet load for all hours. Some resources such as batteries offer exceptional flexibility. This value may be more accurately captured by sub-hourly modeling, though this currently pushes the limits of many available*

[12] IPL IRP Volume I, pg. 141 "Timing: the first year new wind was available was January 1, 2022. The PowerSimm model operates on a calendar year basis, which means that new build decisions will occur on January 1st. Because of the expected contracting and construction lead time required for new wind, it is expected that the in-service date for new wind in 2021 would be at the end of the calendar year. Therefore, the first year new wind is available is 2022, but the cost of the new wind is based on 2021 in-service with 80% PTC."
[13] CAC EJ Public Report on IPL 2019 IRP, 4-16-2020, FINAL, pg. 13
Indianapolis Comments on IPL 2019 IRP 4.15.20, pg. 3
[14] https://cdn.misoenergy.org/20181128%20RIIA%20Workshop430633.pdf, slide 4.

models. IPL will continue to assess whether the value of more granular modeling justifies the increase in complexity.

Additionally, IPL's Harding Street Battery Energy Storage System ("HSS BESS") provides essential primary frequency response ("PFR"). IURC Cause No. 45029 discusses operating considerations for the HSS BESS. IPL has configured the HSS BESS to provide PFR, as that is the most critical BESS component needed on IPL's system at present day. The provision of PFR could be impacted if IPL were required to configure the HSS BESS to concurrently provide other services or offer it as capacity.

3c. Forecasting

Regarding its forecasting process, IPL updates projections as a general business practice throughout the year. Additionally, IPL backcasts against prior forecasts to assess forecast accuracy each month. These practices ensure the most accurate forecast and allow for course correction as forecasting trends change.

Load

The OUCC and CAC EJ indicate that IPL's load forecast used in the IRP is too high in future years.[15] Both stakeholders provide graphs illustrating their opinion. Specifically, the CAC EJ notes the forecast exhibits an Average Annual Growth Rate ("AAGR") of 0.89% over the IRP period compared to little to no growth in prior years. Both CAC EJ and OUCC analyses fail to consider that the IRP load forecast excludes all IPL-sponsored forecasted DSM over the IRP period. IPL intentionally excluded all forecasted DSM from the load forecast because this DSM was instead treated as a selectable resource to the IRP model. By not reducing the forecast for DSM selected in the IRP, the stakeholders' analyses are inaccurate and misleading. IPL has been engaged in meaningful DSM for many years and plans to continue offering DSM based on the recent IRP results; thus, the load forecast must be reduced for selected DSM in order to correctly perform the analysis. If the DSM that was selected by the IRP model (Decrements 1-4) is also included in the load forecast, the AAGR drops to 0.16% from 2020 – 2029, essentially flat and more in line with load trends. Additionally, IPL expects load to begin to level off and flatten from its historical decline due to utility-sponsored and organic saturation of LED lighting. This measure has been the largest driver of efficiency savings in the residential sector over the past decade resulting in declining utility loads. With saturation, there is less low cost, low hanging DSM options remaining for residential customers. This LED saturation is captured in the EIA data that drives the load models resulting in a flat forecast (AAGR 0.16% as noted above).

Income

The OUCC notes that the level of projected growth in the real income variable used in the load forecast is unrealistically high.[16] IPL reviewed the input assumptions provided by Moody's Analytics including income and found their estimates reasonable given the level of high-end, multi-family unit growth IPL is seeing in the Indianapolis city center.[17]

[15] OUCC Public Report on IPL 2019 IRP, 4_15_20, pg. 2; CAC EJ Public Report on IPL 2019 IRP, 4-16-2020, FINAL, pg. 26
[16] OUCC Public Report on IPL 2019 IRP, 4_15_20, pg. 2
[17] IPL IRP Volume 1, pg. 36, IBJ Downtown Apartment Growth

OUCC points out that on pg. 36 of IPL's Public IRP Report Volume 1, IPL mistakenly presents the income growth rate as 0.8% and that this value should be 2%.[18] IPL agrees that the value is 2% and this was a transcription error in the IRP report. The IRP modeling, however, correctly relied on the 2% value.

Electric Vehicles ("EV")

The OUCC notes "[w]hile IPL's load forecast incorporated its EV and distributed solar forecasts, it did not modify its expected load shape resulting from those forecasts."[19] This statement is incorrect. IPL modeled its system load and then layered on hourly forecasts of EVs and Distributed Solar separately within the PowerSimm model. Therefore, the EV components did have a direct influence on IPL's overall load shape.

