Public Response to the Director's Report on the Indiana 2016 IRPs

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Public Response to Director's Draft Report on the 2016 IRPs
September 1, 2017

We appreciate the Director's Draft Report on the 2016 IRPs as well as the chance to respond before the final report is issued. Overall, we felt that the Director echoed many of the key issues identified in our comments on IPL, NIPSCO, and Vectren's IRPs. There are certain areas in which we felt it may be helpful to provide more clarity to our comments and to add more information to the conversation. Those areas are:

1. Examples of ways in which other utilities presented IRP information in clear and concise manners.
2. Additional comments on issues with IPL's stochastic analysis
3. Additional comments on Vectren's energy efficiency cost projection.
4. Additional comments on Vectren's Strategist modeling.
5. Recommendations to improve the stakeholder process.

Examples of Clean and Concise Presentation of Information

We enthusiastically second the Director's recommendation that the utilities endeavor to present basic information in a more readable and accessible fashion. In addition to our original comments on this topic, we also offer some other thoughts on the matter here.

All of the utilities that were the subject of our comments met with TVA to discuss their 2015 IRPs and, as such, seem likely to have read that IRP. TVA's method of presenting data in its IRP is, broadly speaking, better than that of IPL, Vectren, and NIPSCO. For example, TVA has the following graph in its IRP.

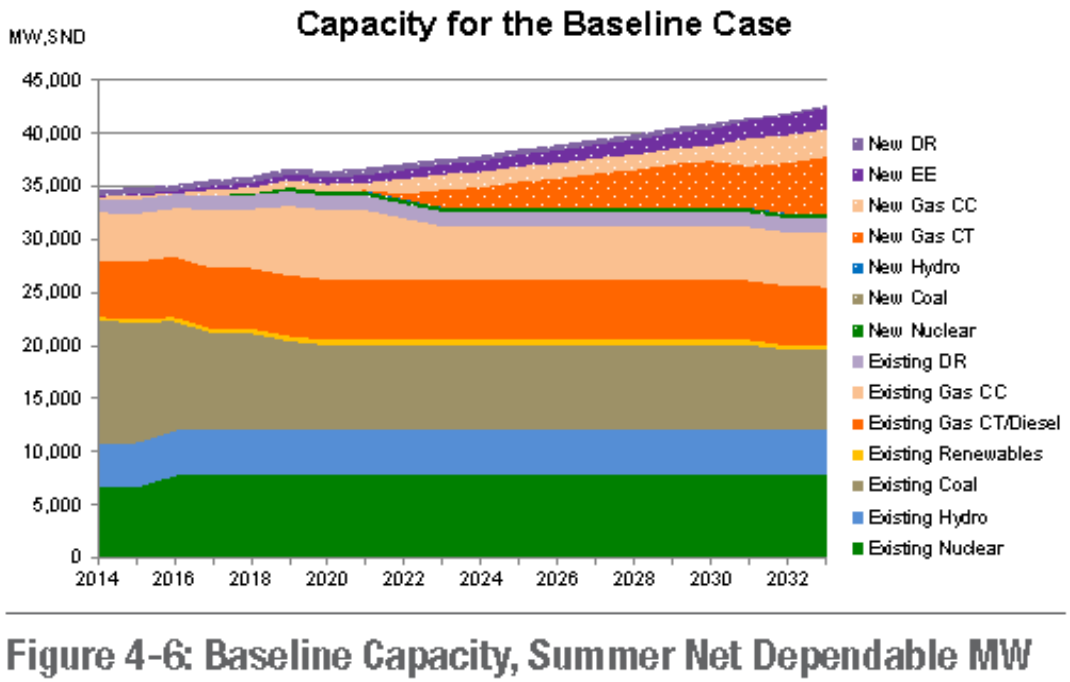


Figure 4-6: Baseline Capacity, Summer Net Dependable MW

Figure 1. Example Graph Showing Resource Additions for a Modeling Scenario

In our experience, other IRPs often have graphs of this kind, but among 2016 IRPs in Indiana only IPL offered something similar for its scenarios.

Likewise, offering the position of the utility relative to its expected peak requirements (and a similar graph for energy) before any resource additions is very helpful (see Figure 2 below, which is again from TVA's 2015 IRP).

