Indianapolis Power & Light Company

2014 Integrated Resource Plan

Public Version

Volume 2 of 2

October 31, 2014

Section 7. ATTACHMENTS - SEE VOLUME 2

Confidential Attachment 1.1 (FERC Form 715 Cover Letter) [170-IAC 4-7-4(b)(10)(A)] [170-IAC 4-7-4(b)(10)(B)]

Attachment 1.2 (US DOE IPL Smart Energy Project)

Confidential Attachment 1.3 (Cost of Transmission Expansion Projects) [170-IAC 4-7-6(d)(2)]

Attachment 1.4 (CVR Demand Response Verification)

Attachment 2.1 (2013 IPL System Load) [170-IAC 4-7-4(b)(13)]

Attachment 3.1 (Load Research Narrative) [170-IAC 4-7-4(b)(3)][170-IAC 4-7-5(a)(1)][170-IAC 4-7-5(a)(2)]

Attachment 3.2 (2013 Hourly Load Shape Summary) [170-IAC 4-7-4(b)(3)][170-IAC 4-7-5(a)(1)][170-IAC 4-7-5(a)(2)]

Attachment 4.1 (DSM Case - Cause No. 44497)

Attachment 4.2 (July 1, 2014 DSM Status Report)

Confidential Attachment 4.3 (DSM Future Avoided Costs) [170-IAC 4-7-6(b)(2)]

Attachment 4.4 (Standard DSM Benefit Cost Tests) [170-IAC 4-7-4(b)(12)][170-IAC 4-7-7(b)] [170-IAC 4-7-7(d)(1)]

Attachment 4.5 (DSM Benefit Cost Results) [170-IAC 4-7-4(b)(12)] [170-IAC 4-7-7(b)] [170-IAC 4-7-7(c)]

Attachment 4.6 (DSM 15-17 Costs and Energy and Demand Savings)

Attachment 4.7 (AEG's DSM Forecast) [170-IAC 4-7-6(b)(4)] [170-IAC 4-7-6(b)(5)] [170-IAC 4-7-6(b)(6)] [170-IAC 4-7-6(b)(7)]

Attachment 4.8 (2012 MPS)

Attachment 4.9 (Benefit Cost Test Equations) [170-IAC 4-7-7(d)(2)]

Attachment 4.10 (DSM Per Participant Data) [170-IAC 4-7-6(b)(4)][170-IAC 4-7-6(b)(5)][170-IAC 4-7-6(b)(6)][170-IAC 4-7-6(b)(7)]

Confidential Attachment 5.1 (Ventyx IPL-IRP 2014 Report)

Attachment 6.1 (10 Yr Energy and Peak Forecast) [170-IAC 4-7-4(b)(2)]

Attachment 6.2 (20 Yr High and Low Range Forecast) [170-IAC 4-7-4(b)(2)]

Confidential Attachment 6.3 (End Use Modeling Technique)

Confidential Attachment 6.4 (EIA End Use Data) [170-IAC 4-7-4(b)(2)]

Confidential Attachment 6.5 (Energy - Forecast Drivers) [170-IAC 4-7-4(b)(2)]

Attachment 6.6 (Energy - Input Data Set 1) [170-IAC 4-7-4(b)(2)] [170-IAC 4-7-5(a)(3)]

Attachment 6.7 (Energy - Input Data Set 2) [170-IAC 4-7-4(b)(2)] [170-IAC 4-7-5(a)(3)]

Attachment 6.8 (Energy - Input Data Set 3) [170-IAC 4-7-4(b)(2)] [170-IAC 4-7-5(a)(3)]

Attachment 6.9 (Peak - Forecast Drivers and Input Data) [170-IAC 4-7-4(b)(2)]

Confidential Attachment 6.10 (Model Performance - Statistical Measures)

Attachment 6.11 (Forecast Error Analysis)

Attachment 7.1 (Non-Technical Summary) [170-IAC 4-7-4(a)]

Attachment 8.1 (Rate REP Projects)

Attachment 8.2 (Rate REP Map)

Attachment 9.1 (IRP Public Advisory Meeting Presentations)

PUBLIC

MISO

March 31, 2014

Federal Energy Regulatory Commission
Secretary of the Commission
Form No. 715
888 First Street, NE
Washington, D.C. 20426

RE: FERC Form 715 - Annual Transmission Planning and Evaluation Report

Dear Secretary Bose:

Pursuant to Sections 213(b), 307(a) and 311 of the Federal Power Act and 18 CFR § 141.300 of the Federal Energy Regulatory Commission's ("FERC" or "Commission") regulations, enclosed for filing is the FERC Form 715 Response for certain Transmission Owners of the Midcontinent Independent System Operator, Inc. ("MISO") that elected to have a regional filing of their FERC Form 715 response. A listing of those Transmission Owners for which this data is supplied (the "Respondents") is included as Attachment 1.[1] A summary of the information submitted in compliance with Part 1 through Part 6, Appendix A of Form 715 is included as Attachment 2.

This filing, submitted to FERC via CD, contains Critical Energy Infrastructure Information ("CEII"). Thus, this filing is made pursuant to the Commission's regulations 18 CFR § 388.112(b)(2)(ii) (A) and contains the following:

1) The electronic media of all six parts of Form 715 with all pages marked "Critical Energy Infrastructure Information - Do Not Release;" and

2) A cover letter with two Attachments identifying the Respondents and a summary of the filing content with all pages marked "Critical Infrastructure Information - Do Not Release."

Please note the following points concerning the filing:

The response for Part 1 has a dual purpose. MISO is providing detailed information that will identify the source of data for each of the six parts of the report with exceptions as noted in Attachment 2. Also, this information is intended to satisfy Part 1 and includes the certifying signature.

PUBLIC

1 The responding Transmitting Utilities are now Transmission Owners of the MISO, and therefore, the MISO will now be filing FERC Form 715 on their behalf.

Midcontinent Independent System Operator, Inc. P.O. Box 4202 Carmel, IN 46082-4202 2985 Ames Crossing Road Eagan, MN 55121 317-249-5400 www.misoenergy.org

The response for all Parts is being made to FERC on a CD.

There will be no charge for providing the public with copies of the FERC 715 filing on a CD. The MISO reserves the right to levy a charge in future filing years if this cost becomes a significant burden.

This letter constitutes MISO's written statement requesting, on behalf of the Respondents, privileged treatment of the information contained in this filing as CEII pursuant to the Commission's Regulations at 18 CFR § 388.112(a).

If you have any questions about this filing, including the above request for CEII treatment, please do not hesitate to contact me. The required contact information is below my signature to this letter.

Ben Stearney
MISO, Engineer II Expansion Planning
2985 Ames Crossing Drive
Eagan, MN 55121
bstearney@misoenergy.org
Phone: 651-632-8414
Fax: 651-632-8417

cc: MISO Transmission Owning Member Respondents

ATTACHMENT 1

MISO
Regional FILING RESPONDENTS
FOR WHICH FERC FORM 715 DATA IS BEING SUPPLIED

BREC	Big Rivers Electric Corporation
CFU	Municipal Electric Utility of the City of Cedar Falls Iowa (Cedar Falls Utilities)
CMMPA	Central Minnesota Municipal Power Agency
CWLD	Columbia Water & Light
CWLP	City Water Power & Light
DPC	Dairyland Power Cooperative
DUKE	Duke Energy Indiana
GRE	Great River Energy
HE	Hoosier Energy
IPL	Indianapolis Power & Light Company
ITCM	ITC Midwest
ITCT	ITCTransmission
MISO	Midcontinent Independent Transmission System Operator
MDU	Montana-Dakota Utilities Co.
MEC	MidAmerican Energy Company
METC	Michigan Electric Transmission Company
MP	Minnesota Power
MPW	Muscatine Power and Water
MRES	Missouri River Energy Services
OTP	Otter Tail Power Company
PPI	Prairie Power Inc.
SIPC	Southern Illinois Power Cooperative
SMMPA	Southern Minnesota Municipal Power Agency
Vectren	Vectren Energy Delivery
XEL	Xcel Energy

March 31, 2014

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317-249-5400 www.misoenergy.org

ATTACHMENT 2

MISO
FERC FORM 715 RESPONSE

ITEMS SUBMITTED AND FEE SCHEDULE

PART 1

- Information regarding identification and certification of contact people required for Part 1 of the order is supplied. Part 1 also included detailed information identifying the source of the data for each of the six parts.

PART 2

- Six power flow cases corresponding to the two, five and ten year time frame are provided in Saved Case format. A detailed description of each case is found in the title [redacted]

- A bus name Data Dictionary complete with EIA generator codes is supplied.

PART 3

- A geographic MISO Transmission Planning Map showing approved future transmission plans in the MISO region is included. Respondents' maps showing breaker placement are also provided.

PART 4

Respondents' Planning Criteria is included and also posted on the MISO's Planning page as required. The MISO utilizes the Respondents' Planning Criteria in the MISO Transmission Expansion Plan ("MTEP") study report filed to meet requirements of Part 4.

PART 5

- Respondents' reporting requirements for Part 5 are satisfied by the MISO's Transmission Planning Business Practices Manual. A copy of the manual is included in this filing.

Midcontinent Independent System Operator, Inc. | P.O. Box 4202 Carmel, IN 46082-4202 | 2985 Ames Crossing Road Eagan, MN 55121 | 317-249-5400 www.misoenergy.org

PART 6

- Respondents' reporting requirements for Part 6 are satisfied by the MTEP report and applicable Appendices. A copy is included in this filing.

Any questions regarding the material should be directed to Mr. Ben Stearney, Engineer II, MISO, 2985 Ames Crossing Drive, Eagan, MN 55121, phone 651-632-8414, bstearney@misoenergy.org, fax 651-632-8417.

There is no charge for a CD of this FERC filing. Requests for a copy should be directed to the FERC. Respondent's contact information is located in Part 1 of the filing.

March 31, 2014

Midcontinent Independent System Operator, Inc.
P.O. Box 4202 Carmel, IN 46082-4202
2985 Ames Crossing Road Eagan, MN 55121
317-249-5400 www.misoenergy.org

Parts 2, 3, and 6 May Contain Critical Energy Infrastructure Information - Do Not Release

FERC Form 715

MISO Region - April 1, 2014

Part 1: Identification and Certification	
Transmitting Utility Name	**Indianapolis Power & Light Company**
Transmitting Utility Mailing Address	**1230 W. Morris St.** **Indianapolis, IN 46221-1710**
Contact Person Name	**Mark J. Kempker**
Title	**Mgr. Transmission Planning**
Telephone Number	**(317) 261-8615**
FAX Number	**(317) 630-5787**

*The Certifying signature below (row 22) is that of the authorized Respondant official who certifies the accuracy of the information submitted, and also authorizes the MISO to consent to release of this filing to third parties pursuant to FERC CEII disclosure policy and subject to any exceptions noted in row 21 of this form.**

Objections or other conditions related to the MISO's release of information contained in this filing to third parties.	NONE
Certifying Official Signature	Mark J. Kempker
Name (please print)	**Mark J. Kempker**
Title	**Mgr. Transmission Planning**

Part 2:	
the Respondent authorizes the MISO to submit powerflow information in the Respondent's behalf. Regional contact information is as follows:	[redacted]
Regional Organization	
Mailing Address	
Contact Person	
Contact Person Title	
Contact Person Telephone Number	
Contact Person email	

Power Flow Cases Available are 2013 MISO MISO Transmission Expansion Plan (MTEP) Models

[redacted]

Respondent authorizes the MISO to submit the Resondant's system representation that exists in the curent MISO MTEP models	[redacted]
Respondent will submit additional powerflow information other than the above MISO MTEP models	

Respondent does not authorize the MISO to submit its system representation that exists in the MISO MTEP models and will submit its own powerflow information	[redacted]			
Respondent authorizes the MISO to submit a data dictionary referencing power flow bus names with long English names and EIA plant codes				
Part 3: Transmitting Utility Map and Diagrams				
Respondent authorizes the MISO to submit a regional bulk transmission Planning map that includes the respondent's bulk transmission system	[redacted]			
Respondent authorizes the MISO to submit the respondent's transmission Planning maps that have been provided to the MISO				
Respondent will submit additional maps				
Part 4: Transmission Planning Reliability Criteria**				
Respondent employs NERC Transmission Planning Standards TPL-001-0.1 , TPL-002-0 , TPL-003-0, and TPL-004-0. FAC-010-2, and NUC-001-2 are also applicable to an RC or TP. RTO and RRO, State, and MISO Member (Local) planning criteria are also used. MISO will submit the applicable criteria following FERC instructions.	Yes	X	No	
Respondent will submit criteria in addition to that submitted by MISO.	Yes		No	X
Respondent will submit its own criteria	Yes		No	X
Part 5: Transmission Planning Assessment Practices**				
Respondent endorsess the MISO Transmission Planning Assessment Practices used in the MTEP, and authorizes the MISO to submit the MISO Planning Business practices document (Assessment Practices) in respondent's behalf.	Yes	X	No	
Respondent will submit Assessment Practices in addition those of the MISO	Yes		No	X
Respondent will submit its own Assessment Practices	Yes		No	X
Part 6: Evaluation of Transmission System Performance				
Respondent cities the Annual MISO MTEP report, including Appendices A, B, C, D1, D2, D3, D4, D5 and D8 as a satisfactory evaluation of the performance of its portion of the transmission system, and authorizes the MISO to submit this report in respondent's behalf.	[redacted]			
Respondent will submit its own evaluation				

*Tranmission planning data is submitted to the MISO for the MISO's further submission as part of the Regional FERC Form 715 filing being made on behalf of Transmission Owning members of the MISO. Parts of this filing contain CEII as marked. Data provided by Transmission Owners marked as CEII will not be used for any other purpose by the MISO unless specifically authorized. FERC Form 715 data as submitted may contain data regarding the electric system of partys other than the responding Transmission Owner. There are no representations made regarding the accuracy of any other party's data included in this filing. In addition, the MISO's policy on disclosure of FERC Form 715 data to FERC is: Upon notification of a third party request to FERC for disclosure of this filing and subject to satisfaction of all other appropriate FERC CEII disclosure requirements, the MISO is authorized to and will consent to such disclosure.

Part 3

[redacted]

Part 3 IPL GENERAL TRANSMISSION MAP

[redacted]

Transmission Planning Criteria

Part 4

Document Change Control

Rev. No.	Changes	Date
1.1	Updated criteria 15-18 & general formatting	8/20/2009
1.2	Updated criteria 9	5/17/2010
1.3	General wording and formatting	2/15/2011
1.4	Updated criteria 1, 2, 9, & 15 added paragraph on upgrades to existing transmission facilities	12/13/2012

Transmission Planning Criteria

Indianapolis Power & Light Company's electric transmission facilities are designed to provide safe, reliable, and low cost service to IPL customers. IPL transmission facilities are planned using the IPL transmission planning reliability criteria in conjunction with the reliability standards of the North American Electric Reliability Council (NERC) including the Transmission Planning (TPL) standards and Modeling Data Analysis (MOD) standards. The NERC reliability standards may be found on the NERC website at http://www.nerc.com. IPL transmission facilities are also planned using the regional reliability standards of the reliability entity Reliability First Corporation (RFC). The RFC reliability standards may be found on the RFC website at http://www.rfirst.org. IPL transmission facilities are also planned as part of an effort to coordinate the development of the greater regional transmission system with neighboring systems and other member companies of the Midwest Independent System Operator (MISO). The MISO regional planning efforts may be found on the MISO website at http://www.midwestiso.org.

IPL transmission plans are based on transmission planning criteria and other considerations. Other considerations include load growth, equipment retirement, decrease in the likelihood of major system events and disturbances, equipment failure or expectation of imminent failure.

Changes to transmission facilities are considered when the transmission planning criteria are exceeded and cannot feasibly be alleviated by sound operating practices. Any recommendations to either modify transmission facilities or adopt certain operating practices must adhere to good engineering practice and sensible business judgment.

Upgrades to existing IPL transmission facilities or new transmission facilities connected to the IPL transmission system proposed by MISO Market Participants and other interested parties will be considered as time permits. The schedule for consideration of Market Participant proposed projects is at the sole discretion of IPL. This type of proposal whether or not fully funded by a Market Participant or other interested parties may not disrupt the on-going IPL planning process, disrupt or otherwise delay the planning process for reliability needs of the IPL system or replace an IPL project scheduled to resolve the same or similar transmission issue.

A summary of IPL transmission planning criteria follows. IPL transmission planning criteria are periodically reviewed and revised, and are subject to change with applicable notice.

Transmission Planning Criteria

1) Limit transmission facility voltages under normal operating conditions to within 5% of nominal voltage, under single contingency outages to 5% below nominal voltage, and under multiple contingency outages to 10% below nominal voltage. In addition to the above limits, generator plant voltages may also be limited by associated auxiliary system limitations that result in narrower voltage limits.

2) Limit thermal loading of transmission facilities under normal operating conditions to within normal limits and under contingency conditions to within emergency limits. New and upgraded transmission facilities can be proposed at 95% of the facility normal rating.

3) Maintain stability limits including critical switching times to within acceptable limits for generators, conductors, terminal equipment, loads, and protection equipment for all credible contingencies including three-phase faults, phase- to-ground faults, and the effect of slow fault clearing associated with undesired relay operation or failure of a circuit breaker to open.

4) Install and maintain facilities such that three-phase, phase- to-phase, and phase-to-ground fault currents are within equipment withstand and interruption rating limits established by the equipment manufacturer.

5) Install and maintain protective relay, control, metering, insulation, and lightning protection equipment to provide for safe, coordinated, reliable, and efficient operation of transmission facilities.