Also, the OUCC pointed out that "IPL's load forecast includes a large jump in EVs during the year 2020 (from approximately 500 to 5,000 in a single year)."[20] IPL discussed this recalibration to better represent the expected trends in EV adoption in the third public advisory meeting on May 14, 2019 and again in a post IRP submission technical discussion with the OUCC. IPL notes that "[the] increase was used in the forecast as a baseline to ensure that the forecast did not miss anything and covered all the possibilities of EV growth for IPL to consider in long-term planning."[21]

The ICC notes IPL may be potentially understating the resource requirements for future EV growth and that IPL potentially mischaracterized the load curve for EVs.[22] IPL acknowledges there is some uncertainty around forecasting EVs. Many sources predict there will be an inflection point where EV ownership moves beyond just early adopters to common car owners. However, it is not currently known when that inflection point will occur. IPL concluded that the lack of reliable, transparent data and the weakness of assumptions regarding the inflection point and maximum penetration required for such modeling is currently too ambiguous for the recent IRP process. Therefore, IPL scaled to generally known and accepted forecasts (i.e., Bloomberg).

3d. DSM modeling methodology

The CAC EJ expressed concern regarding "…whether DSM was properly optimized," and "… cautioned IPL against grouping measures by cost insofar as this would not result in the optimal selection of energy efficiency since this approach does not provide a true representation of how IPL implements its energy efficiency programs."[23] While IPL appreciates and considered the CAC EJ suggestion, energy efficiency assumptions are rapidly changing (e.g., LED baselines) which is creating uncertainty and impacting near-term program offerings (especially residential). As such, there was concern that defining program bundles in 2019 for delivery in 2021 - 2023, much less 2029 or 2039, could result in inaccurate planning and future program delivery risk. IPL prefers bundling measures from most cost effective to least cost effective to provide the most flexibility for developing programs in future years and realistic forecasts of DSM adoption. Also, contrary to the CAC EJ's recommendation, IPL was concerned that bundling by program may actually result in less DSM being selected. For example, with the LED baseline changes, residential programs are having trouble maintaining cost effectiveness in their current or similar form.

[18] OUCC Public Report on IPL 2019 IRP, 4_15_20, pg. 2, footnote 1
[19] OUCC Public Report on IPL 2019 IRP, 4_15_20, pg. 3
[20] Id
[21] IPL 2019 IRP Meeting 3 Summary, pg. 11
[22] IPL IRP_ICC Comments on IRP_041520, pg. 10
[23] CAC EJ Public Report on IPL 2019 IRP, 4-16-2020, FINAL, pg. 9

The CAC EJ indicated that IPL used a loss factor which struck them as improbably low.[24] This loss factor was used for the energy (MWh) portion of the DSM and captures only the transmission and distribution losses to the MISO connection point where the energy is measured for load transactions. IPL used a loss factor of 5.5% for the capacity (MW) value of the DSM in the capacity expansion analysis. These additional losses or control area losses are included to capture the total losses of transmitting from the power plant (resource selection decision point) to the home.

The CAC EJ proposed including a higher loss factor at the May 29, 2019 technical meeting citing the Regulatory Assistance Project's paper on accounting for avoided line losses. That proposal is based on the idea that losses for EE happen at the margin or during periods of high system demand when losses are greater. At the time, IPL consulted with its T&D engineers to determine the feasibility of calculating marginal line losses according to this approach. The IPL T&D team indicated that this would require additional research and analysis that was not available at that point in the IRP process. IPL will continue to work closely with stakeholders to consider this approach in IPL's future IRPs.

The OUCC expressed concern about the amount of avoided T&D capacity costs IPL assumed.[25] IPL utilized conservative T&D avoided cost assumptions in the DSM Market Potential Study ("MPS") and were submitted as Confidential Attachment 5.4 of the IRP. OUCC asserts that "[b]ecause T&D capacity issues will be addressed directly by IPL's TDSIC Plan, no 'avoided' T&D costs should be attributed to DSM."[26] As an initial matter, the OUCC suggestion that the TDSIC Plan is focused on load growth is not accurate.

The general intention of the TDSIC Plan is not to address general capacity issues or load growth as the OUCC would suggest. Rather the Plan is designed to improve safe and reliable functioning through the planned replacement and modernization of aging electric system components, which, if not undertaken, would likely result in more frequent or extended outages for customers or otherwise impair the resiliency of the system. Certain parts of the TDSIC Plan are designed to harden IPL's energy delivery system and minimize emergency restoration. In other words, IPL's TDSIC Plan reduces risk of asset failure, maintains or improves reliability, improves the customer experience, supports the economy, and protects overall public safety. While the plan contains three deliverability projects that will result in capacity benefits, these benefits will be very location specific and, in some cases, are required to host known and anticipated customer load. As such, the delivery of DSM programs will help avoid general circuit capacity issues that the TDSIC Plan was never intended to address.

