



2016

**IRP NON-TECHNICAL
SUMMARY**



BACKGROUND

Indianapolis Power & Light Company (“IPL”) is committed to improving lives by providing safe, reliable, and sustainable energy solutions to more than 480,000 residential, commercial and industrial customers in Indianapolis and surrounding central Indiana communities. The compact service area measures approximately 528 square miles. The Company, which is headquartered in Indianapolis, is subject to the regulatory authority of the Indiana Utility Regulatory Commission (“IURC”) and the Federal Energy Regulatory Commission (“FERC”). IPL fully participates in the electricity markets managed by the Midcontinent Independent System Operator (“MISO”).

Effective planning is integral to serving customers, including anticipating and reacting to changes in technology, public policy, and public perception. A particular section of planning results in an Integrated Resource Plan (“IRP”), which is the subject of this document. Every two years, IPL submits an IRP to the Indiana Utility Regulatory Commission (“IURC”) in accordance with Indiana Administrative Code (IAC 170 4-7) to describe expected electrical load requirements, a discussion of potential risks, possible future scenarios and propose candidate resource portfolios to meet those requirements over a forward looking 20-year study period based upon analysis of all factors. This process includes input from stakeholders known as a “Public Advisory” process.

IRP OBJECTIVE

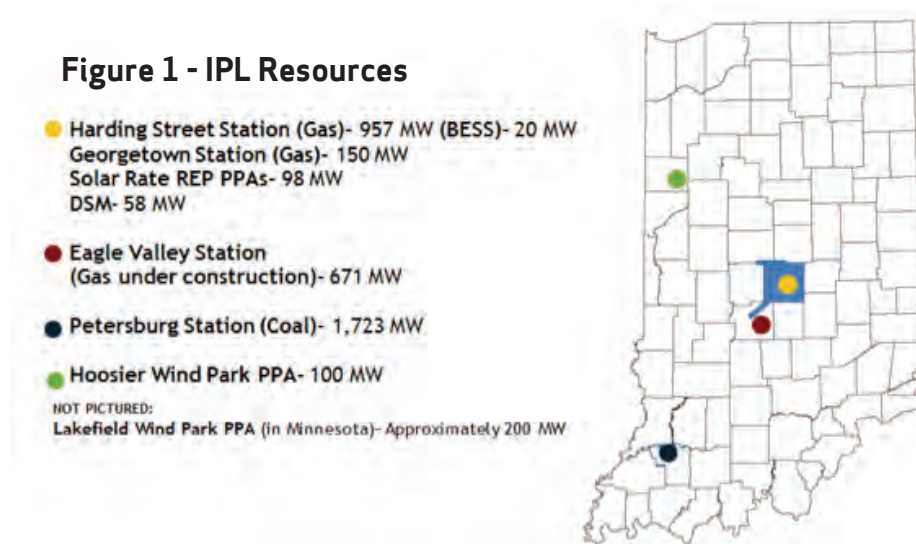
The objective of IPL’s IRP is to identify a portfolio to provide safe, reliable, sustainable, reasonable least cost energy service to IPL customers throughout the study period giving due consideration to potential risks and stakeholder input.

IRP Process

IPL starts the IRP process by modeling its existing resource mix and forecasts customer energy and peak requirements. The existing resources include Demand Side Management (DSM), approximately 2,700 MW of generating resources, and long term contracts known as purchase power agreements (“PPAs”) for approximately 96 MW of solar generation and approximately 300 MW of wind generation. Under the terms of the PPAs, IPL receives all of the energy and Renewable Energy Credits (“RECs”) associated with the wind and solar PPAs which it currently sells to offset the cost of this energy to customers.

However, IPL reserves the right to use RECs to meet any future environmental requirement, such as the EPA's Clean Power Plan ("CPP").

Figure 1 highlights IPL's service territory and resources.



Since 2007, IPL has been a leader in moving towards cleaner resources as shown in Figure 2.

Figure 2 - IPL Resources



IPL identifies potential supply-side resources such as wind, solar, energy storage, or natural gas generation, and demand-side resources such as additional energy efficiency programs, for the IRP model to select to meet future customer energy requirements.