6) Install and maintain transmission facilities as per all applicable Indiana Utility Regulatory Commission rules and regulations, ANSI/IEEE standards, National Electrical Safety Code, IPL electric service and meter guidelines, and all other applicable local, state, and federal laws and codes. Guidelines of the National Electric Code may also be incorporated.

Transmission Planning Criteria

7) The analysis of any project or transaction involving transmission facilities consists of an analysis of alternatives and may include but is not limited to the following:

    a) Initial facility costs and other lifetime costs such as maintenance costs, replacement cost, aesthetics, and reliability.

    b) Consideration of transmission losses.

    c) Assessment of transmission right-of-way requirements, safety issues, and other potential liabilities.

    d) Engineering economic analysis, cost benefit and risk analysis.

8) Plan transmission facilities such that generating capacity is not unduly limited or restricted.

9) Plan, build, and operate transmission facilities to permit the import of power during generation and transmission outage and contingency conditions. Provide adequate import capability to the IPL 138 kV system in central Indiana assuming the outage of the largest base load unit connected to the 138 kV system.

10) Maintain adequate power transfer limits within the criteria specified herein.

11) Provide adequate dynamic reactive capacity to support transmission voltages under contingency outage or other abnormal operating conditions.

12) Minimize and/or coordinate MVAR exchange between IPL and interconnected systems.

13) Generator reactive power output shall be capable of, but not limited to, 95% lag (injecting MVAR) and 95% lead (absorbing MVAR) at the point of interconnection to the transmission system.

Transmission Planning Criteria

14) Design transmission substation switching and protection facilities such that the operation of substation switching facilities involved with the outage or restoration of a transmission line emanating from the substation does not also require the switched outage of a second transmission line terminated at the substation. This design criterion does not include breaker failure contingencies.

15) Design 345 kV transmission substation facilities connecting to generating stations such that maintenance and outage of facilities associated with the generation do not cause an outage of any other transmission facilities connected to the substation. Substation configurations needed to accomplish this objective and meet safety procedures are a breaker and a half scheme, ring bus or equivalent.

16) Avoid excessive loss of distribution transformer capacity resulting from a double contingency transmission facility outage.

17) Coordinate planning studies and analysis with customers to provide reliable service as well as adequate voltage and delivery service capacity for known load additions.

18) Consider long term future system benefits and risks in transmission facility planning studies.

FERC FORM 715 Part 5

Transmission Planning Assessment Practices
April 10, 2014

Indianapolis Power & Light Company employs the Midwest ISO Transmission Planning Assessment Practices, which may be found at the following link:

MISO Transmission Planning Assessment Practices

Indianapolis Power & Light Company

Smart Energy Project

Scope of Work

Indianapolis Power & Light Company's (IPL's) Smart Energy Project involved implementation of distribution automation (DA) assets, an advanced metering infrastructure (AMI) system, a meter data management system (MDMS), and various customer systems. The project deployed 10,349 smart meters and DA equipment including automated switches, relays, reclosers, capacitors, voltage regulators, and condition monitors. Customer systems included enhanced website features, allowing customers to enroll in energy programs and personalized energy dashboard access. IPL also deployed 162 electric vehicle (EV) charging stations to better understand EV impacts on the grid.

Objectives

The Smart Energy Project aimed to improve the operational efficiency of its distribution system, reducing operations and maintenance costs. New DA assets are also used to shorten outage and restoration times, improving service reliability for IPL's customer base.

Deployed Smart Grid Technologies

- **Smart meters:** IPL deployed 3,846 meters to residential locations and 6,503 meters to commercial and industrial locations. The smart meters measure interval consumption data and communicate wirelessly to the utility. They also support outage detection functions that have been integrated into the outage management system.
- **Communications infrastructure:** Radio frequency mesh network technology was used to build the meter communication network. Receivers located at key substations transfer meter data to a fiber optic network, which backhauls the data to the AMI head end system. An additional 90 miles of fiber optic circuits provides the necessary infrastructure for AMI and DA.
- **Advanced electricity service options**: IPL now offers a web portal for customers with either AMI meters or existing automated meter reading (AMR) devices. The web portal facilitates two-way information exchange, allowing customers to view their electricity consumption information and better manage their use and monthly bills. The web portal also provides tips to conserve electricity.

At-A-Glance

Recipient: Indianapolis Power & Light

State: Indiana

NERC Region: ReliabilityFirst Corporation

Total Project Cost: $52,700,000

Total Federal Share: $20,000,000

Project Type: Advanced Metering Infrastructure
Customer Systems
Electric Distribution Systems

Equipment

- 10,349 Smart Meters
- AMI Communications System
  - Meter Communications Network
  - Backhaul Communications Network
- Meter Data Management System
- Customer Web Portal (for customers with both new and pre-project meters)
- DA Equipment for all 400 Circuits
  - Distribution SCADA System
  - DA Communications Network
  - Automated Distribution Circuit Switches
  - Automated Capacitors
  - Automated Voltage Regulators
  - Equipment Condition Monitors
- 162 Electric Vehicle Charging Stations

Key Benefits

- Improved Electric Service Reliability and Power Quality
- Reduced Operating and Maintenance Costs
- Deferred Investment in Distribution Capacity Expansion
- Reduced Costs from Equipment Failures
- Reduced Truck Fleet Fuel Usage
- Reduced Greenhouse Gas and Criteria Pollutant Emissions

- **Distribution automation systems**: The project deployed automated network relays, switches, reclosers, and substation and transformer monitoring systems across all 400 distribution circuits.
- **Automated capacitor controls**: Automated capacitor controls, combined with a new distribution supervisory control and data acquisition (dSCADA) equipment, provides enhanced service restoration and enables more efficient distribution of power across the system.
- **Electric vehicle charging stations**: 162 EV charging stations were deployed in residential, utility fleet, and public locations. IPL is collecting the usage data from the charging stations to help determine the potential impacts of EVs on the grid.

Benefits Realized

- **Improved electric service reliability and power quality:** DA equipment improves system reliability and operational efficiency through reduced outage and restoration times.
- **Reduced operating and maintenance costs:** Operators have the ability to remotely configure field devices to enable live line restrictions on circuits prior to crews completing work and return the settings to normal while avoiding extra trips
- **Deferred investment in distribution capacity expansion:** The verification process for equipment status allows IPL to avoid additional investments in capacitors.
- **Reduced costs from equipment failures:** The combination of automated relays and reclosers helps isolate faults or resume operations in the event of a transient fault. Substation and transformer monitoring informs IPL of irregularities with assets before problems occur, thus reducing equipment failures.
- **Reduced truck fleet fuel usage:** Fully automating meter reading as well as remotely operating devices supports fewer miles driven.
- **Reduced greenhouse gas and criteria pollutant emissions:** Reduced fleet driving results in reduced emissions.

Lessons Learned

Overall, the holistic project was quite successful. Cross functional teams who installed and operate equipment work well together. While the initial DA communications network was not robust enough for all field devices, the expanded system improves reliability. Integration efforts were more extensive than anticipated but ultimately effective. Customer acceptance of website enhancements resulted in improved J.D. Powers customer satisfaction ratings.

Future Plans

IPL plans to continue to leverage its smart grid assets to improve reliability and reduce operating expenses as well as deploy additional distribution protection equipment, interface with distributed generation in its service territory, continue to use conservation voltage reduction program to reduce peak demand, and use the information about grid impacts of electric vehicles through a larger scale project. In addition, plans are in the implementation stage to expand and more effectively monitor telecommunications systems.

Contact Information

Joan Soller
Director, Resource Planning
Indianapolis Power & Light Company (IPL)

Joan.soller@aes.com

Recipient team website: IPLpower.com

Short Term Action Plan Transmission Expansion Projects

	Project	Description	Construction Period	Estimated Cost
1	Transmission Plans for the New Eagle Valley CCGT Phase I	Upgrade conductor for 5 circuits, replace 2 sets of line disconnect switches, three 138 kV breakers, and terminal equipment at EV	2014-2015	[redacted]
2	Transmission Plans for the New Eagle Valley CCGT Phase II	New 138 kV line in spare tower position, new EV substation, 2 sets of terminal equipment, transfer four existing 138 kV circuits.	2015-2016	[redacted]
3	Petersburg to Duke Wheatland to AEP Breed Line	Upgrading this 345 kV line from Pete to Wheatland to Breed from 956 MVA to at least 1386 MVA has been approved by MISO as a market efficiency project and is eligible for MTEP cost sharing.	2015	[redacted]
4	Hanna Substation Upgrade	This includes the replacement of a 275 MVA autotransformer with a 500 MVA autotransformer, adding 2 new 345 kV breakers, upgrading the 138 kV breaker and bus design to improve operational flexibility.	2016	[redacted]
5	Thompson Substation Upgrade	Include a new 345 kV breakers, 2 new 138 kV breakers, and relocating the 275 MVA Hanna autotransformer to increase imports capability into the IPL 138 kV transmission system, improve reliability, and operational flexibility.	2016	[redacted]
6	Static VAR System (SVS)	A new Static VAR System (SVS) is planned at the Southwest 138 kV substation. The design will be finalized in 2014 to provide reactive power in the range of –100 Mvar inductive to +300 Mvar capacitive to provide voltage regulation and mitigate transient voltage response for transmission events. This will also increase import capability into the IPL 138 kV transmission system, improves reliability, and improve operational flexibility.	2016	[redacted]
			total	[redacted]

Note: This does not inlcude any costs for projects completed by other MISO members that will be allocated to IPL

Indianapolis Power & Light Co.

Custom Baseline Profile for

Conservation Voltage Reduction

Demand Response Verification Plan

February 12, 2014

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1. Executive summary

This document describes Indianapolis Power & Light Company's plan to measure demand savings per MISO requirements using a custom baseline. None of the other baseline options in Attachment TT are accurate or applicable to demand reduction through Conservation Voltage Reduction (CVR). CVR requires a different technique using industry accepted methods.

This custom baseline is unique because the most accurate baseline is a voltage profile rather than a load profile. A combination of carefully verified load response to voltage and measured amount of change from a voltage baseline accurately portrays the load reduction. Also, a rapid initiation of the voltage reduction shows a marked change profile at the beginning and end of an event. All of this provides accurate verification of actual results from a reduction event.

The approach for the baseline and demand reduction verification is:

- Adopt a verified CVR factor for load response through controlled tests at IPL.
- Establish a baseline operating voltage of how IPL has operated and would continue to operate without the CVR event (V_{Base}).
- Measure actual voltage (V_{CVR}) during the event and compare to baseline voltage profile.
- Measure actual demand (D_{CVR}) delivered to customers during the CVR event.
- Calibrate the voltage at the beginning of the event the baseline voltage profile.
- Calculate demand reduction using equation (5-11).

This document describes IPLs Custom Baseline and verification protocol in compliance with MISO attachment TT item 3(d).

2. Voltage baseline is more accurate

Many demand reduction baselines use a variety of recent history load profiles for comparison with load profiles on the event day. This can work well if the unmodified profile would have been the same as the event day. IPL tried the standard baselines and found they do not work well for CVR. Consider the following example using the highest ten days method.

Figure 1shows actual highest ten weekday load profiles. It also shows the average baseline as a heavy black line. A dashed line shows the same average baseline with a 40 MW, four hour reduction. Now imagine that a reduction event occurred any one day of the ten days that created the baseline. It is clear that the daily variation completely overwhelms and masks the savings.

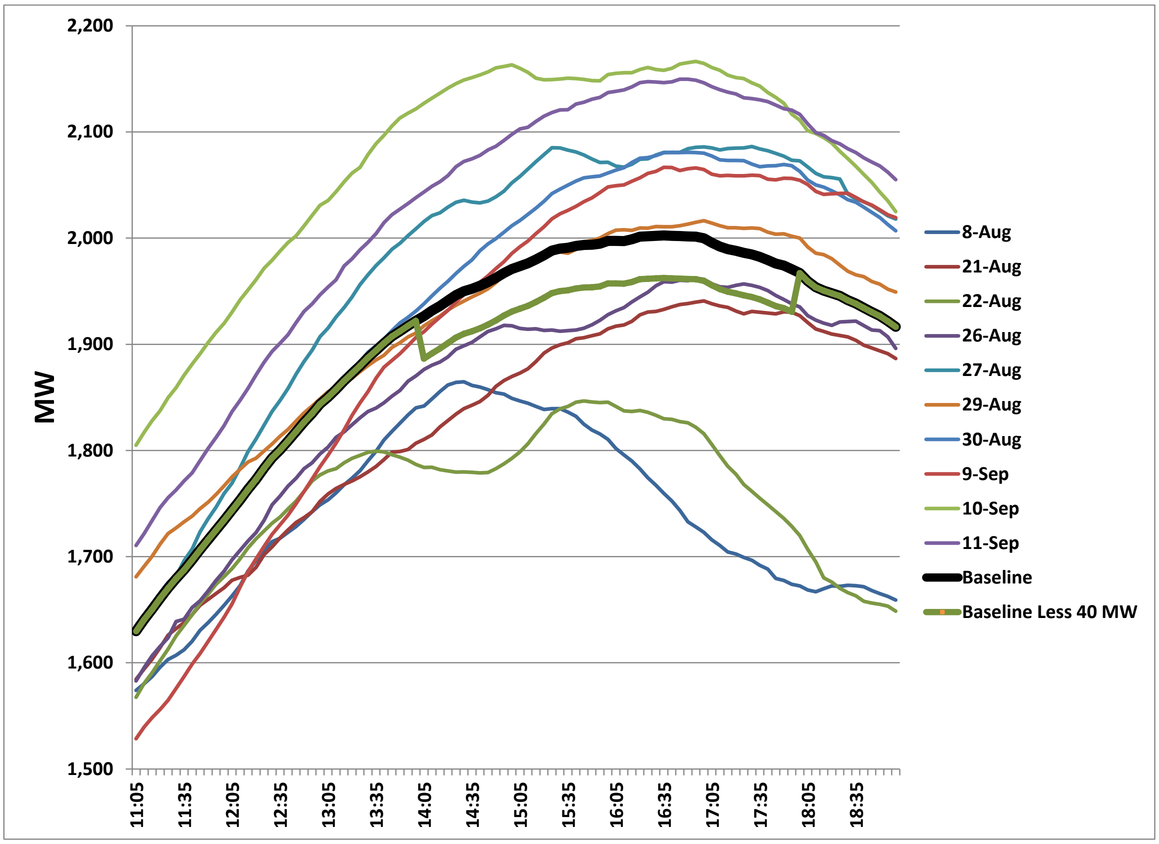

Figure 1 - Top ten in 45 day MW profiles

A second effort to use the top ten also did not produce satisfactory results. Figure 2 shows a normalized version of the same profiles in Figure 1. Demands for each interval are divided by the average for that day. The vertical axis is percent of average for the day. This compresses the profiles closer to the average. It might be possible to observe the leading and trailing edges if the CVR initiates quickly. However load shapes for any individual day still overwhelm and mask the expected savings.

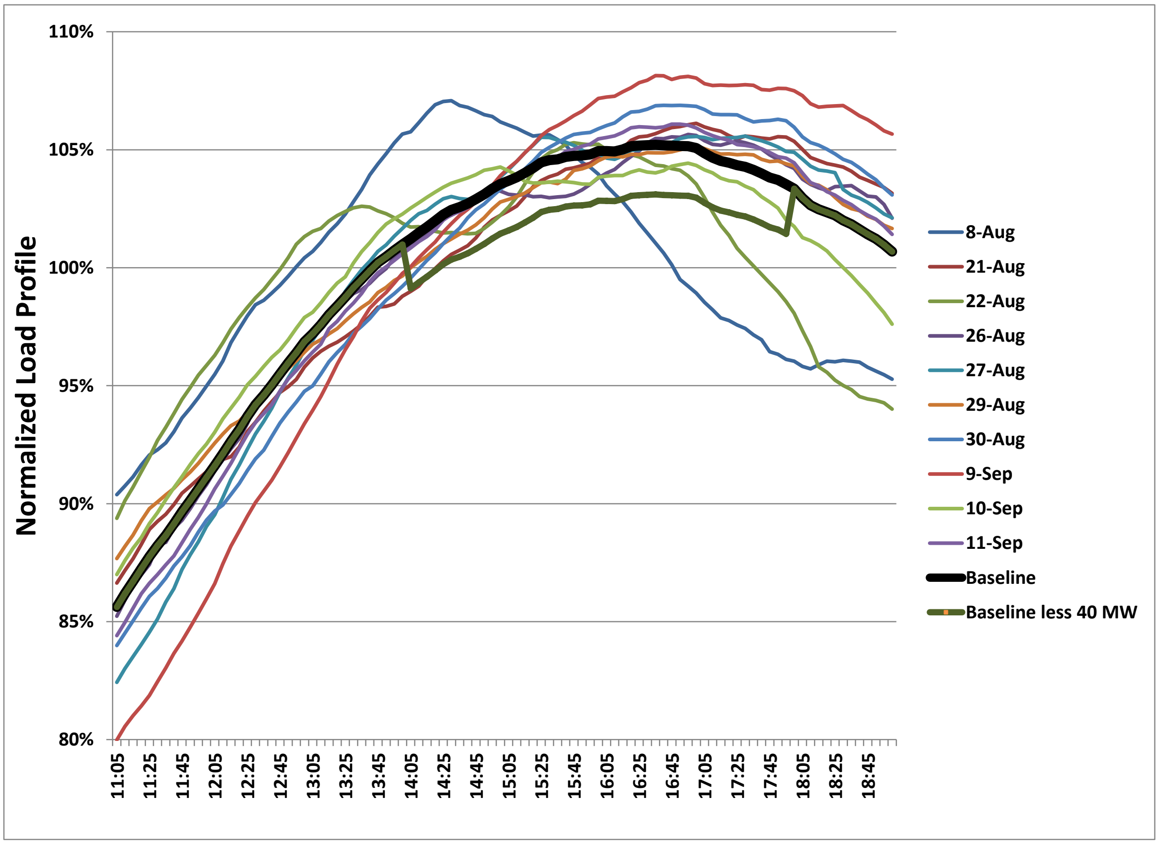

Figure 2 - Top ten in 45 days normalized profiles

The only solution to this problem is to use industry accepted practice of comparing voltage during an CVR event to a voltage baseline. Careful testing before the CVR event reveals a consistent load response to voltage. Combining the measured voltage change and the known voltage response delivers the demand reduction.