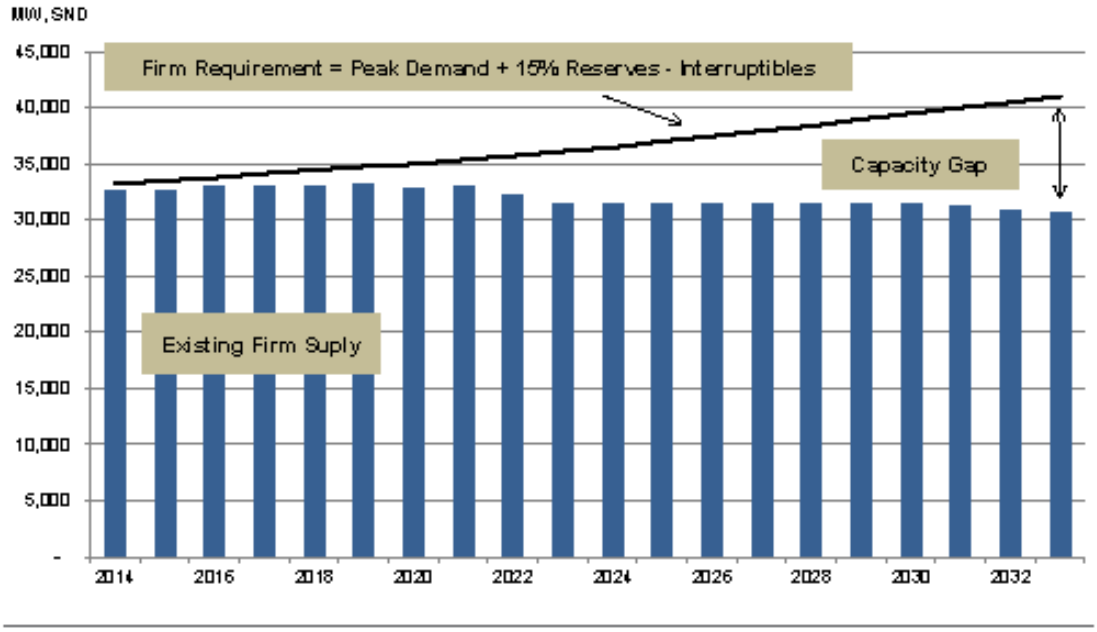


Figure 4-7: Estimating the Capacity Gap

Figure 2. Example Graph Showing the Difference Between Peak Needs and Existing Resources

We should clarify, however, that these graphs are most useful when they are accompanied with tables showing the values in those graphs. Indeed, that criticism applies to many graphs in the Indiana utilities' IRPs in which, oftentimes, information was presented only in graphical format without benefit of the specific values. And some information was even presented without the y-axis labeled – making those graphs not particularly useful.

There is also the need to sharpen the organization of information. For example, in the case of IPL, confidential information was not distinguished from public information in the confidential version of the IRP, making it necessary to compare two versions of the same document to determine what was public. Across all the IRPs, there was a tendency to include appendices without making reference to them in the body of the IRP itself, which begs the obvious question of why those appendices were included at all. Another way to improve data presentation would be to make sure confidential information is included in the body of the main IRP rather than relegating it to a confidential appendix.

We are happy to review and comment on the utilities' efforts to make information in their future IRPs more accessible and understandable before future filings are made.

IPL's Stochastic Analysis

To perform stochastics on a resource plan, one needs to create a probability distribution for each variable tested. The probability distribution requires assumptions regarding its high value, low value, and shape. For this to be meaningful, one needs not only a set of data for each variable to characterize these parameters, but also a reasonable expectation that these data can be used to characterize future outcomes for that variable. In IPL's case, the probability distributions for certain variables appear to bias outcomes against certain portfolios and in favor of others.

For example, using IPL's indicative wind price presented in its first stakeholder presentation of $2,213 per kW[1] (the actual price assumed by IPL is $[redacted] per kW[2]), one can infer the high and low value assumed for IPL's wind cost probability distribution. IPL assumes the low value multiplier to be 0.9, the high value multiplier to be 1.15, and the expected value multiplier to be 1.025. This means that for stochastic purposes, if the indicative price is applied, wind would be assumed to cost not $2,213 per kW, but $2,213 x 1.025 = $2,268 per kW. And the lowest possible value is $1,991 per kW. These numbers are absurdly high. As the Department of Energy (DOE) found in its recent analysis, the average installed cost of wind turbines in 2016 was $1,590 per kW[3] – less than three quarters of IPL's public "expected" value.

Normally, stochastic distributions are constructed on the basis of historic information, though IPL gives no source for its wind or solar multipliers. Of course, the question for technologies like wind and solar is: how far back should one go to gather cost data that is still relevant to today? Because those technologies and their prices have changed so much, even data from five years may reflect different technologies, efficiencies, and cost than those likely to occur today. In future stakeholder processes, if IPL continues to rely so heavily on stochastic analysis instead of scenario testing, it is hard to see how IPL could address these kinds of concerns. Even if stakeholders had the opportunity to substitute their own probability distributions for those assumed by the utility, they would be spending their time developing meaningless probability distributions when a more straightforward and meaningful analysis would rerun the capacity expansion model, not the stochastic/production cost model, with the suggested, alternative

[1] See PDF page 115 of IPL 2016 IRP Volume 2.
[2] See Table 6-3 of Confidential Attachment 2.2.
[3] See https://emp.lbl.gov/sites/default/files/2016_wind_technologies_market_report_final_optimized.pdf

assumption(s) at issue. Using the example of IPL's wind assumption again, if one were to change the expected value of wind to a more reasonable $1,590 per kW, the only impact would be to change the stochastic results for those portfolios that contained some amount of wind. It would be even more important to see how the expansion plan changed if the cost of wind were modified to this value. This is just one example of how scenario testing in the capacity expansion model can be preferable to stochastic modeling.

Even if the probability distributions are meaningful, we reiterate our concern that taking fifty draws, as IPL did, is not enough samples to produce a reliable result. IPL's response to our critique of their Latin Hypercube sampling technique appears to willfully misunderstand and/or ignore our concerns. Pages 47-49 of our report lay out these concerns in detail. IPL's response fails to rebut or even address our critiques on all points. Fifty samples, even when drawn through a Latin Hypercube process, simply cannot adequately represent the variation in a multi-dimensional problem space on the scale of IPL's modeling exercise.