*The null energy of the Wind PPAs is used to supply the load for IPL customers, and in the absence of any Renewable Portfolio Standards (RPS) mandates, IPL is currently selling the associated RECS, but reserves the right to use RECs from the Wind PPAs to meet any future RPS requirement. The Wind PPAs were approved by the IURC and if IPL chooses to monetize the RECs that result from the agreements, IPL shall use the revenues to first offset the cost of the Wind PPAs and next to credit IPL customers through its fuel adjustment clause proceedings. The Green-e Dictionary (http://green-e.org/learn_dictionary.shtml) defines null power as, "Electricity that is stripped of its attributes and undifferentiated. No specific rights to claim fuel source or environmental impacts are allowed for null electricity. Also referred to as commodity or system electricity."

The electric utility industry continues to evolve through technology advancements, fluctuations in customer consumption, changes in state and federal energy policies, uncertainty of long-term fuel supply and prices, and a multitude of other factors. Since the impacts these factors will have on the future utility industry landscape remains largely uncertain, IPL models multiple possible scenarios to evaluate various futures. In this IRP, IPL incorporated potential risks quantitatively and qualitatively in six scenarios summarized in Figure 3.

Figure 3 - IRP Scenario Drivers

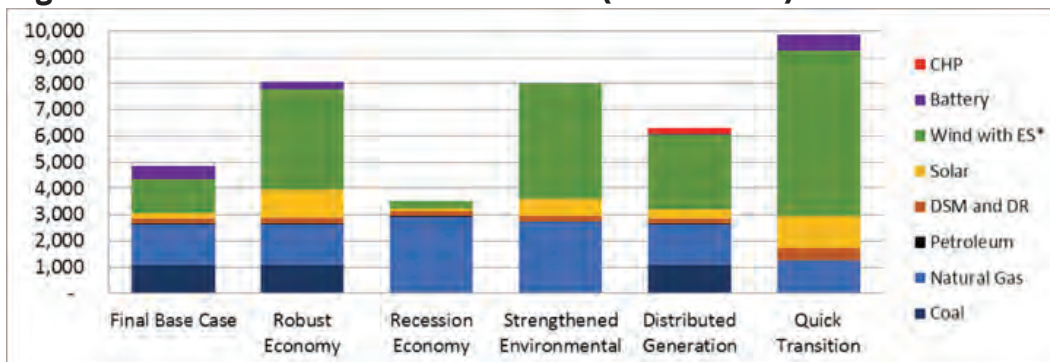
Scenario Name		Load Forecast	Natural Gas and Market Prices	Clean Power Plan (CPP) and Environment	Distributed Generation (DG)
1	Base Case	Use current load growth methodology	Prices derived from an ABB Mass-based CPP Scenario	CPP starting in 2022, Low cost environmental regulations	Expected moderate decreases in technology costs for wind, storage, and solar
2	Robust Economy	High	High	Base Case	Base Case
3	Recession Economy	Low	Low	Base Case	Base Case
4	Strengthened Environmental Rules	Base Case	Base Case	20% RPS, high cost CPP and environmental regulations	Base Case
5	Distributed Generation	Base Case	Base Case	Base Case	Fixed additions of 150 MW DG in 2022, 2025, and 2032
6	Quick Transition	Base Case	Base Case	Base Case	Fixed portfolio to retire coal, add max DSM, minimum baseload (NG), plus solar, wind and storage

The IRP model produces potential candidate future resource portfolios in light of uncertainties and risk factors identified to date. “Unknown unknowns”, such as public policy changes not yet proposed or unexpected future environmental regulations are not included, which could affect implementation plans. Subsequent specific resource changes are based upon competitive processes with detailed regulatory filings such as DSM or Certificate of Public Convenience and Necessity (“CPCN”) proceedings before the Commission.

The candidate resource portfolios resulting from each scenario at the end of the 20 year IRP study period are shown in Figure 4.



Figure 4 - Candidate Resource Portfolios (MW in 2036)



The “Preferred Resource Portfolio” represents what IPL believes to be the most likely based on factors known at the time of the IRP filing. The “Preferred Resource Portfolio” based upon the lowest cost to customers in terms of the Present Value Revenue Requirement (“PVRR”) would be the Base Case scenario. In addition to the traditional customer cost metric of PVRR, IPL developed metrics related to environmental stewardship, financial risk, resiliency, and rate impact metrics to compare the portfolios derived from multiple scenarios which are summarized in Figure 5.