Figure 3 shows the daily voltage profiles for the same top ten days. It also shows the average profile with a heavy black line. The highlighted, dashed line is the voltage reduction required to generate the demand savings depicted on Figure 1and Figure 2. Without question, the profile is much more consistent from day to day. Also, it is far more obvious that the CVR action did happen. This is why the voltage baseline profile is so much better.

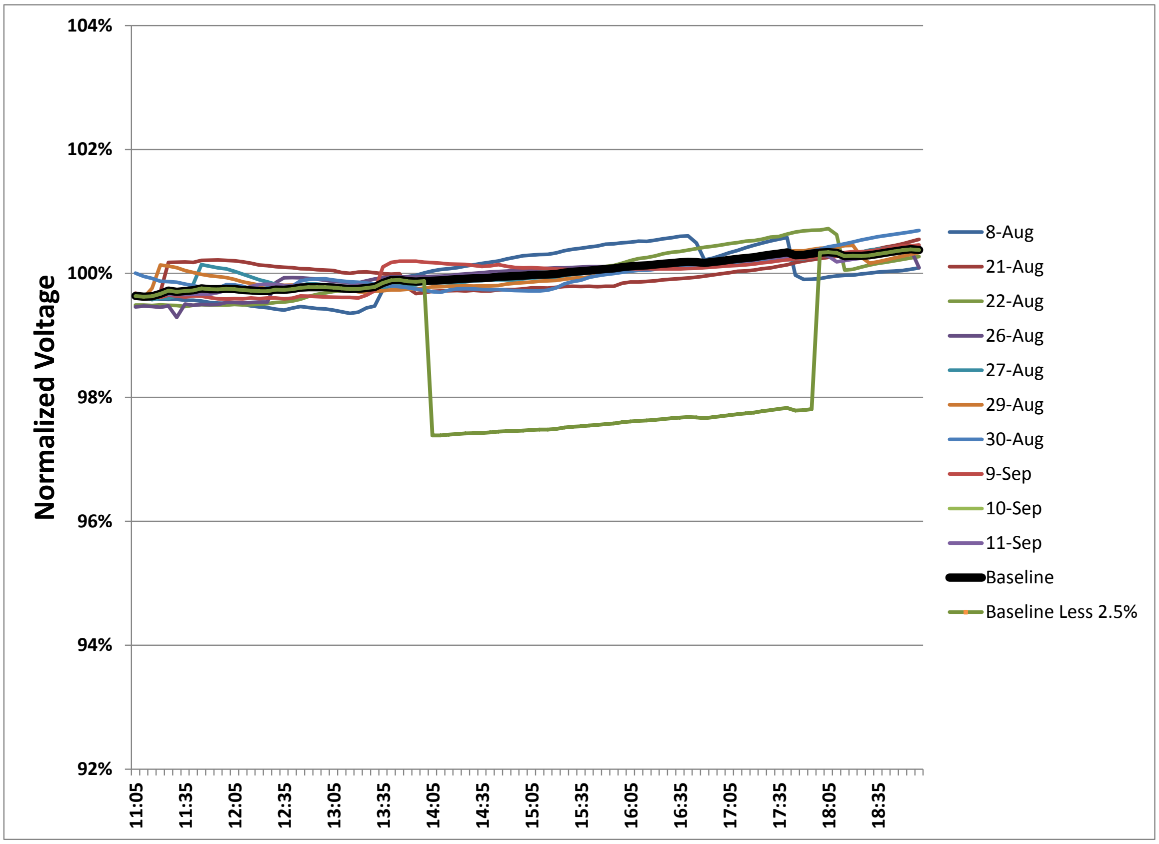

Figure 3 – Top ten in 45 days normalized voltage profile

3. Verify CVR factor through controlled tests

Calculating the load response to CVR requires treating a portion of load and simultaneously comparing the treated load profile to a reference. Simultaneous comparison improves the accuracy and eliminates uncertainty of weather corrections. Repeating the tests on several days and treating different representative groups further improves confidence in the load response. Finally, careful monitoring of individual circuits during a CVR test assures the results do not inadvertently include emergency load transfers, power outages, etc.

IPL conducted tests for near peak summer conditions in 2012 and in 2013. The next two sections describe IPL testing to determine the CVR factor.

3.1. Three days of tests in 2012

IPL conducted tests on three consecutive days in 2012. A selection process identified eleven (out of 99) substation transformers whose aggregate load profile closely matched the profile of the system and of the remaining 88 transformers. The eleven transformers had about 163 MW peak for the test. Voltage was lowered for a four hour strip between 14:00 and 18:00 each day.

Care was taken to be sure no load transfers or other unusual patterns occurred. One industrial customer switched on about 2 MW on one of the three days in the middle of the test. That customer was removed from the analysis because the expected reduction was also about 2 MW.

Figure 4 graphically shows the final results. The blue line shows the treated voltage in per unit of the untreated voltage. The red line shows the treated load profile in per unit of the untreated profile. There is an obvious voltage change and an obvious load response to the voltage. The shorter purple line is a best guess of what the profile would have looked like without the CVR treatment. This test yielded 1.7 MW average demand reduction and CVR_f = 0.85.

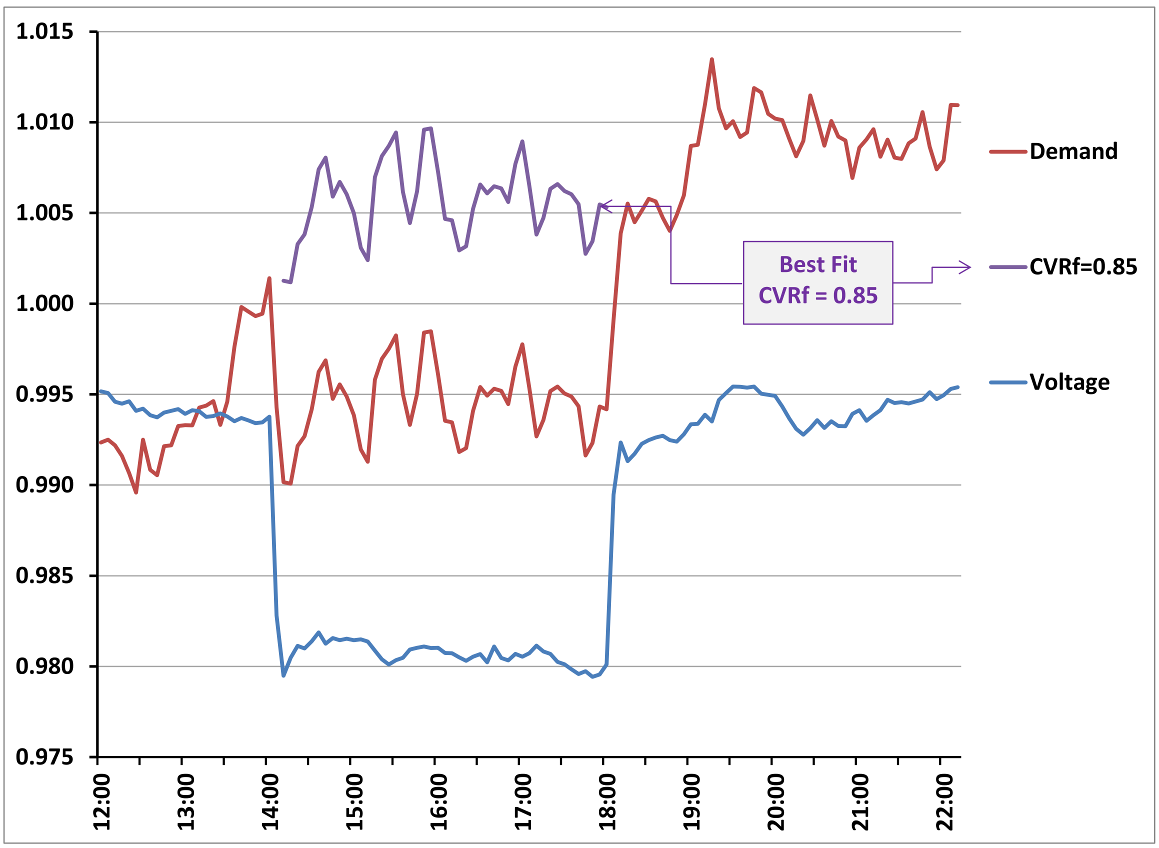

Figure 4 - Three day test results in 2012

3.2. Two days of tests 2013

IPL conducted tests on two more days in 2013. This test provided a much bigger sample, and a different sample from the 2012 test. Thirty-two transformers (about one third) received treatment. Careful analysis revealed load transfers between treated and untreated transformers during the September 11 analysis window. They were removed from the sample leaving twenty-nine treated transformers with about 466 MW. The reaming transformers that did not experience load transfers served as the baseline.

Figure 5 shows the raw data averages for the two days of the test. The green line is voltage on a 120 Volt base while the blue line is the actual MW demand. There is absolutely no doubt that the voltage changed and that the load responded to the voltage. Two light blue diagonal lines provide a visual image of the approximate load profiles for treated load. Those lines projected to the right-hand, MW axis show the reduction was between 5 and 6 MW.

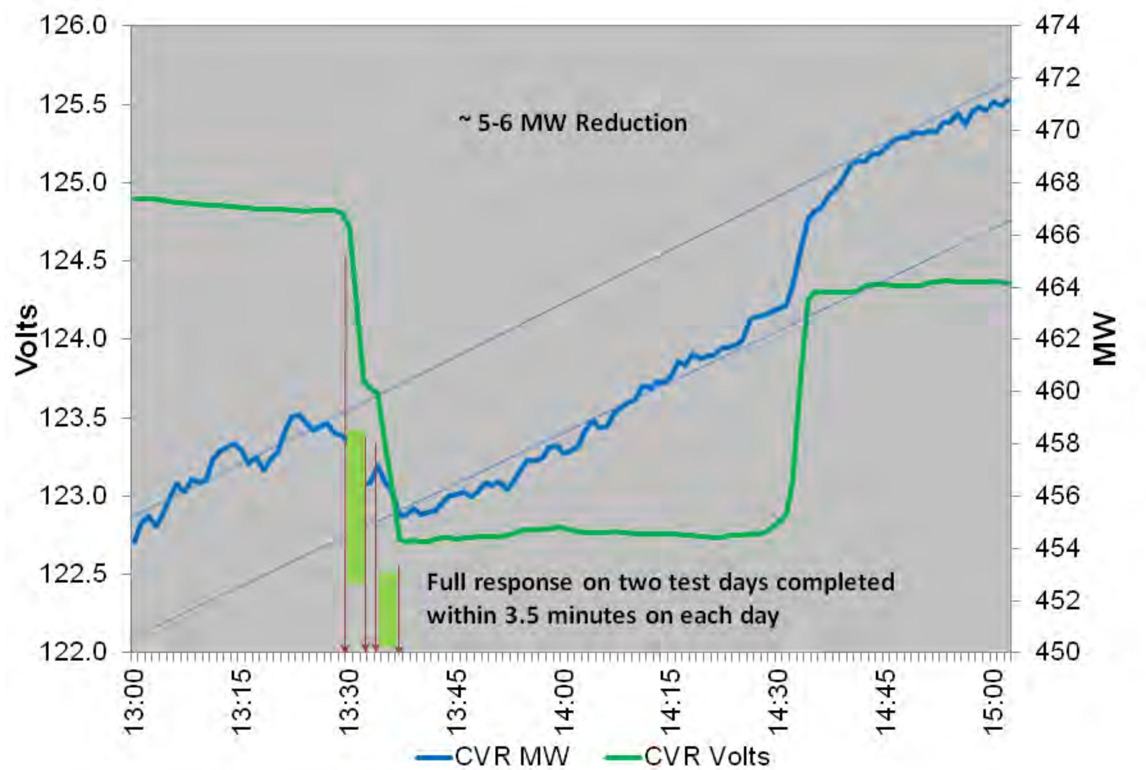

Figure 5 - Raw data from test in 2013

Figure 6 graphically shows a CVR factor calculation comparing the pre-event load, pre-event voltage to their changes during the CVR event. Figure 6 displays the average voltage and average demand over the two days test. The blue line is the treated load profile compared to the baseline load profile in per unit of the baseline. The green line is treated voltage profile compared to the baseline voltage profile in per unit of the baseline voltage profile.

Two yellow lines show the average voltage reduced 0.0163 when CVR was applied. Two red lines through the load profile show the average demand reduced 0.0128 per unit in response to the voltage. The calculated CVR factor is 0.079 using only the before treatment baseline.

Table 1 shows a complete calculation that also includes the post event response. It includes the voltage (yellow) and load (red) averages from Figure 6. Note that the voltage and load averages do not include a short amount of data during the transitions at the beginning and the end of the event. The final CVR factor from this test is 0.75.

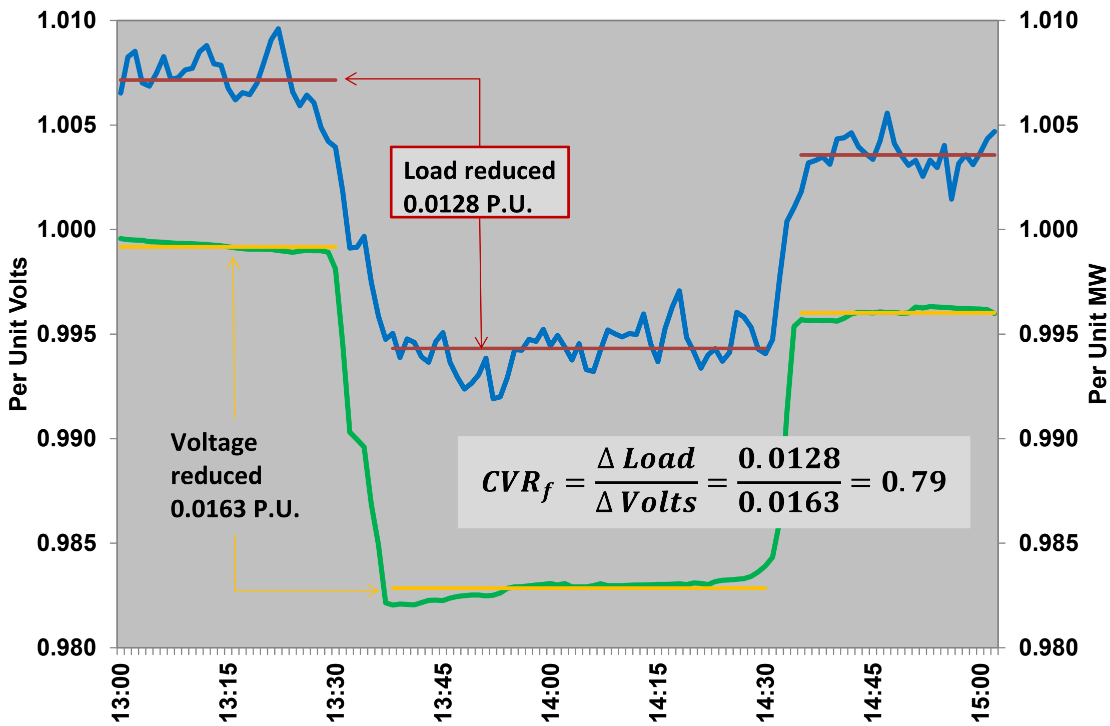

Figure 6 - Leading edge CVR factor calculation

Table 1

Full CVR factor calculation example

	Volt Ratio CVR to Reference	MW Ratio CVR to Reference
1) Before Reduction time window	0.9992	1.0071
2) During Reduction time window	0.9829	0.9943
3) After Reduction time window	0.9960	1.0036
4) Before and After time window (average of Row 1 and Row 3)	0.9977	1.0054
5) Reduction amount (Row 4 - Row 2)	0.0148	0.0111
CVR Factor – Δ Demand / Δ Volts Values from Row 5 0.011 / 0.0148	**0.75**	

IPL conducted two detailed tests over five near peak days using in two years. The aggregate CVR factor for 2012 is 0.85 and is 0.75 for 2013. IPL will use 0.8 CVR factor until additional tests justify changes. This is reasonably conservative to not overestimate savings. The Indiana Utilities Regulatory Commission recently approved a CVR factor of 1.0 for AEP in Indiana. Using a CVR factor of 1.0 would increase IPL savings estimates by 25%

3.3. Ongoing CVR factor measurement

IPL is confident the CVR factor of 0.8 is accurate and does not over estimate savings. However, IPL will continue to conduct verification tests to be sure the CVR factor is correct. IPL will initiate CVR on approximately half of the system on one near peak day, and then the other half on another near peak day. The CVR factor will be calculated as described in section 0, Table 1. The before event window will be one hour will before initiation. The “during event” window will be no less than two and not more than four hours and include all data except the transitions. The after event window will be one full hour after the return to normal is complete.