Vectren's Energy Efficiency Cost Projection

We have learned since filing our comments on Vectren's 2016 IRP that there are additional issues with Vectren's energy efficiency cost projection. Stevie's regression results from his analysis of the problematic EIA Form 861 data set were applied to an estimated levelized cost of Vectren's 2016 programs. This serves as the starting point for the entirety of the cost projection. That starting point was calculated incorrectly, however. The stated levelized cost of Vectren's 2016 program in their 2016 IRP is $0.03322 per kWh. However, that number should be much lower. The following are the generic equations used to develop this levelized cost[4]:

$$Capital\ Recovery\ Factor\ (CRF) = \frac{Weighted\ Average\ Cost\ of\ Capital(1 + Weighted\ Average\ Cost\ of\ Capital)^{Porftolio\ Weighted\ Measure\ Life}}{(1 + Weighted\ Average\ Cost\ of\ Capital)^{Porftolio\ Weighted\ Measure\ Life} - 1}$$

$$Levelized\ Gross\ Cost\ per\ kWh = \frac{First\ year\ program\ cost \times CRF}{Annual\ kWh\ Savings}$$

The weighted average cost of capital was assumed to be Vectren's pre-tax nominal discount rate of 10.09%.[5] However, Stevie's regression was intended to forecast *real*, not nominal costs. That means that the Vectren's real discount rate of 5.186% should have been applied in order to arrive at the correct levelized cost.

[4] See response to CAC DR 9-4 in Cause No. 44927 (Attachment 1).
[5] See CAC response to Vectren DR 2-3 in Cause No. 44927 (Attachment 2) or CAC Exhibit 2 Attachment AS-10_part 2, which was publicly filed in Cause No. 44927.

This change alone reduces the starting cost of Vectren's energy efficiency costs from $0.03322 per kWh to $0.02657 per kWh.[6] In addition, Stevie's cost projection model is limited to two categories of costs reported to EIA, direct costs and customer incentive payments. Excluded from his cost projections are all other costs of energy efficiency:

- administrative,
- marketing,
- monitoring & evaluation,
- performance incentive, and
- other non-program specific costs.

These other important costs were *not* excluded from Vectren's calculation. Simply put, Vectren's cost calculation is not made on the same basis as Stevie's cost projection. Stevie's projection is meant to apply to two categories of energy efficiency costs (direct costs and customer incentive payments), not to the full cost of energy efficiency.

Had Vectren limited the efficiency costs in this calculation to direct costs and customer incentives (in parallel to Stevie), the levelized cost would have been further reduced to $0.02393 per kWh, or *28 percent less* than Stevie calculates as the starting value.[7]

Even if Stevie had correctly specified his regression and used a reliable data source, the application of his results is fundamentally flawed. Several other serious errors and concerns with Stevie's method of applying his cost escalation estimates to Vectren's efficiency are discussed in IURC Cause No. 44927, CAC Exhibit 1, which is the Verified Direct Testimony of Dr. Stanton. These issues include:

(1) the basis for his efficiency cost growth factors are artificially inflated;

(2) he uses his regression results selectively, ignoring certain findings;

(3) his 2017 efficiency costs are erroneously based on expected cumulative savings in 2036; and

(4) he confuses the effects of changes over time with the effects of differing policy choices within a single year.

[6] See Attachment 3 for the 2016 Vectren DSM Electric Scorecard which shows the planned program costs and gross savings for both the C&I and residential sectors.
[7] Based on Vectren's 2016 DSM plan. If actual performance and cost had been used, the levelized cost would drop to $0.02298 per kWh.

Stevie's rebuttal in that docket addresses only some of these critiques and focuses on the language of the critique rather than its substance.

Again, the 2016 levelized cost serves as the starting point for the entirety of Vectren's DSM cost projection, so this error is magnified throughout all the bundles and completely undermines the Strategist modeling evaluating those DSM bundles.

Vectren's Strategist Modeling

In its reply to our comments, Vectren took issue with the following table:

Resource	Scenario						
	Base	High Regu-latory	Low Regu-latory	High Tech-nology	High Economy	Low Economy	Base + Large Load
200 MW Wind	2099	2030	2099	2099	2024	2099	2025
50 MW Solar	2099	2099	2099	2099	2099	2036	2024
50 MW Wind	2019	2099	2099	2099	2099	2099	2025
9 MW Solar	2019	2099	2099	2030	2024	2035	2025
4 MW DR added every 5 years	2020	2099	2020	2099	2020	2020	2020
EE Block 1	2018	2018	2018	2099	2018	2099	2018

Data source: *Strategist file PRV Input Summary report for each scenario*
Note: *"2099" indicates that this resource is never available for selection during the 20-year modeling period.*

Vectren contended that each resource was available to be selected much earlier in the planning period within at least one of "8 model runs performed for each scenario." We acknowledged in our comments that Vectren engaged in an iterative process of evaluating resources. However, we criticized Vectren for using a process that is entirely opaque and resulted in the nonsensical values shown in the table above. We stand by that criticism and offer some additional clarification given Vectren's response to our comments. In its rebuttal testimony in Cause No. 44927, Vectren suggests consideration of the following, saying it should address concerns that it had improperly constrained resource choices: (1) a matrix of its Strategist runs, as well as (2) a flow chart (replicated below). We strongly disagree.