Figure 5 - Metrics Summary

Scenarios	Cost		Financial Risk	Environmental Stewardship				Resiliency			
	20 yr PVRR (\$ MN)	Rate Impact, 20 yr average (real cents/kWh)		Average annual CO2 emissions (tons)	Average annual NOx emissions (tons)	Average annual SO2 emissions (tons)	Total CO2 intensity (tons/MWh)	Planning Reserves (lowest amount over 20 yrs)*	Distributed Generation (Max DG as percent of capacity over 20 yr)	Market Reliance for Energy (Max over 20 yrs)	Market Reliance for Capacity (Max MW over 20 yrs)
Base	\$ 10,309	3.53	\$1,324,989,546	12,883,603	13,181	11,808	0.79	15%	3%	9%	150
Robust Econ	\$ 10,550	3.62	\$1,303,754,944	12,883,183	13,181	11,808	0.70	27%	15%	9%	200
Recession Econ	\$ 11,042	3.78	\$1,463,842,563	3,334,067	1,925	593	0.44	3%	3%	58%	0
Streng Enviro	\$ 11,990	4.11	\$1,126,983,327	3,309,326	1,910	629	0.28	15%	10%	52%	50
Adopt of DG	\$ 11,092	3.80	\$1,294,337,690	13,219,942	12,910	10,874	0.78	15%	11%	9%	50
Quick Transition	\$ 11,988	4.20	\$1,311,247,113	5,403,645	4,320	3,243	0.32	15%	35%	57%	0



HYBRID PREFERRED RESOURCE PORTFOLIO

These metric results spurred discussions about how best to meet the future needs of customers. In the fourth public advisory meeting, IPL shared the Base Case as the preferred resource portfolio. However, subsequent review and stakeholder discussions prompted further developments which lead IPL to believe the ultimate preferred resource portfolio, designed to meet the broad mix of customer and societal needs, will likely be a hybrid of multiple model scenario results.

While the Base Case has the lowest PVRR, it also has the highest collective environmental emission results and least amount of DG penetration. The economic variables used to model environmental and DG costs reflect what is measurable today, for example, potential costs for future regulation. . The model does not include estimated costs for regulations not yet proposed, public policy changes which may occur in the study period or specific customer benefits of DG adoption such as avoided plant operational losses, grid independence or cyber security advantages.

Given that a blend of variables from the base case, strengthened environmental and DG scenarios appear likely to come to fruition , IPL contends that, at this point, a hybrid preferred resource portfolio may be a more appropriate solution.

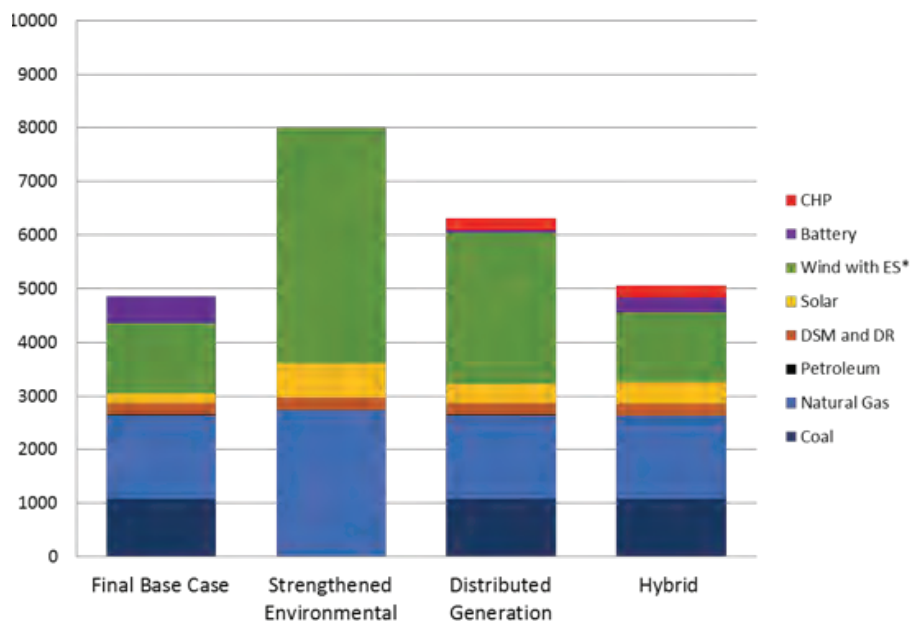
Under this scenario, a hybrid portfolio in 2036 could include two Pete coal units, (although these units would not necessarily serve as baseload generation but could be utilized more as a capacity resource), natural gas generation focused on local system reliability, wind to serve load during non-peak periods, and an average of DSM, solar, energy storage levels from the three scenarios as summarized in Figures 6 and 7.