4. Event savings verification

Demand savings during an event consists of the following steps

- Calculate an average voltage baseline using measured voltages for ten previous non-event days during the same time window as the event. This data is permanently stored in and always available from IPL's PI data historian.
- Compare the hour before event voltage average to the voltage baseline. Calibrate the event hour before voltage to the baseline profile. This step further improves accuracy of results. A calibration example is shown in Figure 7.
- Calculate the voltage reduction from the baseline
- Calculate the demand savings using equation (5-11).

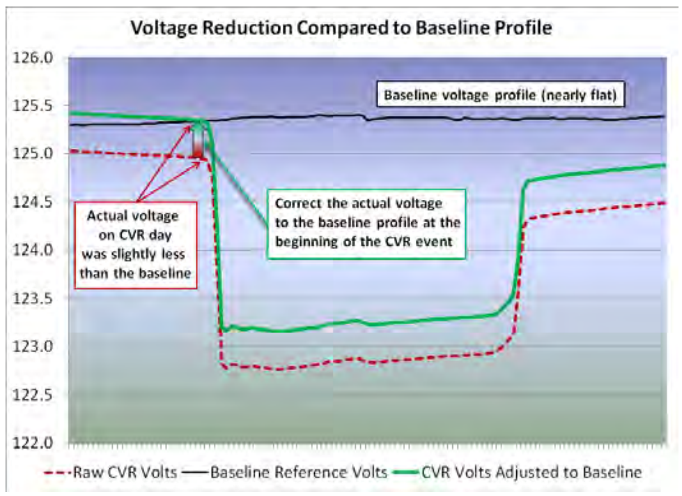

Figure 7- Calibrating event voltage to baseline

IPL has developed and will continue to improve an excel workbook that will perform all savings calculations. It will draw all data from the PI historian to make the savings calculation. Figure 8 shows a sample output from the tool. It simulates the results from testing and a request for 7.5 MW.

CVR Demand Reduction Response Verification Tool

Input Data		
Date	8/28/2013	
Requested Start Time	13:00	Hours
Voltage Reference Start Time	12:25	Hours
Amount Requested	7.5	MW
CVR Factor	0.8	%MW/%V

Hourly Savings		
14:00	7.43	MW
15:00	7.57	MW
16:00	7.79	MW
17:00	8.71	MW
Four hour Average	**7.88**	**MW**

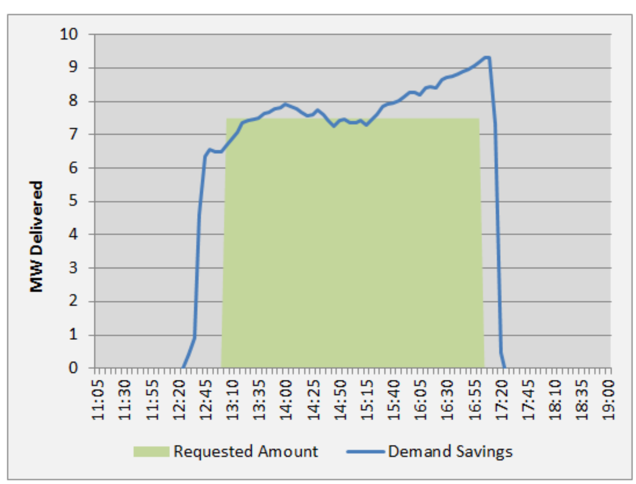

Figure 8 - CVR demand reduction verification

5. Detailed equations to calculate savings

Calculating CVR savings is similar to calculating the original price from a discounted price. It is slightly more complicated because the exact savings rate must be calculated from voltage and load. However the concept is to calculate what the demand would have been and subtract what was actually measured. The demand savings is the calculated non-CVR demand less the measured demand during the CVR event.

The following definitions will be very helpful to understand the calculations:

$D_{Savings} = Demand\ saved\ (measured\ in\ MW)$

$D_{Base} = total\ MW\ demand\ without\ IVVC\ (this\ is\ the\ untreated\ baseline)$

$D_{CVR} = total\ MW\ demand\ with\ IVVC\ in\ service$

$V_{Base} = Baseline\ voltage\ established\ before\ IVVC\ implementation\ (per\ unit)$

$V_{CVR} = Voltage\ measured\ with\ IVVC\ in\ service\ (per\ unit)$

$CVR_f = Agreed\ Conservation\ Voltage\ Reduction\ Factor$

$\Delta V = Difference\ between\ voltage\ with\ IVVC\ and\ established\ baseline\ (per\ unit)$

The most important value in the calculation is the Conservation Voltage Reduction factor, CVR_f. CVR_f describes how energy savings vary with respect to voltage. Industry experts calculate CVR_f by conducting extensive tests on utility circuits and sometimes on individual loads. Sometimes, experts simultaneously enable IVVC on a group of test circuits and compare performance to a second, untreated, group of circuits. In other cases, experts use a single group of circuits to by alternating times with IVVC off and on. Regardless of the method, voltage and energy consumption with IVVC off becomes the baseline. Voltage and energy with IVVC in service are compared to the baseline to determine savings and CVR_f .

The measured voltage difference is:

$$\Delta V = V_{Base} - V_{CVR} \tag{5-1}$$

The energy savings are:

$$E_{Savings} = E_{Base} - E_{CVR} \tag{5-2}$$

The voltage is normally expressed in per unit because the utility maintains a very close tolerance. Nominal voltage is 1.0 per unit. Energy has a large variation over time and normally is not measured in per unit. Energy is most commonly measured in MWh, although kWh, GWh and even Wh can be used.

Experts calculate CVR_f by comparing energy during IVVC treatment times to untreated baselines with the following equation:

$$CVR_f = \frac{\frac{E_{Savings}}{E_{Base}}}{\frac{\Delta V}{V_{Base}}} \tag{5-3}$$

CVR_f is a simple ratio of energy savings to voltage difference. For example, when $CVR_f = 1.0$, we can expect a 1% reduction in energy for every 1% reduction in voltage. A $CVR_f =$

1.5 indicates a 1.5% energy reduction for every 1% reduction in voltage. IPL measured $CVR_f = 0.8$

IPL's plan calls for treating all eligible circuits when needed. This generates maximum reduction. However, no coincident baseline circuits will be available once reduction is fully operational. Therefore, it is important to develop a method to calculate savings when no simultaneous baseline is available. Fortunately, there is a way for IPL to provide assurance that the energy savings are real and the commitments have been met.

V_{Base} is readily available because IPL has extensive historical information in the PI Historian database. Analysis described in Section _(TBA)_ shows IPL maintained a consistent voltage management practices for several years. This past practice of consistent and well managed voltage control allows provides a very good value for V_{Base}.

IPL PI historian also has extensive energy information, but the historical information does not provide the accurate baseline as it did for voltage. Energy is highly dependent on weather and the economy. Adjusting historical energy data for weather, the economy and other factors will never provide a future baseline with the necessary accuracy for IVVC benefits. Using the CVR factor, a well justified voltage baseline, and actual energy use will produce the most accurate savings estimates. This is especially true when IPL uses a conservative $CVR_f = 0.5$ in order to assure savings targets are met or exceeded.

Referring back to the basic energy savings equation (5-2) and rearranging for D_{Base},

(5-4)

The savings portion of (5-4) may also be expressed in terms of E_{Base} and the voltage difference:

(5-5)

Substituting the right side of (5-5) into (5-4) gives the following:

(5-6)

Now solve for E_{Base} in terms of E_{CVR} and CVR_f: in three steps. First rearrange (5-6) to:

(5-7)

Then factoring (5-7) for E_{Base} on the right side of the equation,

(5-8)

And finally we have E_{Base} in terms of measured energy and voltage with IVVC in service.

$$\frac{\quad}{(CV\quad)} \tag{5-9}$$

Now substitute (5-9) for E_{Base} in (5-2). This gives the savings based on energy measured, CVR_f, and voltage difference while IVVC is in service.

$$\left(\frac{CVR}{(CV\quad)}\right) \tag{5-10}$$

Finally, (5-10) can be simplified by factoring E_{CVR} on the right hand side. This gives the savings based on measurements with IVVC fully in service.

$$\left(\frac{\quad}{(CV\quad)}\quad 1\right) \qquad (5\text{-}11)$$

All savings calculations use equation (5-11).

To summarize, IPL will enable IVVC on all eligible circuits to maximize savings for customers. Perfect knowledge of savings will never be available. However IPL can reliably confirm that it met or exceeded the savings commitments as

- Adopt a conservative CVR factor (see other sections describing the use of 0.5)
- Establish a baseline operating voltage of how IPL has operated and would continue to operate without the sophistication of Smart Grid IVVC (V_{Base})
- *Measure actual energy delivered to customers while IVVC is in service* (E_{CVR})
- Measure actual voltage delivered to customers while IVVC is in service (V_{CVR})
- Calculate savings using equation (5-11)

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Date	HE1	HE2	HE3	HE4	HE5	HE6	HE7	HE8	HE9	HE10	HE11	HE12	HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21	HE22	HE23	HE24
1/1/2013	1586	1554	1526	1525	1532	1568	1597	1630	1631	1676	1713	1721	1719	1713	1712	1696	1728	1856	1951	1955	1946	1911	1856	1803
1/2/2013	1764	1758	1761	1792	1856	1970	2123	2251	2264	2222	2168	2133	2074	2011	1985	1998	2039	2129	2207	2199	2173	2113	2052	1976
1/3/2013	1925	1898	1888	1901	1932	2033	2163	2274	2257	2206	2154	2117	2092	2034	2032	2018	2019	2085	2147	2111	2070	1989	1901	1802
1/4/2013	1739	1716	1701	1721	1762	1854	2008	2122	2124	2099	2076	2036	2011	1957	1929	1888	1877	1970	2075	2062	2035	1988	1911	1830
1/5/2013	1772	1743	1724	1733	1756	1800	1865	1937	1942	1920	1882	1843	1760	1695	1707	1723	1759	1846	1913	1894	1872	1808	1740	1655
1/6/2013	1592	1543	1511	1499	1500	1520	1559	1605	1638	1684	1763	1809	1847	1848	1849	1851	1884	1955	2039	2023	1987	1921	1848	1761
1/7/2013	1702	1683	1697	1722	1787	1946	2115	2235	2219	2174	2099	2032	1976	1920	1875	1824	1818	1908	2050	2050	2017	1950	1853	1760
1/8/2013	1703	1673	1681	1684	1729	1827	2012	2136	2113	2040	1974	1932	1880	1800	1768	1716	1720	1805	1939	1940	1913	1843	1745	1646
1/9/2013	1562	1514	1482	1469	1484	1581	1758	1867	1848	1828	1809	1757	1720	1687	1655	1638	1636	1731	1838	1843	1829	1787	1701	1617
1/10/2013	1570	1549	1546	1560	1609	1714	1883	2010	1973	1945	1932	1922	1916	1901	1882	1867	1896	1947	1976	1935	1881	1791	1675	1554
1/11/2013	1470	1426	1394	1378	1408	1478	1631	1736	1715	1698	1697	1688	1678	1638	1600	1575	1551	1581	1667	1637	1610	1557	1491	1402
1/12/2013	1328	1284	1263	1256	1267	1305	1356	1430	1467	1493	1489	1476	1453	1424	1396	1379	1398	1485	1537	1508	1477	1443	1379	1304
1/13/2013	1249	1208	1176	1173	1195	1230	1281	1361	1425	1495	1547	1581	1625	1654	1704	1746	1770	1832	1911	1922	1918	1881	1822	1765
1/14/2013	1715	1693	1699	1719	1773	1902	2100	2242	2218	2186	2159	2104	2062	2062	2064	2073	2106	2149	2230	2197	2165	2091	1992	1890
1/15/2013	1826	1795	1787	1785	1830	1937	2136	2248	2216	2187	2129	2070	2054	2022	1981	1998	2014	2068	2126	2099	2059	1988	1877	1766
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1/17/2013	1666	1629	1613	1621	1650	1748	1922	2020	2007	1980	1943	1868	1832	1803	1766	1759	1755	1851	1994	2012	2009	1963	1879	1788
1/18/2013	1740	1722	1729	1756	1797	1919	2102	2224	2193	2095	2036	1974	1926	1867	1824	1781	1774	1827	1946	1929	1908	1844	1765	1677
1/19/2013	1602	1546	1522	1517	1523	1555	1618	1680	1697	1685	1667	1631	1585	1533	1485	1464	1458	1518	1632	1643	1618	1584	1535	1465
1/20/2013	1409	1382	1377	1419	1471	1543	1617	1718	1772	1801	1802	1765	1747	1706	1673	1682	1739	1846	1960	1963	1944	1896	1848	1768
1/21/2013	1728	1700	1694	1713	1765	1867	1995	2111	2157	2214	2269	2260	2269	2252	2217	2206	2237	2319	2467	2482	2460	2392	2306	2225
1/22/2013	2169	2152	2153	2166	2207	2312	2468	2600	2588	2538	2459	2387	2330	2276	2215	2182	2192	2309	2433	2430	2402	2326	2216	2119
1/23/2013	2040	2016	2005	2018	2062	2161	2326	2423	2388	2369	2378	2357	2317	2290	2250	2229	2232	2258	2312	2285	2242	2158	2055	1956
1/24/2013	1926	1913	1915	1940	1980	2091	2275	2398	2367	2311	2278	2226	2174	2135	2076	2042	2067	2144	2269	2275	2259	2189	2075	1973
1/25/2013	1914	1873	1854	1856	1879	1982	2146	2263	2243	2224	2240	2183	2123	2098	2067	2053	2062	2084	2151	2127	2096	2046	1975	1896
1/26/2013	1833	1802	1799	1807	1842	1890	1952	2032	2056	2059	2012	1920	1859	1792	1742	1699	1694	1765	1917	1957	1955	1936	1886	1841
1/27/2013	1793	1761	1754	1750	1761	1797	1842	1888	1913	1930	1928	1899	1868	1857	1839	1837	1864	1924	1978	1959	1930	1857	1765	1654
1/28/2013	1572	1520	1488	1479	1502	1600	1752	1860	1827	1815	1819	1817	1814	1799	1767	1745	1740	1770	1804	1779	1733	1656	1543	1426
1/29/2013	1354	1307	1276	1277	1309	1406	1584	1701	1680	1661	1671	1669	1658	1658	1642	1612	1613	1643	1714	1686	1650	1575	1472	1353
1/30/2013	1268	1206	1185	1182	1219	1328	1505	1647	1655	1654	1680	1700	1674	1663	1643	1672	1728	1797	1922	1957	1961	1923	1858	1780
1/31/2013	1738	1730	1728	1748	1805	1922	2117	2237	2194	2194	2191	2160	2152	2123	2083	2053	2080	2124	2239	2280	2291	2284	2233	2183

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Date	**HE1**	**HE2**	**HE3**	**HE4**	**HE5**	**HE6**	**HE7**	**HE8**	**HE9**	**HE10**	**HE11**	**HE12**	**HE13**	**HE14**	**HE15**	**HE16**	**HE17**	**HE18**	**HE19**	**HE20**	**HE21**	**HE22**	**HE23**	**HE24**
2/1/2013	2150	2133	2133	2158	2207	2294	2447	2564	2541	2487	2443	2375	2309	2261	2228	2202	2177	2212	2338	2351	2324	2277	2198	2085
2/2/2013	2008	1953	1922	1904	1911	1946	2004	2060	2065	2082	2078	2014	2012	1992	1971	1967	1957	1993	2049	2043	2019	1999	1962	1920
2/3/2013	1882	1867	1866	1884	1898	1922	1959	2005	2029	2068	2069	2045	2046	2052	2048	2038	2034	2051	2123	2120	2100	2077	2000	1929
2/4/2013	1857	1815	1798	1797	1827	1935	2114	2231	2208	2187	2177	2115	2090	2080	2042	1987	1904	1904	2024	2058	2025	1957	1866	1762
2/5/2013	1702	1667	1669	1675	1723	1829	2018	2147	2120	2085	2096	2056	2023	2025	1991	1940	1930	1953	2048	2038	1988	1915	1816	1725
2/6/2013	1657	1624	1621	1630	1667	1762	1950	2058	2027	2012	1987	1938	1882	1851	1820	1789	1790	1836	1979	2033	2019	1953	1853	1755
2/7/2013	1682	1631	1616	1617	1667	1782	1939	2055	2015	1951	1879	1822	1771	1729	1675	1635	1604	1625	1735	1772	1753	1689	1588	1484
2/8/2013	1434	1416	1434	1458	1512	1637	1829	1964	1962	1974	2009	1994	1974	1958	1936	1913	1906	1917	1973	1972	1946	1897	1825	1721
2/9/2013	1663	1610	1596	1613	1639	1710	1801	1879	1893	1851	1806	1751	1693	1638	1584	1546	1541	1583	1726	1785	1785	1759	1707	1645
2/10/2013	1589	1548	1521	1503	1494	1519	1563	1609	1649	1686	1698	1656	1636	1641	1635	1636	1653	1662	1734	1733	1693	1607	1520	1424
2/11/2013	1352	1305	1293	1301	1365	1492	1700	1854	1859	1880	1932	1928	1934	1916	1898	1867	1865	1867	1945	1967	1937	1873	1778	1679
2/12/2013	1617	1591	1592	1607	1649	1783	1977	2073	2027	1962	1907	1855	1813	1763	1725	1671	1651	1689	1803	1864	1865	1823	1746	1658
2/13/2013	1608	1579	1572	1585	1624	1733	1925	2028	2000	1988	1993	1963	1915	1862	1782	1706	1671	1680	1799	1863	1857	1815	1735	1632
2/14/2013	1565	1536	1524	1537	1565	1669	1854	1946	1925	1891	1847	1790	1769	1723	1705	1703	1657	1667	1778	1834	1830	1775	1697	1619
2/15/2013	1557	1530	1520	1540	1580	1693	1862	1973	1959	1955	1978	1949	1931	1905	1906	1901	1877	1881	1951	1990	1967	1932	1875	1807
2/16/2013	1752	1736	1707	1700	1725	1778	1853	1913	1946	1967	1967	1978	1954	1907	1889	1904	1926	1975	2058	2079	2051	2004	1941	1871
2/17/2013	1822	1795	1792	1811	1836	1889	1955	2008	2006	1954	1894	1835	1793	1738	1687	1640	1632	1671	1826	1922	1923	1887	1837	1759
2/18/2013	1711	1676	1671	1677	1714	1799	1931	2008	1970	1930	1895	1823	1762	1720	1659	1628	1636	1687	1791	1799	1774	1712	1615	1519
2/19/2013	1444	1414	1441	1497	1574	1735	1937	2080	2081	2108	2145	2149	2168	2158	2146	2138	2168	2204	2281	2288	2249	2175	2063	1969
2/20/2013	1905	1878	1870	1881	1940	2068	2266	2358	2322	2272	2200	2139	2087	2038	1982	1952	1928	1988	2098	2155	2130	2074	1972	1880
2/21/2013	1821	1816	1822	1828	1856	1956	2116	2206	2171	2167	2157	2059	2025	1977	1949	1962	1994	2033	2105	2126	2117	2061	1953	1835
2/22/2013	1773	1735	1699	1669	1697	1772	1881	1968	1972	2001	2015	2016	2017	2010	1989	1957	1923	1917	1952	1950	1913	1860	1797	1707
2/23/2013	1641	1614	1592	1594	1619	1678	1753	1820	1826	1810	1789	1754	1711	1652	1597	1556	1541	1581	1708	1792	1804	1793	1754	1698
2/24/2013	1652	1625	1610	1615	1632	1677	1744	1784	1782	1756	1705	1657	1620	1585	1537	1509	1496	1540	1650	1773	1787	1762	1709	1646
2/25/2013	1607	1583	1594	1610	1670	1788	1993	2078	2010	1928	1901	1841	1803	1768	1709	1670	1663	1705	1804	1882	1875	1817	1727	1629
2/26/2013	1553	1522	1513	1519	1556	1665	1854	1992	2009	1996	2020	2002	1984	1952	1912	1895	1874	1870	1908	1903	1866	1791	1688	1584
2/27/2013	1507	1464	1447	1454	1500	1635	1826	1948	1955	1972	1985	1973	1975	1984	1988	1980	1974	1986	2044	2067	2035	1966	1853	1756
2/28/2013	1689	1647	1627	1625	1662	1768	1924	2023	2012	2008	2015	2011	1990	1970	1933	1912	1924	1932	1980	2003	1980	1920	1822	1714