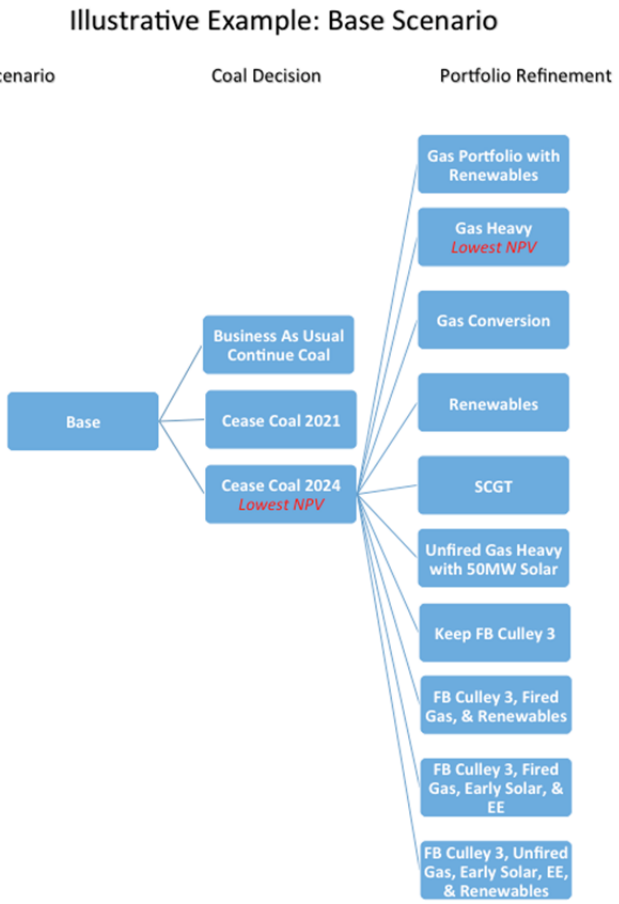


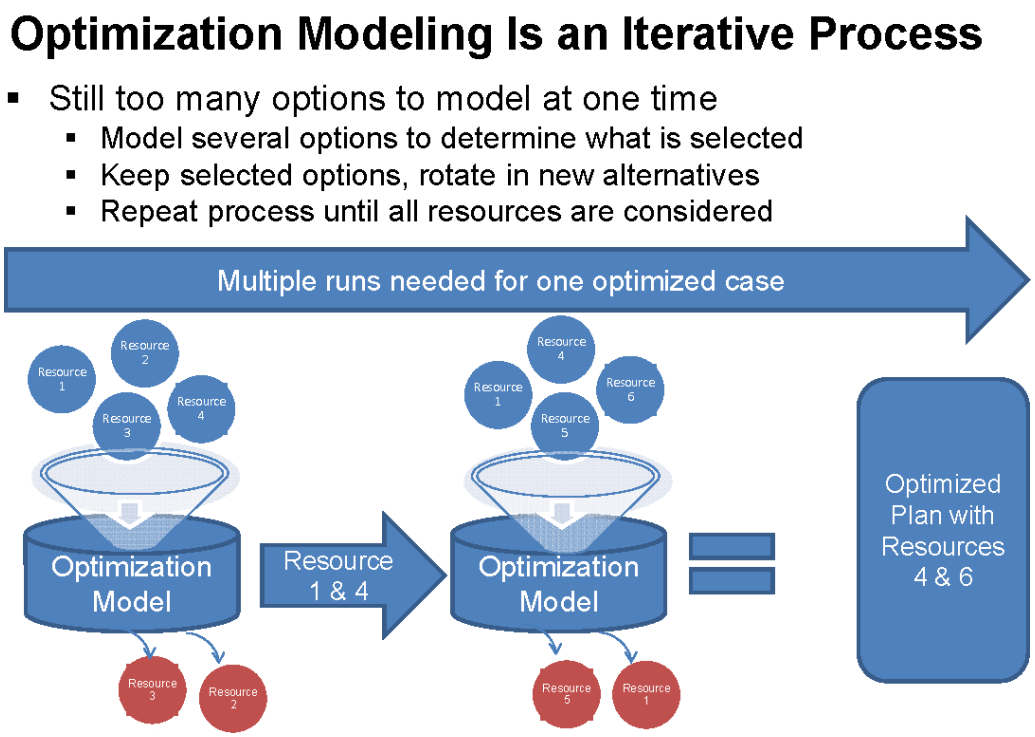
Figure 3. Vectren's Process Flow Chart for Strategist Modeling

First, Vectren's Process Flow Chart leaves out a fourth step, which is the construction of the final portfolio in each scenario. The third step shown in Figure 3 above (Vectren's so-called "Portfolio Refinements", a term that is literally never used in Vectren's IRP) does not result in a final version of each scenario. Vectren's flow chart does nothing to rectify our concern: the relationship between the eight modeling runs performed for each scenario and the final scenario run is completely undescribed.

In addition, each of the portfolio refinements is characterized in large part by requiring the model to include specific generation units—a modeling procedure that is at odds with any optimization process. Indeed, to call any of the scenarios run by Vectren "optimized" is, at best, disingenuous.

Finally, Vectren's process flow chart sheds no light on the development of the "Balanced Energy" portfolios.

Vectren has also directed us to one of the slides from a stakeholder presentation.[8] That slide says simply:



Not only is this explanation nonspecific, but it is contradicted by Vectren's own modeling files.

Our interpretation of this language, based on its plain meaning, is that the final version of each scenario includes the option to select all the resources that were in all the other, non-final runs. A review of the Low Economy runs, as an example, does not bear this out. The final Low Economy run does not allow for the selection of energy efficiency, yet at least one of the non-final iterations of the Low Economy scenario requires adoption of the first four blocks of energy efficiency. Even if each resource was evaluated, selected options kept, and new alternatives rotated in as Vectren claims, it matters a great deal what the other assumptions were in each run when each alternative was considered.