Since 2011, IPL's DSM programs have contributed to a summer cumulative peak coincident reduction of approximately 150 MW system wide. While IPL has not commissioned a study to identify circuit level avoided T&D costs, it is reasonable to presume there are real costs that have been avoided (and will continue to be delayed as a result of DSM program delivery). DSM programs and measures have a long useful life (on average seven to nine years, with some measures useful lives of up to 25 years) with cumulative effects over time, which the benefit and cost analysis is designed to capture. Not including T&D avoided costs in this calculation would unfairly burden the results of the benefit and cost analysis and would favor a supply side only approach.

Additionally, per 170 IAC 4-7-4-29 in the IRP Rules, the IRP must include the following:

[24] CAC EJ Public Report on IPL 2019 IRP, 4-16-2020, FINAL, pg. 33
[25] OUCC Public Report on IPL 2019 IRP, 4_15_20, pg. 7
[26] Id

An explanation, with supporting documentation, of the avoided cost calculation for each year in the forecast period, if the avoided cost calculation is used to screen demand-side resources. The avoided cost calculation must reflect timing factors specific to the resource under consideration such as project life and seasonal operation. The avoided cost calculation must include the following:

(A) The avoided generating capacity cost adjusted for transmission and distribution losses and the reserve margin requirement.

(B) The avoided transmission capacity cost.

(C) The avoided distribution capacity cost.

(D) The avoided operating cost, including:(i) fuel cost;(ii) plant operation and maintenance costs;(iii) spinning reserve;(iv) emission allowances;(v) environmental compliance costs; and(vi) transmission and distribution operation and maintenance costs.

Accordingly, IPL included a conservative estimate for the avoided T&D benefits that DSM receives which assumes only 20% of its circuits are at or near capacity. Additionally, IPL's T&D team calculated the T&D estimates based on assumptions of known costs rather than using the simple and less rigorous industry approach of using 10% of the generation capacity avoided costs.

IPL is confident in its capacity expansion analyses and the modeling team took deliberate steps to model additional DSM until the PVRR increased, which ensures the IPL's IRP results identified the most economic level of DSM. A robust set of scenarios around DSM in the modeling supports identifying a target level of DSM that is economic (by the measure of the 20-year PVRR), which puts DSM on the same playing field as supply side resources. The target level of DSM is between Decrement 3 and Decrement 4 for the 2021 – 2023 period.[27] In future IRP processes, IPL will strive to provide additional details and work with stakeholders in advance for more read only access to the models.

Section 4: All Source RFP process and results

IPL appreciates the feedback from stakeholders about our efforts to solicit bids for new generation.[28] IPL's decision to pursue an All Source RFP solicitation was discussed with stakeholders during the IRP process. Through the modeling and selection of the preferred resource portfolio, IPL's 2019 IRP identified a need for approximately 200 megawatts (MW) of near-term replacement unforced capacity (UCAP). IPL's All-Source RFP aims to competitively procure replacement capacity available beginning in the 2023-2024 MISO Planning Year.

IPL contracted Sargent & Lundy ("S&L"), an independent third-party consultant, to execute the RFP and evaluate proposals. The All-Source RFP solicitation was released on December 20, 2019. Bidders were required to provide their notice of intent by January 24, 2020 and were able to submit any questions and clarification requests prior to the bidder proposal deadline. Written responses to all submitted questions were published to IPL's RFP webpage (www.iplpower.com/rfp). While the 2019 IRP modeling indicated that a combination of wind, solar, storage, and energy efficiency was expected to be the lowest cost options for the replacement capacity, the RFP allows for assessment of the type, size, and location of all resources bid into the process. IPL received 152 proposals from 57 projects on or before the bidder proposal due date, February 28, 2020. The proposals included thermal, solar, wind, storage, hybrid (solar + storage) and demand response projects. Upon receipt of these bids, S&L began the Phase 1 evaluation, which included an initial screening and shortlisting of proposals according to a qualitative and initial

[27] IPL IRP Volume I, pg. 202
[28] Indiana AEE IPL Comments Final, pg. 2
Indianapolis Comments on IPL 2019 IRP 4.15.20, pg. 5

pricing evaluation. The scoring criteria for this phase is included in Table 3.1 of the public RFP document. Phase 2 of the All-Source RFP includes a quantitative evaluation where bid proposals are run through production cost and revenue requirement models. Phase 2 additionally considers twelve qualitative criteria: (1) technical viability (2) development and schedule risk, (3) permitting risk, (4) environmental impacts (5) contractor experience, (6) financing plan and qualifications, (7) T&D system integration, (8) site control, (9) community impacts and acceptance, (10) operations and maintenance plan, (11) fuel supply plan (if applicable), and (12) exceptions to agreements. The Phase 2 evaluation also includes T&D studies, and due diligence with short listed bidders. IPL anticipates preliminary selection of proposal(s), due diligence, and contract negotiations to extend through the remainder of the year, with eventual IURC filings.

Conclusion

IPL thanks stakeholders for their review and participation in IPL's 2019 IRP and anticipates continued collaboration.