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3/1/2013	1644	1607	1593	1590	1632	1727	1917	2002	1988	1986	1987	1981	1965	1953	1943	1924	1927	1935	1966	1973	1929	1870	1801	1717
3/2/2013	1655	1614	1595	1597	1617	1665	1732	1796	1856	1897	1924	1909	1892	1867	1846	1826	1826	1828	1874	1927	1912	1875	1812	1746
3/3/2013	1700	1668	1640	1643	1641	1672	1718	1743	1785	1807	1769	1726	1721	1719	1706	1683	1680	1707	1785	1913	1913	1891	1828	1770
3/4/2013	1723	1712	1718	1745	1808	1940	2131	2199	2118	2016	2002	1940	1887	1850	1858	1863	1888	1896	1949	1996	1951	1870	1769	1661
3/5/2013	1589	1560	1542	1541	1582	1685	1861	1945	1910	1921	1938	1943	1945	1951	1934	1934	1932	1960	2000	2044	2009	1944	1842	1734
3/6/2013	1685	1653	1650	1664	1709	1805	1983	2069	2082	2073	2061	2035	2007	2001	1981	1983	1978	1995	2038	2081	2048	1974	1867	1754
3/7/2013	1684	1650	1632	1640	1669	1790	1959	2021	1997	1990	1965	1922	1885	1860	1835	1839	1847	1861	1910	1979	1952	1895	1795	1698
3/8/2013	1643	1619	1628	1645	1696	1821	2014	2076	1991	1911	1861	1814	1778	1738	1683	1636	1621	1597	1650	1765	1775	1756	1691	1619
3/9/2013	1569	1518	1502	1502	1520	1555	1608	1631	1664	1649	1620	1583	1541	1500	1474	1467	1468	1485	1524	1595	1576	1537	1478	1402
3/10/2013	1333	1296	1260	1257	1264	1299	1336	1367	1400	1419	1428	1420	1382	1359	1339	1341	1360	1396	1454	1523	1489	1415	1317	1243
3/11/2013	1196	1174	1179	1216	1309	1486	1640	1650	1639	1680	1696	1720	1735	1712	1721	1737	1787	1808	1851	1897	1852	1761	1655	1590
3/12/2013	1544	1526	1526	1553	1662	1850	1986	1979	1953	1970	1976	1902	1834	1759	1718	1685	1699	1731	1771	1872	1848	1755	1648	1594
3/13/2013	1561	1565	1585	1636	1756	1949	2093	2079	2060	2073	2059	2032	2037	2011	1985	1975	1969	1957	1978	2037	2003	1902	1796	1735
3/14/2013	1700	1692	1719	1754	1873	2058	2197	2142	2073	2004	1937	1881	1830	1783	1711	1679	1712	1715	1758	1851	1821	1741	1645	1592
3/15/2013	1554	1546	1556	1593	1702	1885	2013	1980	1941	1922	1857	1800	1740	1686	1634	1624	1610	1594	1617	1659	1623	1556	1469	1395
3/16/2013	1352	1327	1320	1329	1361	1424	1499	1534	1540	1546	1560	1576	1558	1547	1551	1569	1589	1592	1632	1687	1661	1610	1519	1476
3/17/2013	1451	1441	1454	1474	1499	1538	1619	1659	1720	1759	1761	1746	1727	1706	1681	1643	1639	1670	1736	1805	1774	1698	1617	1567
3/18/2013	1554	1550	1553	1569	1689	1867	1996	1982	1972	1975	1963	1937	1889	1859	1869	1861	1873	1875	1902	1920	1861	1751	1637	1571
3/19/2013	1564	1584	1628	1676	1808	2018	2140	2131	2093	2076	2077	2034	1963	1916	1851	1798	1753	1747	1800	1907	1884	1791	1695	1626
3/20/2013	1596	1580	1590	1635	1757	1958	2081	2068	2054	2047	2004	1976	1950	1917	1885	1920	1942	1960	1997	2084	2057	1969	1876	1813
3/21/2013	1784	1779	1784	1823	1937	2126	2247	2207	2142	2066	2039	1984	1938	1874	1812	1771	1755	1753	1799	1920	1909	1839	1750	1696
3/22/2013	1670	1675	1694	1737	1862	2051	2177	2131	2026	1955	1888	1834	1778	1725	1656	1610	1565	1545	1577	1692	1711	1671	1592	1515
3/23/2013	1480	1455	1447	1460	1489	1554	1633	1691	1717	1711	1666	1593	1536	1461	1417	1389	1380	1390	1419	1542	1566	1540	1492	1451
3/24/2013	1426	1403	1402	1418	1446	1493	1570	1634	1691	1719	1723	1733	1738	1729	1738	1784	1830	1832	1853	1898	1862	1791	1716	1651
3/25/2013	1621	1608	1611	1654	1748	1885	1976	1992	2014	2027	2000	1976	1947	1912	1894	1897	1894	1886	1900	1963	1915	1818	1722	1652
3/26/2013	1618	1602	1615	1645	1740	1891	1996	1979	1987	1958	1899	1840	1808	1796	1757	1734	1722	1762	1809	1898	1865	1777	1681	1614
3/27/2013	1585	1578	1589	1629	1746	1909	2003	1976	1919	1871	1817	1792	1797	1790	1767	1728	1702	1691	1710	1822	1819	1758	1667	1617
3/28/2013	1597	1589	1605	1639	1743	1914	2007	1975	1910	1860	1809	1764	1725	1678	1629	1576	1532	1520	1533	1644	1659	1608	1530	1483
3/29/2013	1453	1463	1469	1515	1606	1742	1846	1832	1807	1778	1715	1625	1573	1526	1482	1450	1432	1423	1433	1511	1500	1462	1388	1339
3/30/2013	1320	1315	1333	1359	1411	1487	1561	1576	1559	1518	1467	1419	1374	1337	1316	1289	1302	1324	1339	1424	1418	1374	1312	1254
3/31/2013	1208	1183	1171	1181	1195	1241	1297	1330	1388	1415	1421	1368	1315	1272	1240	1222	1215	1230	1281	1386	1373	1333	1268	1223

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4/1/2013	1208	1220	1251	1305	1423	1585	1700	1712	1714	1716	1708	1692	1683	1645	1609	1581	1557	1559	1592	1704	1720	1660	1579	1528
4/2/2013	1494	1492	1511	1546	1659	1829	1930	1893	1844	1821	1775	1745	1722	1669	1616	1569	1542	1540	1557	1666	1687	1635	1559	1506
4/3/2013	1483	1481	1503	1543	1658	1823	1933	1900	1841	1809	1765	1723	1694	1649	1597	1556	1531	1523	1558	1664	1659	1601	1516	1459
4/4/2013	1426	1410	1413	1447	1546	1713	1815	1809	1790	1750	1710	1671	1630	1596	1530	1505	1467	1460	1452	1538	1560	1490	1407	1356
4/5/2013	1337	1334	1342	1378	1476	1634	1728	1723	1698	1658	1631	1598	1574	1544	1511	1459	1435	1400	1390	1472	1479	1426	1353	1294
4/6/2013	1264	1248	1249	1265	1291	1358	1401	1446	1407	1467	1456	1425	1369	1336	1309	1299	1302	1294	1302	1368	1379	1325	1245	1180
4/7/2013	1125	1103	1081	1078	1090	1129	1144	1181	1235	1276	1284	1292	1299	1287	1290	1292	1311	1309	1326	1414	1411	1331	1224	1148
4/8/2013	1093	1076	1067	1096	1189	1377	1490	1505	1529	1564	1573	1586	1591	1568	1551	1534	1519	1503	1491	1553	1538	1430	1306	1221
4/9/2013	1159	1122	1111	1133	1227	1404	1510	1514	1548	1580	1624	1678	1696	1695	1674	1657	1638	1613	1589	1644	1643	1543	1412	1308
4/10/2013	1244	1196	1180	1193	1276	1453	1563	1586	1639	1708	1746	1777	1778	1786	1798	1766	1711	1678	1622	1676	1610	1474	1352	1254
4/11/2013	1196	1164	1156	1167	1262	1423	1540	1551	1590	1629	1642	1655	1654	1620	1603	1578	1578	1568	1575	1593	1533	1410	1296	1209
4/12/2013	1174	1137	1144	1179	1291	1481	1631	1654	1674	1672	1675	1671	1682	1682	1665	1632	1634	1618	1627	1668	1649	1571	1477	1398
4/13/2013	1352	1313	1302	1310	1339	1406	1441	1496	1539	1560	1554	1523	1485	1430	1392	1367	1349	1334	1341	1422	1464	1420	1359	1298
4/14/2013	1266	1252	1239	1233	1255	1297	1305	1343	1374	1364	1346	1329	1315	1303	1301	1303	1310	1303	1315	1388	1426	1345	1248	1164
4/15/2013	1116	1094	1091	1124	1220	1417	1509	1546	1559	1597	1596	1594	1599	1579	1566	1538	1517	1508	1498	1536	1550	1441	1316	1220
4/16/2013	1176	1140	1128	1155	1243	1417	1519	1549	1555	1590	1603	1587	1581	1585	1583	1592	1585	1578	1563	1585	1560	1458	1342	1256
4/17/2013	1208	1181	1176	1212	1314	1544	1599	1612	1628	1640	1639	1643	1632	1622	1608	1606	1582	1568	1553	1632	1601	1526	1376	1255
4/18/2013	1204	1163	1153	1175	1273	1460	1542	1592	1645	1694	1722	1742	1733	1691	1652	1610	1602	1616	1612	1615	1564	1460	1357	1252
4/19/2013	1182	1161	1154	1188	1293	1433	1640	1678	1724	1771	1777	1782	1716	1753	1749	1749	1736	1734	1715	1731	1713	1630	1554	1474
4/20/2013	1433	1410	1396	1416	1464	1527	1546	1563	1577	1568	1550	1519	1472	1438	1401	1380	1366	1360	1365	1445	1513	1481	1439	1396
4/21/2013	1366	1358	1360	1374	1404	1458	1472	1514	1516	1495	1458	1432	1390	1362	1332	1330	1327	1337	1348	1431	1478	1417	1333	1272
4/22/2013	1248	1243	1256	1314	1432	1633	1713	1682	1656	1649	1629	1618	1616	1588	1563	1534	1511	1494	1478	1520	1539	1438	1308	1219
4/23/2013	1171	1146	1150	1175	1276	1458	1538	1549	1575	1610	1607	1611	1623	1549	1561	1549	1539	1549	1539	1573	1538	1440	1331	1240
4/24/2013	1189	1159	1168	1204	1317	1513	1634	1676	1704	1793	1773	1771	1749	1718	1683	1654	1636	1627	1612	1658	1681	1581	1479	1406
4/25/2013	1380	1375	1374	1425	1531	1721	1768	1734	1704	1679	1657	1642	1624	1598	1563	1535	1492	1472	1474	1526	1587	1514	1418	1355
4/26/2013	1325	1320	1333	1370	1479	1651	1719	1686	1660	1640	1612	1590	1565	1541	1509	1483	1444	1412	1387	1429	1453	1393	1303	1224
4/27/2013	1183	1158	1158	1173	1209	1275	1304	1351	1373	1382	1370	1351	1332	1321	1305	1303	1304	1306	1315	1352	1365	1316	1244	1173
4/28/2013	1129	1102	1089	1082	1102	1135	1153	1230	1284	1323	1348	1356	1350	1339	1337	1341	1365	1370	1379	1413	1415	1346	1245	1172
4/29/2013	1131	1105	1117	1133	1240	1416	1529	1540	1564	1581	1585	1587	1573	1568	1555	1525	1512	1493	1484	1504	1536	1436	1302	1205
4/30/2013	1148	1115	1119	1141	1235	1406	1490	1518	1552	1591	1618	1639	1670	1697	1700	1710	1696	1670	1640	1649	1672	1554	1400	1280