For example, one of the non-final Low Economy runs is titled "Low Economy-Cease Coal 2024-Gas Conversion" meaning that the resource portfolio contains both the closure of certain Vectren coal units as well as their conversion to gas units. All of these resource choices are forced in with the end result that the reserve margin is well over what is required. It should be of no surprise, therefore, that no other resources including energy efficiency are chosen. Why should this run influence the

[8] Response to CAC DR 5-2 in Cause No. 44927.

resources included in the final Low Economy run? And how, if at all, does it influence the included resources?

There is no satisfactory answer to these questions. And nothing Vectren has said about its IRP clarifies:

(1) Why Vectren kept some resources but not others,
(2) How and in what order each resource was evaluated, and
(3) How one should interpret the results of any of these runs.

We find a clear explanation of the reasoning behind Vectren's construction of its Strategist modeling completely lacking.

Recommendations for Improving the Stakeholder Process

In their responses to our comments, we noted that at least one utility was surprised to read our comments and would have expected that much of what we said would be addressed through the stakeholder process. As such, we thought it would be helpful to set expectations for stakeholder participation in the IRP process as well as make some recommendations to improve the stakeholder process.

Review of submitted IRPs by stakeholders is a critical component of the integrated resource planning process: We do not see future stakeholder processes resulting in a consensus IRP document. To reach such an outcome would require far more than just four meetings presenting public information. It would require extensive side-by-side work between stakeholders' experts and utility staff/contractors running the IRP model and creating the inputs. It would require an ability to review all the modeling files as they are produced. It would also require an extensive back and forth process to create the narrative describing the modeling and forecasting efforts. And finally, it would require significant investment from outside sources because the level of funding needed to allow stakeholder groups to participate in the development of IRPs in that depth is not normally available. Because it seems highly unlikely that the stakeholder processes will move in this direction, it is unreasonable to expect that the stakeholder process will resolve all disagreements between stakeholders and utilities. It is also unreasonable to think the presentation of publicly available information in four different sessions[9] can adequately substitute for (1) thorough review of IRPs once they are filed, (2) thorough review of the modeling files associated with those IRPs once they are provided to stakeholders, and (3) the ability to ask detailed discovery questions. As has happened in the past, that information can be expected to continue to yield additional disagreements between stakeholders and utilities that were not raised in

[9] In addition, the utility runs these stakeholder sessions, controls the timing and amount of information that is shared with stakeholders, and controls the floor during the meeting, which also limits the ability of stakeholders (and their experts) to get complete information out of these meetings.

the stakeholder process – often simply because they could not have been raised without the opportunity to review the final IRP and modeling files nor were there resources to engage us earlier in the process even if this information had been made available to us sooner.

The stakeholder process plays a different role: If the correct information is presented in the stakeholder process, it can alert all the parties to fundamental disagreements especially as to basic assumptions about modeling inputs. For example, even before the IRP was filed, a problem with the use of the PIRA forecasts in NIPSCO's IRP had been identified. If the utilities are willing, an attempt at rectifying those disagreements by changing modeling assumptions could be made. To date, however, the utilities have often reacted defensively to questions raised about their modeling assumptions, and/or have claimed that they are unable to address any such questions during the current IRP process but could only consider doing so in future IRPs.

The designation of "stakeholder portfolios" should be limited to stakeholders' actual requests: Another change that would improve the outcomes of stakeholder processes is to identify and model "stakeholder" portfolios only if the stakeholders can direct the modeler to make specific changes and can see all the modeling inputs and outputs before those runs are finalized. It is not possible to summarize all the key inputs to each run in a public presentation. As a result, each of the utilities constructed so called "Stakeholder" portfolios with assumptions that our clients did not endorse, but were not made apparent to us until we had reviewed the modeling files after the submission of the IRP. The whole process of constructing those portfolios and presenting them in the IRPs then becomes an exercise in wasted time and energy because they are portfolios that none of the parties believe to be realistic and yet the name "Stakeholder" portfolio implies our clients' endorsement.

The stakeholder process can add some additional value: Our clients have expressed appreciation for the efforts NIPSCO put into communicating with stakeholders interested in participating. And while not all aspects of the process were desirable, NIPSCO is to be commended for going above and beyond in communicating with interested parties and scheduling one-on-one meetings to discuss issues and concerns.

In sum, we appreciate the opportunity to provide these additional comments and look forward to seeing the Director's Final Report.

ATTACHMENT 1

STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

VERIFIED PETITION OF SOUTHERN INDIANA GAS AND ELECTRIC COMPANY D/B/A VECTREN ENERGY DELIVERY OF INDIANA, INC. REQUESTING THE INDIANA UTILITY REGULATORY COMMISSION TO APPROVE CERTAIN DEMAND SIDE MANAGEMENT PROGRAMS AND GRANT COMPANY AUTHORITY TO RECOVER COSTS, INCLUDING PROGRAM COSTS, INCENTIVES AND LOST MARGINS, ASSOCIATED WITH THE DEMAND SIDE MANAGEMENT PROGRAMS VIA THE COMPANY'S DEMAND SIDE MANAGEMENT	**CAUSE NO. 44927**

PETITIONER'S RESPONSE TO CITIZENS ACTION COALITION'S NINTH DATA REQUEST TO VECTREN

Southern Indiana Gas and Electric Company d/b/a Vectren Energy Delivery of Indiana, Inc. ("Vectren South"), pursuant to 170 IAC 1-1.1-16 and the discovery provisions of Rules 26 through 37 of the Indiana Rules of Trial Procedure, by its counsel, hereby submits the following Objections and Responses to the Citizens Action Coalition's ("CAC") Ninth Set of Data Requests to Vectren South dated August 28, 2017 ("Requests").