Figure 6 – Summary of Resources (MW cumulative changes 2017-2036)

	Final Base Case	Strengthened Environmental	Distributed Generation	Hybrid
Coal	1078	0	1078	1078
Natural Gas	1565	2732	1565	1565
Petroleum	11	11	11	0
DSM and DR	208	218	208	212
Solar	196	645	352	398
Wind with ES*	1300	4400	2830	1300
Battery	500	0	50	283
CHP	0	0	225	225
totals	4858	8006	6319	5060

*Wind resources include small batteries for energy storage ("ES").

Figure 7 – Candidate Resource Portfolios including Hybrid Option
Operating Capacity of IPL Resources in 2036 (MW)



IPL anticipates that additional potential changes not easily modeled may affect future resource portfolios such as the impacts of pending local gubernatorial and national Presidential election results, public policy changes, or stakeholder input.

Although the model selects specific resources in each scenario based upon current market conditions and what IPL knows today, as yet unidentified, cost effective resources may exist in the future. IPL will evaluate these resource options in subsequent IRPs to develop the best Preferred Portfolio based on updates to market and fuel price outlooks, future environmental regulations, relative costs of technologies, load forecasts and public policy changes.

Results of subsequent IRPs will likely vary from these IRP results. During this interim time period, IPL does not anticipate significant changes to the resource mix aside from DSM program expenditures and welcomes discussion with stakeholders. IPL invites continued stakeholder dialog and feedback following the filing of this IRP and anticipates scheduling an additional public advisory meeting to facilitate this in early 2017.

PUBLIC ADVISORY PROCESS

IPL hosted four Public Advisory meetings to discuss the IRP process with interested parties and solicit feedback from stakeholders. The meeting agendas from each meeting are highlighted in the box below. For all meeting notes, presentations and other materials see IPL's IRP webpage at IPLpower.com/irp.

Meeting #1

- Introduction to IPL's IRP Process
- Selectable Supply-side and Demand-side Resource Options
- Discussion of Risks
- Scenario Development

Meeting #2

- Stakeholder Presentations
- Resource Adequacy
- Transmission & Distribution
- Load Forecast
- Environmental Risks
- Modeling Update

Meeting #3

- Draft Model Results for all Scenarios

Meeting #4

- Final Model Results
 - Preferred Resource Portfolio
 - Metrics & Sensitivity Analysis Results
- Short Term Action Plan

IPL incorporated feedback from stakeholders to shape the scenarios develop metrics and clarify the data presented. IPL is planning an additional public meeting in early 2017 to listen to stakeholders feedback about the final IRP document.

2016 Short Term Action Plan

2016 Short Term Action Plan Items (2017-2019)		
Resource Changes	2017	Implement DSM proposed for 2017, seek approval for 2018-2020 DSM action plan
	2017	Complete EV CCGT Construction
	2018	Complete CCR/NAAQS-SO ₂ Petersburg Upgrades
Transmission	2017	Upgrade (1) 138 kV line, replace (1) 345kV to 138 kV auto-transformer and continue long-term planning
	2018	Upgrade 3 substations, (3) 138 kV lines, and replace breakers at 2 substations and continue long-term planning
	2019	Implement projects identified in 2017 and 2018

CONCLUSION

It does not represent a planning play book, specific commitment or approval request to take any specific actions. The IRP forms a foundation for future regulatory requests based upon a holistic view of IPL's resource needs and portfolio options. IPL plans to conduct a public meeting to address questions and comments related to this IRP.