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5/1/2013	1206	1158	1139	1144	1233	1386	1475	1533	1597	1676	1732	1776	1822	1853	1869	1865	1860	1835	1805	1774	1770	1654	1493	1369
5/2/2013	1280	1230	1200	1208	1283	1437	1522	1587	1652	1724	1768	1796	1828	1839	1846	1817	1780	1732	1699	1682	1696	1578	1430	1314
5/3/2013	1246	1194	1173	1193	1269	1429	1518	1565	1600	1638	1669	1693	1719	1738	1712	1679	1618	1572	1534	1533	1551	1473	1346	1241
5/4/2013	1167	1129	1096	1092	1118	1145	1166	1234	1294	1340	1359	1365	1366	1357	1338	1330	1316	1314	1306	1323	1356	1304	1228	1155
5/5/2013	1105	1074	1051	1049	1043	1067	1088	1165	1233	1275	1298	1319	1323	1321	1312	1317	1331	1328	1346	1373	1403	1335	1231	1163
5/6/2013	1112	1089	1093	1118	1221	1390	1481	1529	1550	1580	1612	1632	1630	1598	1568	1543	1515	1505	1488	1509	1532	1424	1306	1214
5/7/2013	1155	1124	1112	1132	1226	1394	1476	1533	1557	1617	1648	1670	1680	1676	1649	1600	1584	1562	1549	1553	1587	1489	1354	1249
5/8/2013	1185	1152	1137	1156	1246	1399	1479	1556	1606	1683	1712	1749	1761	1755	1740	1722	1691	1676	1647	1627	1641	1532	1390	1276
5/9/2013	1199	1157	1136	1160	1239	1393	1486	1516	1597	1673	1735	1790	1803	1762	1709	1675	1665	1623	1572	1593	1585	1480	1346	1260
5/10/2013	1197	1163	1152	1165	1250	1415	1504	1572	1616	1664	1684	1684	1673	1657	1623	1594	1570	1534	1496	1466	1458	1372	1269	1179
5/11/2013	1129	1094	1076	1084	1106	1151	1194	1285	1344	1391	1404	1377	1353	1312	1304	1300	1296	1288	1274	1286	1355	1312	1246	1181
5/12/2013	1137	1110	1108	1112	1142	1165	1199	1264	1304	1319	1317	1290	1278	1253	1253	1236	1247	1246	1268	1319	1391	1348	1265	1203
5/13/2013	1166	1144	1154	1194	1315	1486	1581	1590	1604	1622	1618	1614	1585	1572	1541	1519	1497	1483	1457	1470	1514	1424	1305	1208
5/14/2013	1165	1126	1123	1149	1244	1408	1510	1470	1553	1596	1621	1643	1669	1698	1725	1745	1749	1750	1741	1730	1751	1648	1497	1371
5/15/2013	1299	1247	1221	1230	1317	1469	1576	1659	1737	1814	1876	1932	1991	2038	2066	2073	2032	2006	1972	1958	1964	1833	1664	1519
5/16/2013	1424	1357	1328	1326	1405	1556	1644	1728	1782	1869	1918	1964	1977	1994	2017	2019	2031	2016	1968	1920	1917	1788	1608	1472
5/17/2013	1371	1304	1274	1280	1363	1529	1606	1693	1785	1879	1944	1994	2031	2054	1983	1857	1783	1741	1688	1670	1672	1594	1468	1355
5/18/2013	1278	1232	1199	1184	1209	1239	1287	1369	1439	1490	1513	1531	1543	1576	1609	1657	1684	1686	1665	1636	1647	1583	1489	1370
5/19/2013	1286	1217	1183	1160	1166	1158	1192	1309	1432	1532	1622	1704	1774	1835	1896	1950	1987	1989	1973	1930	1939	1836	1679	1542
5/20/2013	1456	1407	1378	1386	1486	1637	1756	1829	1893	1970	2045	2141	2221	2257	2269	2257	2230	2195	2154	2092	2076	1933	1757	1620
5/21/2013	1516	1457	1385	1327	1400	1521	1631	1673	1722	1826	1913	1999	2073	2132	2167	2193	2181	2129	2038	1975	1965	1832	1638	1485
5/22/2013	1396	1345	1304	1309	1393	1554	1656	1699	1737	1829	1871	1863	1836	1825	1830	1862	1836	1783	1743	1740	1731	1617	1465	1345
5/23/2013	1265	1209	1186	1208	1291	1420	1517	1560	1602	1637	1666	1679	1675	1664	1626	1590	1534	1479	1460	1480	1483	1408	1297	1210
5/24/2013	1157	1132	1119	1134	1223	1351	1448	1483	1499	1531	1531	1530	1539	1524	1510	1484	1462	1440	1414	1389	1409	1361	1264	1171
5/25/2013	1109	1072	1048	1051	1079	1087	1118	1191	1252	1296	1307	1306	1291	1267	1264	1251	1256	1244	1248	1267	1307	1259	1195	1126
5/26/2013	1076	1042	1033	1022	1046	1056	1080	1138	1187	1211	1235	1223	1235	1228	1233	1239	1243	1245	1240	1262	1310	1269	1199	1133
5/27/2013	1083	1053	1038	1031	1061	1071	1071	1132	1230	1297	1342	1368	1385	1427	1479	1529	1540	1550	1553	1566	1564	1469	1361	1270
5/28/2013	1194	1157	1141	1157	1256	1406	1520	1620	1686	1755	1816	1872	1924	1953	1959	1969	1956	1929	1928	1897	1900	1810	1645	1516
5/29/2013	1411	1343	1303	1303	1380	1514	1620	1725	1833	1937	2017	2098	2163	2200	2229	2250	2230	2174	2112	2043	2034	1906	1731	1581
5/30/2013	1475	1403	1365	1373	1444	1566	1685	1794	1896	2020	2134	2229	2290	2318	2315	2300	2285	2247	2154	2100	2072	1968	1805	1653
5/31/2013	1547	1479	1432	1426	1489	1601	1686	1731	1750	1783	1804	1793	1827	1840	1841	1851	1840	1792	1753	1718	1735	1689	1584	1477

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Date	**HE1**	**HE2**	**HE3**	**HE4**	**HE5**	**HE6**	**HE7**	**HE8**	**HE9**	**HE10**	**HE11**	**HE12**	**HE13**	**HE14**	**HE15**	**HE16**	**HE17**	**HE18**	**HE19**	**HE20**	**HE21**	**HE22**	**HE23**	**HE24**
6/1/2013	1399	1338	1287	1244	1244	1271	1290	1356	1418	1489	1565	1582	1576	1582	1589	1616	1644	1641	1623	1580	1591	1544	1454	1358
6/2/2013	1274	1217	1170	1145	1131	1113	1143	1241	1334	1388	1407	1428	1444	1451	1460	1480	1492	1477	1457	1444	1453	1404	1292	1194
6/3/2013	1125	1091	1074	1091	1164	1269	1369	1438	1486	1537	1570	1583	1602	1612	1606	1609	1596	1590	1567	1534	1525	1457	1323	1220
6/4/2013	1156	1115	1103	1120	1188	1288	1399	1470	1535	1607	1627	1661	1693	1712	1717	1723	1712	1696	1652	1607	1612	1526	1374	1264
6/5/2013	1188	1152	1138	1143	1220	1320	1419	1499	1568	1636	1697	1765	1821	1845	1904	1931	1925	1913	1883	1817	1821	1718	1545	1407
6/6/2013	1281	1243	1204	1211	1259	1372	1506	1546	1577	1620	1651	1671	1695	1755	1814	1862	1867	1859	1807	1757	1747	1678	1525	1394
6/7/2013	1311	1258	1225	1221	1282	1378	1453	1546	1603	1686	1752	1809	1855	1856	1823	1784	1718	1645	1594	1565	1582	1517	1420	1304
6/8/2013	1236	1174	1139	1119	1132	1144	1183	1272	1346	1408	1475	1533	1580	1616	1648	1669	1677	1668	1637	1591	1603	1558	1452	1353
6/9/2013	1265	1210	1170	1148	1149	1134	1159	1246	1349	1471	1571	1639	1685	1736	1758	1740	1712	1683	1657	1632	1648	1594	1491	1392
6/10/2013	1315	1262	1231	1242	1322	1450	1544	1619	1720	1815	1883	1927	1956	1942	1904	1842	1804	1815	1796	1751	1744	1680	1527	1403
6/11/2013	1313	1266	1233	1238	1313	1410	1528	1636	1754	1867	1951	2028	2117	2179	2222	2253	2199	2172	2103	2050	2025	1932	1766	1611
6/12/2013	1503	1436	1402	1395	1483	1596	1731	1851	1963	2053	2180	2313	2434	2477	2473	2473	2443	2416	2399	2321	2305	2205	2044	1911
6/13/2013	1817	1738	1689	1612	1634	1721	1790	1815	1856	1874	1876	1903	1959	1999	2034	2033	2013	1960	1890	1795	1734	1662	1500	1362
6/14/2013	1278	1216	1192	1190	1247	1335	1438	1533	1626	1722	1778	1857	1907	1938	1962	1991	1982	1946	1867	1799	1762	1685	1532	1401
6/15/2013	1297	1235	1194	1174	1190	1182	1231	1324	1449	1555	1648	1733	1786	1825	1878	1907	1872	1865	1849	1789	1770	1705	1582	1477
6/16/2013	1385	1335	1283	1254	1241	1239	1246	1317	1382	1450	1485	1545	1607	1676	1720	1755	1804	1816	1803	1765	1765	1728	1604	1468
6/17/2013	1376	1316	1285	1290	1376	1481	1603	1708	1841	1992	2102	2207	2276	2330	2352	2370	2337	2260	2183	2128	2086	1973	1783	1616
6/18/2013	1484	1411	1360	1354	1418	1503	1626	1741	1846	1974	2078	2173	2265	2314	2334	2333	2303	2244	2165	2077	2001	1902	1720	1568
6/19/2013	1443	1359	1309	1302	1353	1434	1536	1624	1723	1827	1910	1986	2056	2106	2152	2173	2168	2140	2076	1997	1964	1867	1688	1523
6/20/2013	1412	1337	1295	1288	1354	1441	1561	1670	1784	1911	2010	2111	2208	2264	2309	2321	2304	2273	2216	2123	2047	1923	1731	1574
6/21/2013	1462	1388	1345	1338	1389	1460	1592	1701	1839	1987	2109	2204	2287	2350	2392	2404	2391	2330	2236	2144	2086	1999	1868	1722
6/22/2013	1601	1517	1451	1436	1431	1433	1481	1604	1757	1938	2079	2182	2245	2279	2262	2122	1984	1890	1822	1777	1771	1718	1612	1498
6/23/2013	1404	1337	1297	1272	1266	1249	1291	1407	1555	1709	1868	1979	2064	2113	2070	1899	1827	1789	1758	1747	1763	1729	1612	1498
6/24/2013	1412	1359	1335	1346	1432	1546	1647	1773	1864	1987	2102	2206	2297	2375	2423	2453	2460	2433	2355	2254	2197	2074	1891	1739
6/25/2013	1614	1530	1476	1454	1515	1623	1734	1855	1976	2154	2241	2327	2436	2524	2563	2592	2578	2515	2424	2359	2324	2132	1878	1691
6/26/2013	1583	1500	1449	1440	1490	1586	1676	1764	1838	1925	2034	2176	2285	2337	2305	2215	2138	2106	2047	1981	1955	1872	1725	1590
6/27/2013	1489	1423	1392	1398	1477	1591	1703	1803	1931	2142	2189	2279	2374	2435	2463	2504	2498	2488	2446	2358	2290	2183	1990	1813
6/28/2013	1694	1602	1536	1510	1549	1616	1714	1843	1966	2078	2175	2235	2283	2310	2233	2062	2079	2066	2010	1929	1851	1741	1601	1465
6/29/2013	1364	1298	1251	1228	1239	1231	1268	1377	1470	1532	1582	1610	1635	1629	1589	1565	1576	1558	1542	1510	1533	1505	1408	1328
6/30/2013	1248	1198	1172	1156	1164	1167	1184	1248	1330	1415	1486	1556	1607	1637	1637	1634	1620	1608	1595	1568	1596	1547	1440	1341

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7/1/2013	1257	1220	1201	1252	1336	1393	1469	1558	1639	1680	1727	1779	1776	1787	1765	1755	1713	1653	1619	1591	1613	1540	1433	1351
7/2/2013	1280	1242	1216	1222	1294	1389	1472	1541	1610	1668	1671	1695	1752	1803	1814	1823	1827	1795	1760	1693	1665	1595	1469	1352
7/3/2013	1273	1218	1201	1200	1270	1363	1444	1557	1623	1693	1754	1819	1868	1917	1935	1968	1970	1934	1831	1760	1728	1677	1546	1421
7/4/2013	1322	1250	1214	1185	1190	1192	1188	1257	1349	1446	1551	1632	1665	1667	1645	1633	1612	1572	1515	1476	1473	1437	1413	1344
7/5/2013	1268	1217	1194	1196	1238	1291	1362	1462	1585	1691	1759	1822	1870	1922	1947	1981	1989	1973	1907	1829	1812	1758	1627	1505
7/6/2013	1414	1351	1312	1295	1303	1317	1327	1389	1458	1528	1571	1595	1591	1580	1581	1576	1584	1569	1534	1520	1547	1538	1448	1346
7/7/2013	1271	1204	1174	1152	1152	1152	1164	1229	1308	1389	1479	1598	1722	1819	1879	1948	2012	2030	1990	1942	1918	1848	1705	1564
7/8/2013	1465	1395	1361	1372	1438	1536	1660	1784	1907	2029	2150	2233	2255	2297	2289	2332	2373	2373	2323	2247	2219	2125	1963	1823
7/9/2013	1698	1611	1571	1571	1636	1749	1859	1967	2083	2148	2200	2281	2329	2414	2499	2556	2568	2512	2443	2344	2294	2190	2037	1889
7/10/2013	1784	1694	1652	1634	1701	1816	1918	2057	2187	2345	2427	2403	2296	2127	2098	2163	2231	2256	2216	2162	2124	2017	1852	1680
7/11/2013	1527	1438	1371	1351	1404	1487	1571	1677	1780	1886	1965	2022	2058	2089	2104	2116	2106	2069	2003	1918	1863	1777	1612	1471
7/12/2013	1360	1293	1255	1246	1299	1384	1465	1582	1689	1801	1895	1956	2015	2069	2109	2133	2117	2075	2005	1903	1846	1772	1609	1472
7/13/2013	1365	1296	1250	1230	1233	1236	1270	1376	1503	1641	1739	1808	1866	1930	1991	2047	2067	2032	1988	1928	1886	1815	1689	1573
7/14/2013	1473	1394	1338	1313	1301	1281	1316	1450	1610	1770	1922	2063	2159	2225	2272	2307	2341	2343	2319	2273	2233	2159	2016	1869
7/15/2013	1756	1665	1606	1595	1649	1745	1858	2001	2154	2301	2410	2495	2564	2613	2646	2654	2631	2609	2551	2462	2396	2266	2060	1887
7/16/2013	1755	1648	1594	1575	1634	1730	1838	1981	2143	2318	2439	2525	2602	2631	2637	2649	2612	2589	2539	2467	2419	2318	2138	1962
7/17/2013	1831	1729	1671	1652	1709	1810	1913	2055	2205	2368	2503	2608	2672	2722	2747	2757	2746	2734	2686	2588	2516	2396	2202	2029
7/18/2013	1890	1788	1711	1685	1729	1831	1933	2093	2260	2424	2530	2628	2713	2768	2789	2793	2769	2736	2674	2590	2532	2419	2221	2050
7/19/2013	1921	1830	1759	1744	1792	1902	1989	2133	2274	2432	2550	2634	2699	2738	2761	2749	2721	2666	2586	2495	2459	2348	2180	2023
7/20/2013	1900	1797	1727	1678	1664	1675	1689	1811	1959	2026	2079	2052	1934	1840	1785	1768	1749	1713	1678	1666	1679	1626	1536	1453
7/21/2013	1386	1321	1290	1310	1229	1272	1279	1372	1513	1681	1811	1877	1926	1975	2048	2110	2108	2100	2071	2038	2051	1958	1815	1693
7/22/2013	1591	1508	1452	1449	1513	1639	1718	1779	1836	1918	1966	2022	2079	2151	2206	2245	2229	2229	2187	2133	2092	1982	1794	1649
7/23/2013	1538	1457	1422	1422	1493	1621	1715	1857	2003	2191	2331	2435	2519	2557	2591	2579	2537	2458	2345	2194	2091	1927	1709	1541
7/24/2013	1416	1315	1268	1260	1311	1394	1456	1528	1593	1671	1734	1792	1859	1898	1929	1945	1950	1919	1866	1784	1748	1649	1495	1372
7/25/2013	1278	1224	1196	1197	1256	1341	1428	1530	1613	1697	1758	1818	1871	1923	1980	1998	2006	1990	1929	1851	1823	1720	1550	1419
7/26/2013	1322	1263	1236	1234	1297	1388	1460	1576	1669	1789	1852	1911	1989	2036	2059	2052	2017	1936	1854	1810	1800	1716	1585	1475
7/27/2013	1384	1318	1288	1271	1286	1323	1345	1391	1466	1561	1628	1676	1689	1703	1715	1731	1722	1696	1628	1545	1534	1458	1351	1249
7/28/2013	1169	1118	1084	1067	1067	1065	1070	1147	1222	1298	1340	1385	1410	1418	1432	1452	1459	1455	1439	1437	1475	1429	1326	1225
7/29/2013	1160	1130	1116	1130	1214	1318	1405	1492	1582	1668	1731	1794	1833	1881	1907	1932	1945	1917	1852	1780	1765	1648	1490	1366
7/30/2013	1275	1224	1199	1206	1271	1390	1462	1548	1644	1734	1765	1793	1805	1817	1794	1773	1735	1705	1681	1681	1698	1613	1482	1382
7/31/2013	1307	1259	1246	1255	1332	1483	1564	1613	1661	1722	1764	1793	1825	1852	1862	1858	1848	1838	1820	1793	1816	1742	1599	1480