I. General Objections.

1. The responses provided to the Requests have been prepared pursuant to a reasonable and diligent investigation and search conducted in connection with the Requests in those areas where information is expected to be found. To the extent the Requests purport to require more than a reasonable and diligent investigation and search, Vectren South objects on grounds that they include an undue burden and unreasonable expense.

2. Vectren South objects to the Requests to the extent they seek documents or information which are not relevant to the subject matter of this proceeding and which are not reasonably calculated to lead to the discovery of admissible evidence.

3. Vectren South objects to the Requests (including Instruction Nos. 1(a), 1(b) and 2(d)) to the extent they seek responses and information from individuals and entities who are not parties to this proceeding and to the extent they request the production of information and documents not presently in Vectren South's possession, custody, or control.

4. Vectren South objects to the Requests to the extent the Requests seek information outside the scope of this proceeding, and as such, the Requests seek information not reasonably calculated to lead to the discovery of relevant or admissible evidence.

5. Vectren South objects to the Requests to the extent they seek an analysis, calculation, or compilation which has not already been performed and which Vectren South objects to performing.

6. Vectren South objects to the Requests to the extent they are vague and ambiguous and provide no basis from which Vectren South can determine what information is sought.

7. Vectren South assumes no obligation to supplement these responses except to the extent required by Ind. Tr. R. 26(E) (1) and (2) and objects to the extent the instructions and/or Requests (including Instruction No. 2(f)) purport to impose any greater obligation.

8. Vectren South objects to the Requests to the extent they seek information that is subject to the attorney-client, work product, settlement negotiation, or other applicable privileges.

9. Vectren South objects to the Requests to the extent the seek information that is confidential, proprietary, competitively sensitive, and/or trade secret.

10. The responses constitute the corporate responses of Vectren South and contain information gathered from a variety of sources. Vectren South objects to the Requests (including Instruction Nos. 1(j), 1(k) and 2(g)) to the extent they request identification of and personal information about all persons who participated in responding to each data request on the grounds that they are overbroad and unreasonably burdensome given the nature and scope of the requests and the many people who may be consulted about them.

11. Vectren South objects to the Requests to the extent the discovery sought is unreasonably cumulative or duplicative, or is obtainable from some other source that is more convenient, less burdensome, or less expensive.

12. Vectren South objects to the Requests to the extent the burden or expense of the proposed discovery outweighs its likely benefit, taking into account the needs of the case, the amount in controversy, the parties' resources, the importance of

the issues at stake in litigation, and the importance of the proposed discovery in resolving the issues.

13. Vectren South objects to the Requests to the extent they solicit copies of voluminous documents.

14. Vectren South objects to the Requests (including Instruction No. 2(h)) to the extent they request identification of witnesses who will be prepared to testify concerning the matters contained in each response on the grounds that Vectren South is under no obligation to call witnesses to respond to questions about information provided in discovery.

Subject to and without waiver of the general and specific objections set forth herein, Vectren South responds to the Requests in the manner set forth below.

II. Data Request Responses.

Request No. 9-4: Refer to the response to CAC 2-1. Please confirm that the following generic equations were used to calculate the $0.03322 per kWh figure given at page 4 of Dr. Stevie's rebuttal testimony. If it is not, please provide the generic equations used to calculate the $0.03322 per kWh figure.

$$Capital\ Recovery\ Factor\ (CRF) = \frac{Weighted\ Average\ Cost\ of\ Capital(1+Weighted\ Average\ Cost\ of\ Capital)^{Porftolio\ Weighted\ Measure\ Life}}{(1+Weighted\ Average\ Cost\ of\ Capital)^{Porftolio\ Weighted\ Measure\ Life}-1}$$

$$Levelized\ Gross\ Cost\ per\ kWh\ = \frac{First\ year\ program\ savings \times CRF}{Annual\ kWh\ Savings}$$

Response: **Yes, the generic equations identified above are similar to the equations Vectren South used to calculate the $0.03322 per kWh figure at page 4 of Dr. Stevie's rebuttal testimony.**

ATTACHMENT 2

STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

VERIFIED PETITION OF SOUTHERN INDIANA GAS AND ELECTRIC COMPANY D/B/A VECTREN ENERGY DELIVERY OF INDIANA, INC. REQUESTING THE INDIANA UTILITY REGULATORY COMMISSION TO APPROVE CERTAIN DEMAND SIDE MANAGEMENT PROGRAMS AND GRANT COMPANY AUTHORITY TO RECOVER COSTS, INCLUDING PROGRAM COSTS, INCENTIVES AND LOST MARGINS, ASSOCIATED WITH THE DEMAND SIDE MANAGEMENT PROGRAMS VIA THE COMPANY'S DEMAND SIDE MANAGEMENT ADJUSTMENT	)	**CAUSE NO. 44927**

CAC'S RESPONSES TO VECTREN SOUTH'S SECOND SET OF DATA REQUESTS

Pursuant to 170 IAC 1-1.1-16 and the agreements regarding discovery reflected in the Indiana Utility Regulatory Commission's ("Commission") Prehearing Conference and Docket Entries in this cause, Citizens Action Coalition ("CAC") submits the following responses to Southern Indiana Gas and Electric Company, Inc. d/b/a Vectren Energy Delivery of Indiana, Inc.'s ("Vectren South" or "Petitioner") second set of data requests.