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8/1/2013	1386	1331	1293	1297	1366	1505	1564	1646	1740	1855	1928	2000	2070	2113	2125	2121	2098	2064	1992	1908	1885	1766	1589	1446
8/2/2013	1336	1270	1235	1229	1290	1405	1474	1560	1637	1729	1811	1903	1997	2060	2090	2030	1949	1872	1818	1780	1799	1718	1596	1491
8/3/2013	1402	1339	1298	1282	1295	1330	1341	1414	1500	1591	1643	1689	1752	1827	1892	1941	1957	1935	1879	1795	1751	1647	1504	1372
8/4/2013	1270	1196	1152	1129	1124	1122	1119	1203	1314	1408	1492	1556	1613	1672	1724	1757	1787	1785	1760	1708	1703	1602	1447	1319
8/5/2013	1244	1194	1177	1191	1287	1414	1493	1573	1685	1782	1880	1949	2018	2062	2102	2079	2017	1964	1918	1872	1864	1739	1581	1457
8/6/2013	1383	1323	1301	1307	1400	1558	1639	1707	1784	1861	1897	1947	2001	2041	2038	2034	2070	2068	2049	2014	2020	1905	1740	1621
8/7/2013	1526	1463	1432	1433	1509	1673	1752	1828	1895	1963	2039	2108	2217	2292	2327	2364	2345	2313	2250	2199	2165	2031	1856	1716
8/8/2013	1601	1534	1500	1505	1589	1748	1816	1903	2004	2103	2198	2306	2402	2456	2416	2317	2232	2191	2147	2125	2100	1948	1783	1642
8/9/2013	1548	1487	1451	1454	1527	1686	1761	1807	1856	1926	2004	2102	2191	2240	2289	2308	2274	2189	2082	2006	1982	1860	1708	1562
8/10/2013	1464	1392	1347	1328	1344	1365	1388	1470	1578	1707	1829	1935	2015	2070	2123	2154	2156	2127	2065	1999	1978	1871	1725	1593
8/11/2013	1489	1409	1345	1307	1300	1308	1304	1416	1565	1722	1834	1920	1996	2057	2101	2138	2164	2152	2116	2044	2027	1881	1701	1553
8/12/2013	1449	1378	1348	1356	1445	1619	1691	1790	1912	2032	2138	2242	2313	2378	2399	2391	2321	2251	2166	2135	2096	1954	1769	1621
8/13/2013	1534	1448	1420	1414	1502	1642	1699	1764	1828	1926	1987	2041	2085	2092	2075	2045	1974	1895	1796	1703	1680	1548	1399	1284
8/14/2013	1212	1168	1155	1159	1241	1380	1449	1506	1572	1633	1659	1696	1724	1730	1739	1752	1734	1715	1669	1639	1634	1514	1363	1257
8/15/2013	1190	1150	1133	1143	1218	1366	1435	1489	1548	1634	1680	1710	1742	1764	1760	1761	1767	1728	1676	1657	1659	1546	1399	1294
8/16/2013	1219	1180	1162	1173	1255	1404	1479	1532	1579	1627	1653	1688	1729	1753	1773	1771	1751	1720	1655	1618	1619	1530	1414	1310
8/17/2013	1233	1188	1153	1146	1161	1191	1212	1289	1407	1509	1585	1642	1693	1718	1728	1745	1757	1756	1715	1678	1669	1577	1460	1353
8/18/2013	1268	1213	1174	1150	1148	1163	1157	1240	1349	1470	1591	1683	1758	1821	1861	1900	1938	1940	1900	1876	1855	1724	1549	1418
8/19/2013	1323	1266	1240	1253	1338	1511	1582	1654	1758	1878	1978	2074	2153	2208	2248	2283	2266	2229	2172	2113	2071	1897	1708	1544
8/20/2013	1443	1368	1331	1333	1408	1565	1646	1719	1850	1986	2104	2201	2278	2334	2378	2409	2394	2358	2282	2251	2199	2029	1840	1680
8/21/2013	1560	1485	1441	1431	1504	1673	1754	1825	1941	2082	2208	2297	2372	2430	2466	2502	2484	2438	2360	2316	2253	2052	1853	1684
8/22/2013	1584	1498	1457	1453	1525	1692	1769	1822	1933	2060	2196	2317	2390	2373	2410	2388	2282	2174	2097	2074	2037	1884	1714	1588
8/23/2013	1497	1433	1394	1395	1466	1622	1710	1764	1878	1981	2074	2169	2238	2297	2339	2365	2346	2282	2191	2106	2030	1881	1700	1547
8/24/2013	1421	1348	1291	1264	1255	1289	1288	1384	1505	1645	1763	1847	1940	2034	2101	2149	2173	2147	2068	1985	1910	1778	1618	1483
8/25/2013	1373	1303	1255	1223	1216	1226	1211	1304	1438	1590	1722	1848	1962	2063	2150	2213	2249	2236	2175	2115	2051	1876	1679	1526
8/26/2013	1415	1349	1310	1321	1412	1588	1679	1756	1897	2062	2217	2342	2448	2497	2500	2527	2508	2460	2395	2365	2297	2108	1915	1756
8/27/2013	1634	1575	1532	1538	1617	1796	1903	1946	2027	2141	2290	2456	2601	2660	2696	2678	2663	2619	2543	2502	2432	2250	2044	1888
8/28/2013	1773	1691	1653	1653	1742	1911	1990	2043	2171	2321	2448	2555	2677	2754	2807	2801	2768	2705	2627	2577	2490	2300	2079	1910
8/29/2013	1771	1674	1618	1611	1674	1841	1919	1963	2078	2210	2335	2426	2502	2556	2601	2601	2585	2518	2444	2410	2340	2147	1930	1765
8/30/2013	1639	1555	1502	1489	1559	1710	1776	1864	1974	2136	2274	2385	2489	2565	2643	2657	2648	2594	2558	2577	2407	2274	2095	1939
8/31/2013	1792	1683	1600	1545	1530	1534	1525	1616	1787	1942	2091	2214	2328	2430	2478	2418	2181	2069	1997	1968	1892	1767	1653	1549

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9/1/2013	1454	1390	1344	1312	1300	1316	1329	1380	1470	1568	1683	1808	1900	1954	2016	2062	2070	2061	1972	1946	1910	1805	1666	1549
9/2/2013	1455	1391	1350	1337	1355	1386	1387	1432	1519	1608	1665	1744	1849	1953	2017	2065	2083	2048	1979	1946	1880	1710	1544	1413
9/3/2013	1317	1258	1227	1221	1281	1431	1490	1542	1612	1686	1748	1813	1869	1897	1930	1954	1951	1928	1855	1834	1777	1617	1435	1316
9/4/2013	1251	1203	1185	1193	1280	1423	1506	1554	1633	1732	1807	1875	1944	2018	2084	2127	2141	2107	2050	2027	1935	1765	1590	1435
9/5/2013	1346	1287	1264	1269	1359	1515	1596	1648	1748	1867	1959	2024	2105	2187	2253	2272	2271	2231	2176	2157	2063	1866	1663	1517
9/6/2013	1392	1311	1263	1255	1328	1476	1549	1580	1655	1737	1828	1907	2009	2090	2158	2201	2189	2137	2040	1997	1912	1770	1605	1465
9/7/2013	1359	1293	1249	1228	1243	1280	1291	1363	1483	1626	1770	1883	1969	2043	2117	2170	2184	2120	2052	2053	1992	1878	1737	1601
9/8/2013	1510	1438	1387	1352	1348	1365	1370	1449	1609	1759	1911	2039	2130	2194	2219	2212	2254	2225	2187	2209	2112	1957	1776	1624
9/9/2013	1527	1455	1423	1422	1517	1688	1803	1840	1924	2033	2162	2339	2486	2571	2647	2670	2655	2618	2556	2543	2459	2272	2068	1925
9/10/2013	1817	1729	1691	1683	1760	1937	2036	2083	2200	2360	2509	2647	2754	2809	2801	2804	2759	2669	2556	2506	2366	2172	1988	1837
9/11/2013	1705	1645	1613	1606	1678	1869	1970	2006	2118	2265	2405	2555	2664	2725	2776	2789	2754	2677	2578	2544	2412	2213	2002	1838
9/12/2013	1723	1648	1601	1591	1679	1836	1932	1932	1947	1915	1999	2025	2055	2122	2171	2220	2211	2148	2082	2039	1906	1718	1535	1395
9/13/2013	1306	1246	1223	1220	1289	1435	1510	1531	1573	1626	1679	1659	1663	1647	1637	1633	1612	1563	1515	1526	1476	1395	1273	1182
9/14/2013	1127	1082	1066	1064	1088	1142	1161	1218	1280	1331	1350	1362	1369	1384	1400	1422	1437	1435	1405	1445	1400	1316	1228	1154
9/15/2013	1096	1067	1041	1035	1042	1070	1083	1135	1207	1269	1315	1353	1385	1426	1464	1494	1502	1503	1539	1590	1529	1436	1324	1232
9/16/2013	1174	1133	1124	1140	1246	1424	1542	1552	1580	1616	1645	1674	1702	1696	1666	1645	1621	1608	1582	1629	1544	1425	1300	1203
9/17/2013	1158	1122	1113	1134	1211	1376	1474	1480	1518	1577	1616	1653	1689	1707	1703	1693	1680	1649	1635	1689	1615	1480	1352	1258
9/18/2013	1198	1168	1154	1171	1254	1427	1548	1551	1598	1666	1718	1785	1850	1922	1976	2013	2016	1986	1956	1998	1901	1753	1595	1466
9/19/2013	1380	1336	1320	1329	1418	1560	1685	1721	1742	1789	1794	1820	1914	1992	2059	2117	2127	2102	2068	2094	2014	1863	1692	1571
9/20/2013	1485	1432	1399	1406	1475	1657	1757	1786	1858	1973	2057	2084	2069	2039	2012	1949	1894	1828	1799	1789	1727	1626	1498	1387
9/21/2013	1283	1223	1173	1152	1163	1202	1244	1276	1345	1416	1459	1475	1482	1494	1500	1486	1486	1463	1433	1467	1420	1334	1234	1166
9/22/2013	1105	1065	1047	1033	1045	1073	1096	1133	1214	1268	1302	1328	1346	1362	1388	1414	1440	1443	1441	1495	1427	1334	1228	1147
9/23/2013	1103	1073	1070	1089	1183	1356	1467	1474	1513	1558	1596	1629	1644	1654	1663	1660	1650	1630	1610	1637	1553	1429	1295	1208
9/24/2013	1153	1114	1102	1118	1202	1381	1470	1482	1522	1580	1639	1663	1699	1704	1741	1750	1750	1713	1708	1736	1646	1512	1380	1270
9/25/2013	1201	1162	1140	1157	1236	1405	1517	1520	1554	1634	1709	1771	1811	1844	1865	1875	1861	1821	1774	1781	1670	1517	1372	1263
9/26/2013	1190	1145	1130	1140	1219	1379	1465	1476	1535	1599	1659	1707	1752	1792	1822	1838	1837	1807	1779	1788	1681	1538	1392	1276
9/27/2013	1212	1161	1147	1151	1229	1383	1482	1495	1535	1617	1674	1745	1796	1834	1850	1864	1854	1799	1728	1709	1611	1487	1368	1255
9/28/2013	1182	1135	1101	1097	1117	1167	1202	1247	1325	1409	1470	1532	1576	1626	1670	1701	1718	1679	1663	1664	1584	1485	1382	1283
9/29/2013	1208	1157	1132	1124	1132	1166	1213	1254	1325	1374	1406	1432	1434	1437	1432	1440	1446	1459	1508	1534	1477	1386	1288	1206
9/30/2013	1155	1128	1135	1162	1257	1438	1575	1589	1622	1681	1724	1766	1800	1811	1816	1804	1778	1743	1737	1762	1664	1539	1402	1297

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Date	HE1	HE2	HE3	HE4	HE5	HE6	HE7	HE8	HE9	HE10	HE11	HE12	HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21	HE22	HE23	HE24
10/1/2013	1231	1196	1183	1199	1283	1451	1587	1601	1633	1675	1694	1720	1731	1746	1765	1785	1776	1763	1772	1795	1709	1571	1439	1337
10/2/2013	1265	1221	1206	1213	1320	1507	1640	1661	1710	1760	1787	1811	1830	1860	1882	1912	1897	1854	1870	1880	1772	1639	1503	1393
10/3/2013	1319	1280	1260	1274	1361	1544	1678	1693	1726	1791	1860	1919	1927	1949	1989	2013	1995	1961	1963	1965	1868	1732	1576	1457
10/4/2013	1373	1320	1299	1300	1386	1542	1676	1689	1766	1839	1847	1873	1925	1999	2068	2095	2052	1975	1965	1941	1857	1742	1609	1504
10/5/2013	1416	1362	1327	1305	1325	1367	1442	1490	1570	1662	1703	1685	1675	1675	1679	1675	1667	1696	1720	1677	1600	1508	1413	1330
10/6/2013	1266	1220	1194	1185	1189	1225	1265	1309	1346	1362	1381	1391	1378	1374	1366	1368	1381	1385	1447	1463	1391	1297	1193	1134
10/7/2013	1084	1069	1065	1089	1179	1343	1471	1468	1499	1551	1551	1559	1562	1555	1523	1507	1492	1481	1534	1544	1474	1378	1266	1183
10/8/2013	1136	1117	1106	1131	1217	1389	1505	1495	1507	1555	1592	1617	1636	1632	1626	1614	1591	1556	1583	1589	1505	1392	1275	1196
10/9/2013	1144	1113	1111	1129	1217	1390	1508	1494	1515	1566	1597	1633	1656	1660	1653	1649	1635	1601	1625	1630	1540	1425	1293	1212
10/10/2013	1158	1124	1120	1139	1219	1372	1502	1508	1529	1576	1616	1648	1666	1671	1683	1660	1651	1611	1635	1623	1529	1413	1294	1203
10/11/2013	1147	1119	1114	1129	1201	1360	1477	1480	1517	1570	1604	1639	1655	1663	1656	1659	1641	1600	1583	1560	1482	1386	1275	1189
10/12/2013	1123	1084	1067	1057	1082	1137	1189	1223	1288	1343	1380	1409	1443	1471	1479	1467	1450	1438	1488	1490	1445	1374	1296	1220
10/13/2013	1170	1124	1090	1065	1063	1083	1122	1146	1215	1269	1313	1344	1360	1381	1393	1413	1426	1413	1453	1450	1378	1289	1203	1134
10/14/2013	1080	1060	1059	1077	1164	1312	1429	1436	1462	1503	1536	1558	1587	1594	1589	1566	1542	1528	1587	1558	1469	1373	1270	1185
10/15/2013	1128	1107	1095	1111	1193	1337	1465	1486	1518	1564	1585	1607	1612	1610	1591	1569	1559	1568	1622	1588	1521	1423	1318	1236
10/16/2013	1186	1155	1137	1141	1203	1342	1462	1464	1479	1509	1521	1516	1524	1512	1503	1487	1473	1458	1521	1504	1447	1354	1253	1184
10/17/2013	1126	1115	1109	1139	1224	1375	1492	1514	1530	1556	1569	1560	1578	1571	1537	1509	1490	1485	1570	1557	1511	1426	1331	1261
10/18/2013	1214	1195	1193	1216	1304	1439	1547	1550	1553	1559	1546	1543	1538	1518	1492	1454	1427	1420	1473	1458	1414	1342	1268	1204
10/19/2013	1163	1135	1128	1133	1163	1221	1286	1347	1393	1437	1441	1418	1373	1348	1319	1320	1319	1327	1415	1430	1408	1351	1293	1239
10/20/2013	1201	1184	1174	1171	1198	1239	1293	1316	1341	1351	1334	1328	1311	1304	1290	1294	1305	1331	1424	1418	1363	1307	1238	1187
10/21/2013	1140	1114	1118	1150	1257	1407	1531	1539	1544	1546	1565	1549	1540	1535	1511	1497	1503	1539	1585	1556	1491	1413	1331	1268
10/22/2013	1248	1239	1253	1299	1414	1593	1733	1719	1692	1667	1627	1602	1583	1560	1559	1554	1582	1618	1664	1635	1588	1499	1399	1338
10/23/2013	1302	1298	1316	1349	1450	1618	1727	1732	1739	1748	1711	1657	1623	1627	1634	1632	1630	1645	1710	1643	1646	1550	1459	1393
10/24/2013	1350	1329	1333	1353	1448	1610	1731	1726	1739	1766	1749	1737	1750	1737	1700	1696	1690	1725	1785	1762	1707	1623	1539	1480
10/25/2013	1452	1443	1460	1492	1592	1754	1878	1859	1771	1755	1724	1675	1632	1586	1540	1499	1492	1513	1606	1609	1586	1537	1464	1403
10/26/2013	1371	1362	1361	1376	1417	1484	1569	1589	1615	1621	1623	1599	1520	1440	1406	1429	1405	1418	1492	1484	1453	1411	1364	1312
10/27/2013	1303	1290	1301	1321	1354	1413	1480	1512	1504	1467	1414	1391	1361	1337	1321	1323	1331	1378	1502	1509	1470	1416	1350	1303
10/28/2013	1286	1288	1318	1367	1495	1685	1826	1803	1771	1714	1666	1630	1606	1573	1545	1510	1496	1533	1626	1608	1552	1468	1379	1311
10/29/2013	1275	1269	1272	1314	1419	1615	1742	1718	1699	1698	1672	1658	1651	1614	1593	1573	1564	1612	1655	1624	1562	1464	1353	1286
10/30/2013	1232	1208	1203	1219	1313	1483	1608	1621	1602	1633	1626	1638	1637	1615	1616	1595	1571	1610	1643	1611	1540	1434	1323	1258
10/31/2013	1196	1163	1154	1168	1267	1440	1561	1584	1582	1617	1631	1643	1643	1630	1618	1603	1608	1649	1652	1601	1515	1387	1286	1210