GENERAL OBJECTIONS

A. CAC objects to Requests to the extent that they seek information that is not relevant to the above referenced proceedings, Indiana Rule of Evidence 401.

B. CAC objects to Requests that are not "reasonably calculated to lead to the discovery of admissible evidence," Indiana Trial Rule 26(B)(1).

C. CAC objects to Requests that are overly broad, unduly burdensome, oppressive, and calculated to take Joint Intervenors and their staff away from normal work activities, and require

them to expend significant resources to provide complete and accurate answers to Vectren South's Request, which are only of marginal value to Vectren South. *See* Indiana Trial Rule 26 (B)(1).

D. CAC assumes, for the purpose of providing these objections and responses, that the Requests do not seek information that is privileged, protected by the work product doctrine, or otherwise exempt from disclosure. Joint Intervenors object to the Requests to the extent, if any, that they call for production of any such material.

E. CAC reserves all of its evidentiary objections or other objections to the introduction or use of any response at any hearing in this action.

F. CAC does not, by any response to any Request, waive any objections to that Request.

G. CAC does not admit to the validity of any legal or factual contention asserted or assumed in the text of any Request.

H. CAC reserves the right to assert additional objections as appropriate, and to amend or supplement these objections and responses as appropriate.

I. The foregoing general objections shall apply to each of the following Requests whether or not restated in the response to any particular response.

Request No. 2-1: Please provide in electronic, spreadsheet format with all formulas and links intact, all workbooks the CAC used to create the regression analyses described by CAC witness Stanton in CAC Exhibit 1. Please provide the data sets in Excel spreadsheet format, separately for each regression.

Response:

Please see the Excel sheet provided to Vectren with CAC's Second Supplemental Response to Vectren Set 1.

Request No. 2-2: Please provide in electronic, spreadsheet format with all formulas and links intact, the regression results (actual model runs) discussed by witness Stanton in CAC Exhibit 1.

Response:

Please see the Excel sheet provided to Vectren with CAC's Second Supplemental Response to Vectren Set 1.

Request No. 2-3: Please provide in electronic, spreadsheet format with all formulas and links intact, all workbooks the CAC used to calculate levelized costs, as discussed by witness Sommer in CAC Exhibit 2.

Response:

Please see the attached "44927--CAC Exhibit 2-Figure 4--CONFIDENTIAL Workpaper--7-28-17_5-Corrected," which has been corrected in response to this request since our submission of workpapers to the parties on July 30, 2017, and will be provided to the Commission, under seal, once the Commission rules on the pending motion for confidential protection filed by Vectren. The corrections addressed the number of years of inflation included in the conversion of certain program costs from nominal to real dollars, but did not change anything presented in CAC Exhibit 2 or the approach that we took in our calculation of the levelized costs, as discussed by Witness Sommer in CAC Exhibit 2. Our approach was largely based on the spreadsheet Vectren provided in response to CAC Data Request 2-1, despite the fact that there are several aspects of Vectren's analysis that did not make sense.

First, in order to levelize 2016 program costs, Vectren used its pre-tax nominal discount rate of 10.09%. This levelization is a key step in Dr. Stevie's analysis because the resulting cost per kWh is the starting point for his DSM cost projections. However, as described in Vectren's response to CAC Data Request 1-23, Dr. Stevie forecasts DSM costs in real dollars. So it is not clear why Vectren would have used a pre-tax nominal discount rate to develop the starting cost for a forecast in *real* dollars.

Second, as described in Vectren's response to CAC Data Request 4-3, Dr. Stevie's estimate of 2018-2020 proposed program levelized costs shown in Table RGS-1 are based on a *different* nominal discount rate, the *post-tax nominal* discount rate of 7.29%. In addition, the kWh impacts were levelized using the real discount rate of 5.186%, a step that was not employed in Dr. Stevie's cost projections. So not only are the levelized costs in Table RGS-1 in nominal, not real, dollars, but they were developed using a different nominal discount rate than Dr. Stevie used in his DSM cost projections for the IRP, as well as a different levelization methodology.

When developing our levelized cost projection for CAC Exhibit 2, we decided to mimic Vectren's approach in its response to CAC Data Request 2-1 while keeping the result as comparable as possible with Dr. Stevie's real (not nominal) cost forecast for DSM. We converted Vectren's program costs into real dollars using Vectren's assumed inflation rate of 1.6%. Vectren levelizes program costs using a capital recovery factor (the ratio of a constant annuity to the present value of that annuity); therefore, we should have then calculated the present value of the program costs (in real dollars). However, since Vectren's capital recovery factor is based on a pre-tax nominal discount rate, using the real discount rate would have resulted in the application of two different discount rates in the same levelization. Therefore, we simply ignored the present value step. Changing any one of these factors, i.e., levelizing using the real, not pre-tax nominal, discount rate or calculating the present value of 2018-2020 program costs would make the proposed program costs look even lower in comparison to Dr. Stevie's DSM cost projections. Therefore our approach gave the most conservative, i.e., the highest result possible, for the 2018-2020 DSM plan.

ATTACHMENT 3

Vectren December 2016 Electric DSM Scorecard
Portfolio period: January 2016 – December 2016

	Measures/Projects Implemented				Gross kWh Savings				Net kWh Savings				Program Expenditures			
Residential Programs	Current Month (Dec)	Program YTD	Planning Goal	% to Goal	Current Month (Dec)	Program YTD	Planning Goal	% to Goal	Current Month (Dec)	Program YTD	Planning Goal	% to Goal	Current Month (Dec)	Program YTD	Planning Goal	% to Goal
Residential Lighting	74,882	272,104	314,618	86%	1,930,087	7,145,203	6,902,972	104%	945,743	3,501,149	3,382,456	104%	$242,456	$860,686	$737,106	117%
Home Energy Assessments	368	1,850	1,500	123%	283,744	1,404,989	2,048,260	69%	249,695	1,236,390	1,802,469	69%	$54,649	$286,110	$307,623	93%
Income Qualified Weatherization	138	740	485	153%	207,616	967,691	1,103,043	88%	207,616	967,691	1,103,043	88%	$48,700	$331,461	$364,079	91%
Appliance Recycling	67	998	952	105%	71,328	1,066,968	1,020,544	105%	39,587	591,268	565,083	105%	$6,036	$150,303	$175,100	86%
Energy Efficient Schools	0	2,400	2,400	100%	0	739,963	739,963	100%	0	702,965	702,965	100%	$1,615	$133,567	$143,971	93%
Residential Prescriptive	562	7,178	4,808	149%	291,636	3,175,641	2,068,640	154%	145,818	1,587,821	1,055,556	150%	$107,569	$1,209,527	$1,031,250	117%
Residential New Construction	0	128	103	124%	0	358,493	260,756	137%	0	340,569	247,719	137%	$3,730	$83,873	$90,666	93%
Multi-Family Direct Install	2,780	3,737	5,471	68%	75,894	157,088	326,240	48%	75,894	157,088	326,240	48%	$12,740	$30,672	$40,676	75%
Residential Behavioral Savings	0	49,751	49,751	100%	853,780	9,410,847	8,200,000	115%	853,780	9,410,847	8,200,000	115%	$2,152	$349,194	$357,075	98%
Conservation Voltage Reduction													$2,421	$19,451	$20,000	97%
Residential Smart Thermostat Program	0	2,000	2,000	100%	0	858,000	858,000	100%	0	686,400	686,400	100%	-$1,278	$952,554	$989,000	96%
Total Residential	78,797	340,886	382,088	89%	3,714,085	25,284,883	23,528,418	107%	2,518,132	19,182,188	18,071,930	106%	$480,791	$4,407,398	$4,256,546	104%
Commercial & Industrial Programs																
Small Business Direct Install	397	10,760	26,037	41%	162,556	4,051,904	6,619,675	61%	162,556	4,051,904	6,619,675	61%	$8,515	$1,468,856	$1,527,655	96%
Commercial & Industrial Prescriptive	3,073	16,676	12,540	133%	710,847	8,947,824	6,911,630	129%	575,786	7,247,737	5,598,420	129%	$40,641	$978,251	$839,295	117%
Commercial & Industrial New Construction	0	0	15	0%	0	0	519,000	0%	0	0	498,240	0%	$1,614	$29,392	$173,022	17%
Commercial & Industrial Custom	3	20	25	80%	3,273,209	7,639,112	4,296,200	178%	2,520,371	5,882,116	3,308,074	178%	$12,396	$1,162,630	$798,626	146%
Building Tune-up	0	0	9	0%	0	0	450,000	0%	0	0	450,000	0%	$43	$10,964	$134,432	8%
Conservation Voltage Reduction													$2,260	$20,101	$20,000	101%
Total C&I	3,473	27,456	38,626	71%	4,146,612	20,638,840	18,796,505	110%	3,258,713	17,181,757	16,474,409	104%	$65,469	$3,670,193	$3,493,030	105%
Total Residential and C&I	82,270	368,342	420,714	88%	7,860,697	45,923,722	42,324,923	109%	5,776,845	36,363,945	34,546,340	105%	$546,259	$8,077,592	$7,749,576	104%
Outreach													$3,092	$265,503	$446,800	59%
Evaluation													$70,947	$367,725	$409,819	90%
Total Outreach and Evaluation													$74,039	$633,228	$856,619	74%
Total Portfolio	82,270	368,342	420,714	88%	7,860,697	45,923,722	42,324,923	109%	5,776,845	36,363,945	34,546,340	105%	$617,877	$8,710,820	$8,606,195	101%
Flex Funding																
Appliance Recycling (Flex Funding 4/28/16)															$50,750	
Residential Prescriptive (Flex Funding 9/28/16)															$198,856	
C&I Custom (Flex Funding 9/28/16)															$230,000	
C&I Prescriptive (Flex Funding (9/28/16)															$40,000	
Market Potential Study (Flex Funding (10/11/16)													$10,515	$19,613	$25,000	
Food Bank (Flex Funding 9/28/16)	24,288	24,288	24,288	100%	395,387	395,387	395,387	100%	395,387	395,387	395,387	100%	$0	$67,460	$67,446	100%
Total Flex Funding															$612,052	
Total Portfolio including Flex Funding	82,270	368,342	420,714	88%	8,256,084	46,319,110	42,720,310	108%	6,172,232	36,759,332	34,941,727	105%	$617,877	$8,797,892	$9,218,248	95%