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11/1/2013	1168	1143	1150	1177	1270	1448	1586	1591	1602	1627	1612	1575	1558	1530	1505	1479	1451	1456	1498	1486	1464	1401	1329	1254
11/2/2013	1213	1181	1174	1188	1230	1299	1364	1403	1431	1442	1420	1392	1381	1361	1341	1358	1384	1423	1492	1482	1451	1405	1334	1276
11/3/2013	1238	1220	1220	1233	1260	1312	1376	1423	1451	1437	1397	1381	1358	1338	1325	1317	1338	1421	1539	1541	1528	1477	1409	1343
11/4/2013	1298	1261	1250	1253	1302	1417	1607	1681	1674	1666	1672	1657	1657	1636	1622	1623	1622	1659	1728	1697	1647	1568	1466	1363
11/5/2013	1305	1266	1239	1235	1261	1358	1528	1607	1590	1530	1546	1567	1629	1616	1608	1576	1555	1592	1690	1665	1625	1541	1431	1326
11/6/2013	1260	1209	1187	1177	1205	1305	1483	1568	1572	1589	1620	1638	1641	1644	1627	1610	1626	1673	1683	1665	1641	1583	1482	1394
11/7/2013	1332	1304	1291	1313	1361	1488	1685	1782	1754	1724	1699	1660	1631	1617	1573	1549	1552	1661	1745	1731	1699	1648	1572	1492
11/8/2013	1446	1425	1430	1441	1491	1610	1786	1869	1821	1780	1741	1690	1644	1624	1582	1539	1528	1588	1662	1637	1612	1567	1485	1410
11/9/2013	1346	1301	1291	1284	1303	1350	1414	1457	1488	1485	1474	1444	1414	1365	1339	1318	1329	1387	1475	1459	1436	1398	1353	1286
11/10/2013	1232	1202	1192	1193	1213	1247	1307	1349	1395	1417	1415	1402	1390	1358	1346	1336	1362	1465	1591	1606	1598	1556	1490	1422
11/11/2013	1378	1364	1363	1376	1405	1492	1663	1759	1743	1747	1738	1724	1720	1711	1682	1673	1692	1741	1770	1763	1741	1699	1625	1556
11/12/2013	1507	1478	1469	1485	1529	1650	1845	1950	1899	1856	1835	1807	1804	1780	1779	1790	1834	1913	1969	1957	1933	1870	1776	1691
11/13/2013	1637	1620	1622	1641	1695	1823	2001	2082	2016	1950	1906	1849	1807	1763	1729	1701	1711	1812	1920	1915	1897	1827	1740	1651
11/14/2013	1588	1558	1539	1548	1589	1699	1877	1943	1894	1839	1801	1746	1718	1684	1649	1603	1612	1694	1770	1764	1732	1671	1589	1497
11/15/2013	1427	1384	1369	1368	1399	1498	1660	1747	1737	1737	1755	1723	1698	1658	1604	1569	1588	1648	1683	1648	1609	1571	1500	1426
11/16/2013	1362	1315	1277	1264	1261	1294	1357	1401	1447	1500	1519	1510	1491	1455	1416	1388	1394	1481	1530	1500	1457	1413	1358	1277
11/17/2013	1212	1170	1143	1122	1119	1138	1173	1202	1236	1301	1341	1368	1389	1391	1405	1406	1367	1378	1457	1469	1452	1393	1329	1259
11/18/2013	1211	1177	1187	1199	1252	1384	1568	1675	1647	1630	1638	1630	1618	1597	1579	1564	1570	1669	1768	1768	1742	1684	1608	1511
11/19/2013	1458	1432	1427	1449	1495	1620	1818	1915	1874	1822	1789	1727	1706	1681	1641	1620	1651	1744	1855	1858	1832	1782	1680	1592
11/20/2013	1534	1509	1512	1524	1566	1694	1874	1955	1907	1883	1853	1795	1735	1697	1660	1657	1657	1764	1829	1803	1758	1681	1582	1469
11/21/2013	1399	1358	1333	1327	1362	1470	1649	1745	1734	1740	1746	1738	1709	1687	1675	1671	1681	1742	1751	1712	1677	1594	1501	1397
11/22/2013	1327	1279	1253	1250	1278	1372	1539	1657	1655	1669	1710	1721	1727	1747	1742	1716	1715	1793	1818	1797	1772	1720	1662	1585
11/23/2013	1539	1510	1501	1508	1540	1587	1669	1741	1771	1776	1762	1751	1740	1764	1779	1792	1826	1938	2002	2000	1991	1956	1896	1837
11/24/2013	1804	1763	1757	1761	1779	1817	1881	1935	1942	1901	1847	1796	1770	1733	1695	1684	1730	1893	1994	2005	1995	1955	1902	1830
11/25/2013	1782	1750	1736	1733	1769	1865	2016	2115	2103	2104	2113	2098	2074	2044	2015	2003	2004	2075	2084	2048	2006	1930	1822	1709
11/26/2013	1629	1590	1569	1568	1604	1711	1868	1961	1951	1968	1969	1969	1948	1924	1910	1867	1869	1954	1983	1972	1953	1904	1831	1749
11/27/2013	1683	1648	1633	1655	1713	1838	2003	2121	2135	2159	2187	2180	2162	2100	2000	1972	1979	2075	2140	2123	2103	2062	1983	1892
11/28/2013	1821	1770	1739	1739	1761	1783	1820	1856	1868	1865	1855	1815	1736	1639	1551	1499	1503	1592	1666	1679	1697	1709	1690	1666
11/29/2013	1650	1641	1640	1660	1704	1763	1850	1900	1883	1825	1753	1698	1644	1588	1566	1552	1585	1701	1787	1809	1797	1777	1730	1668
11/30/2013	1607	1575	1562	1563	1568	1599	1659	1700	1706	1688	1635	1590	1529	1481	1440	1412	1440	1548	1626	1641	1644	1622	1579	1518

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12/1/2013	1463	1426	1401	1397	1409	1444	1487	1543	1555	1537	1505	1472	1436	1410	1384	1377	1416	1535	1642	1669	1661	1616	1544	1459
12/2/2013	1401	1377	1373	1387	1432	1560	1732	1865	1836	1830	1823	1785	1752	1725	1697	1679	1714	1799	1835	1816	1781	1721	1623	1512
12/3/2013	1443	1405	1390	1400	1453	1582	1765	1868	1838	1821	1824	1813	1777	1757	1738	1718	1724	1791	1818	1787	1752	1683	1575	1463
12/4/2013	1390	1350	1324	1313	1343	1449	1608	1728	1702	1693	1707	1707	1704	1704	1690	1671	1657	1722	1783	1752	1703	1626	1514	1396
12/5/2013	1314	1268	1232	1235	1271	1380	1587	1734	1733	1770	1823	1848	1866	1871	1868	1900	1945	2040	2085	2068	2049	1988	1906	1808
12/6/2013	1748	1708	1685	1689	1731	1831	1968	2058	2060	2065	2077	2073	2068	2054	2061	2053	2067	2156	2155	2119	2070	2015	1940	1843
12/7/2013	1792	1782	1791	1809	1840	1903	1987	2071	2085	2056	1996	1944	1893	1845	1816	1825	1866	2009	2086	2080	2071	2049	1996	1930
12/8/2013	1856	1807	1770	1761	1764	1796	1835	1898	1920	1961	1974	1974	1959	1930	1917	1917	1956	2050	2092	2070	2027	1957	1855	1746
12/9/2013	1679	1644	1637	1651	1700	1834	2007	2118	2116	2108	2114	2097	2089	2061	2033	2065	2048	2189	2246	2230	2197	2121	2023	1909
12/10/2013	1837	1798	1785	1791	1844	1953	2147	2276	2258	2206	2162	2130	2087	2069	2033	2021	2038	2174	2261	2249	2219	2165	2071	1978
12/11/2013	1931	1907	1917	1933	1956	2073	2246	2339	2283	2260	2218	2111	2041	2004	2036	2073	2114	2231	2289	2305	2305	2252	2180	2103
12/12/2013	2069	2051	2045	2057	2116	2236	2425	2537	2497	2419	2353	2283	2211	2167	2156	2152	2170	2311	2380	2365	2326	2271	2166	2060
12/13/2013	1989	1948	1924	1935	1980	2074	2233	2355	2293	2203	2118	2049	1985	1947	1955	1951	1967	2052	2063	2042	2015	1960	1889	1792
12/14/2013	1713	1646	1621	1608	1622	1668	1728	1812	1841	1879	1905	1895	1873	1844	1826	1822	1832	1937	1981	1974	1957	1933	1882	1810
12/15/2013	1757	1711	1692	1698	1708	1748	1805	1886	1947	2013	2039	1998	1943	1963	1999	2009	2047	2139	2190	2173	2142	2070	1984	1882
12/16/2013	1820	1786	1770	1782	1829	1939	2107	2224	2232	2218	2214	2194	2176	2163	2137	2133	2126	2203	2231	2194	2150	2083	1984	1877
12/17/2013	1802	1762	1750	1752	1787	1905	2094	2193	2193	2193	2192	2155	2120	2086	2050	2076	2096	2184	2236	2195	2166	2112	2001	1890
12/18/2013	1818	1797	1784	1809	1860	1973	2164	2282	2237	2158	2104	2027	1953	1903	1854	1832	1882	2017	2121	2101	2077	2001	1896	1763
12/19/2013	1687	1632	1615	1601	1624	1711	1868	1968	1942	1870	1861	1828	1795	1778	1767	1755	1770	1867	1886	1861	1821	1759	1665	1545
12/20/2013	1456	1401	1360	1358	1373	1470	1622	1733	1752	1742	1751	1743	1739	1727	1712	1695	1680	1714	1726	1682	1638	1584	1508	1419
12/21/2013	1327	1276	1249	1242	1252	1296	1372	1456	1544	1617	1674	1678	1667	1659	1648	1637	1661	1742	1744	1729	1701	1662	1603	1514
12/22/2013	1453	1386	1350	1334	1342	1374	1433	1503	1572	1621	1656	1682	1701	1706	1706	1712	1743	1818	1859	1850	1838	1813	1759	1682
12/23/2013	1622	1583	1567	1582	1627	1717	1860	1976	2022	2050	2068	2081	2074	2067	2050	2036	2043	2104	2154	2136	2123	2105	2067	1999
12/24/2013	1956	1940	1935	1953	1999	2093	2205	2295	2318	2312	2244	2157	2077	1987	1929	1891	1907	2031	2104	2103	2090	2073	2032	1976
12/25/2013	1908	1848	1812	1801	1803	1834	1873	1907	1934	1956	1967	1959	1938	1901	1854	1825	1807	1855	1876	1864	1855	1833	1781	1718
12/26/2013	1667	1640	1633	1627	1661	1756	1876	1972	1977	1948	1937	1897	1844	1788	1742	1713	1743	1872	1943	1932	1908	1866	1796	1717
12/27/2013	1650	1622	1595	1581	1617	1691	1807	1893	1892	1855	1806	1752	1703	1655	1618	1583	1600	1700	1791	1787	1782	1751	1693	1612
12/28/2013	1542	1507	1477	1473	1486	1532	1581	1639	1659	1639	1602	1569	1512	1463	1435	1434	1460	1565	1655	1657	1642	1601	1551	1485
12/29/2013	1432	1395	1372	1364	1375	1389	1431	1481	1534	1557	1581	1560	1511	1500	1584	1644	1724	1826	1865	1867	1861	1821	1763	1706
12/30/2013	1678	1657	1655	1663	1724	1820	1944	2052	2075	2058	2060	2036	2003	1950	1932	1945	1981	2089	2174	2157	2138	2081	1996	1910
12/31/2013	1843	1806	1789	1788	1810	1884	1990	2074	2074	2106	2056	1984	1924	1875	1846	1838	1855	1950	2008	1940	1878	1803	1737	1694

Load Research

Load shape data including annual load shapes, seasonal load shapes, monthly load shapes, selected weekly load shapes, and daily load shapes are maintained by IPL at the rate class/customer class level. The sample for the Small Commercial Class Rate SS is stratified using NAICS codes in to manufacturing low and high use and non-manufacturing low and high use. All load research is developed by IPL.

IPL currently maintains a load research sample of 501 load profile meters. The distribution of these meters by rate and class are shown in the following table.

Load Research Meters by Rate and Class			
Rate RS	96	Rate SS	103
Rate RC	83	Rate SH	68
Rate RH	151		
Residential	330	Sm C & I	171

In addition to the Residential and Small Commercial/Industrial meters outlined above, all Large Commercial/Industrial have 15 minute profile metering. The 15 minute information provides load research and billing increment data for our demand sensitive customers.

Table 1 shows the load research sample design. The stratification criteria are shown for the following rates:

RS – Residential Basic Service
RC – Residential Basic Service with electric water heating
RH – Residential Basic Service with electric heat
SS – Small Commercial & Industrial Secondary Service (Small)
SH – Small Commercial & Industrial Secondary Service (Electric Space Conditioning

Table 1

STRATIFICATION CRITERIA BY RATE

Rate	# of Strata	Criteria
RS	4	high/low winter and high/low summer
RC	4	high/low winter and high/low summer
RH	5	small/large heat pump houses, small/large resistance houses and apartments
SS	6	survey small/large by manufacturing; non-manufacturing; billing manufacturing/non-manufacturing

SH	4	annual kWh

Hourly 8760 data is retained in EXCEL spreadsheets.

Historical Billing Data

Historical billing data by account for the demand billed customers is maintained on an on-going basis.

IPL 2014 IRP

Attachment 3.2 (2013 Hourly Load Shape Summary) is provided electronically.

Petitioner's Exhibit ZE-2
2015-2017 Action Plan

This report was prepared by

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CONTENTS

CHAPTER | **1**

RESIDENTIAL LIGHTING PROGRAM

Program Description

The Residential Lighting program will encourage residential customers in improving the energy efficiency of their homes through lighting measures. The program will primarily focus on CFL lighting, but begin to phase in LED technologies as their market readiness increases.

The program will provide upstream "buydowns" for certain products such as compact fluorescent lamps so that customers pay a lower price at the point of purchase without needing to apply for a rebate. The upstream buydown activity is a component of the program's focus on market transformation that will increase the demand for high efficiency products.

Objectives

The purpose of the Residential Lighting program is to increase the penetration of high-efficiency measures in the homes of IPL's residential customers. The program enables the adoption of these energy efficiency measures by offering point of purchase rebates for the purchase and installation of qualifying home equipment for lighting.

The program has several objectives:

- Increase consumers' awareness of the breadth of energy efficiency opportunities in their homes.
- Make a significant contribution to IPL's energy savings achievements.
- Demonstrate IPL's commitment to and confidence in the measures' performance and their ability to reduce home energy use.
- Strengthen customer trust in IPL as their partner in saving energy.

The Residential Lighting program is well-suited for accomplishing these objectives because the rebate-eligible measures are proven technologies about which customers can readily find supporting information.

Projected Savings

The estimated energy savings are given in terms of annual per-unit values. These values were applied to the estimated number of measures rebated under the program each year. The savings noted in each year reflect the savings from measures installed by customers through the program in that year. This does *not* include the impact of measures still in operation from previous years.

Total Net Incremental Energy Savings (kWh)

	Total Net Incremental Energy Savings (kWh)		
Measure	**2015**	**2016**	**2017**
ENERGY STAR CFL	9,084,827	8,963,187	8,840,071
ENERGY STAR LED	746,254	937,060	1,129,565
ENERGY STAR Reflector CFL	1,297,832	1,140,769	982,230
ENERGY STAR Reflector LED	373,127	562,236	753,043
ENERGY STAR Specialty CFL	4,866,871	4,889,011	4,911,150
TOTAL	**16,368,911**	**16,492,264**	**16,616,059**

Total Net Incremental Demand Savings (kW)

	Total Net Incremental Demand Savings (kW)		
Measure	2015	2016	2017
ENERGY STAR CFL	1,078.8	1,064.4	1,049.8
ENERGY STAR LED	89.2	112.0	135.1
ENERGY STAR Reflector CFL	154.1	135.5	116.6
ENERGY STAR Reflector LED	44.6	67.2	90.0
ENERGY STAR Specialty CFL	577.9	580.6	583.2
TOTAL	**1,945**	**1,960**	**1,975**

Administrative Requirements

IPL will administer the Residential Lighting program through an implementation contractor. IPL's role will be to ensure that:

- The implementation contractor performs all the activities associated with delivery of all components of the program, and
- IPL's educational and program messages are delivered accurately and clearly to ensure the effectiveness of program delivery and maximize customer satisfaction with the program.

The program is expected to operate according to the following administrative and total utility budget:

	Total Utility Budget		
Total Admin Costs	$480,021	$480,918	$475,420
Total Incentive Costs	$1,483,403	$1,486,392	$1,468,066
Total Utility Budget	**$1,963,423**	**$1,967,310**	**$1,943,486**

Cost-Effectiveness

The cost-effectiveness metrics of the Residential Prescriptive program are as follows:

	Cost Effectiveness Tests			
Program	TRC Ratio	UCT Ratio	PCT Ratio	RIM Ratio
Res Lighting	**1.05**	**2.25**	**3.05**	**1.00**

CHAPTER | 2

RESIDENTIAL INCOME QUALIFIED WEATHERIZATION PROGRAM

Program Description

The Residential Income Qualified Weatherization program will provide energy efficiency services and energy education to IPL's low-income customers; helping them to reduce their energy usage and increase the affordability of their energy bills. This program will focus on education and the installation of measures in homes that meet the low income criteria.

Participating households will receive the following types of assistance:

- In-Home Audits and Education—These are on-site inspections and tests used to identify the applicability of energy-savings measures the program offers and to educate residents about ways to reduce their energy usage.
- Direct Installation of Measures—Install measures to reduce energy use in the home at no charge to residents.

Objectives

The purpose of the Residential Income Qualified Weatherization program is to educate and assist eligible residential customers with making their homes more energy efficient. Unlike other programs, a principle objective is to provide repairs necessary to install energy savings improvements in a part of the housing stock that is often old and substandard in comparison to middle and upper income housing.

Projected Savings

The estimated energy savings are given in terms of annual per-unit values. These values were applied to the estimated number of households participating in the program each year. The savings noted in each year reflect incremental or annual savings from measures installed by customers through the program in that year. This does *not* include the impact of measures still in operation from previous years.

Total Net Incremental Energy Savings (kWh)

	Total Net Incremental Energy Savings (kWh)		
Measure	2015	2016	2017
Attic Insulation	93,565	93,565	93,565
Audit Recommendations	77,340	77,340	77,340
CFLs	1,197,600	1,197,600	1,197,600
Faucet Aerator	221,240	221,240	221,240
Infiltration Reduction	101,478	101,478	101,478
Low Flow Showerhead	311,048	311,048	311,048
Pipe Wrap	17,478	17,478	17,478
Tank Wrap (EF 0.88)	37,205	37,205	37,205
TOTAL	**2,056,953**	**2,056,953**	**2,056,953**

Total Net Incremental Demand Savings (kW)

	Total Net Incremental Demand Savings (kW)		
Measure	2015	2016	2017
Attic Insulation	72.5	72.5	72.5
Audit Recommendations	5.0	5.0	5.0
CFLs	300.0	300.0	300.0
Faucet Aerator	30.0	30.0	30.0
Infiltration Reduction	17.5	17.5	17.5
Low Flow Showerhead	-	-	-
Pipe Wrap	2.5	2.5	2.5
Tank Wrap (EF 0.88)	5.0	5.0	5.0
TOTAL	**433**	**433**	**433**

Administrative Requirements

IPL will mainly administer the Residential Income Qualified Weatherization program with a program implementation contractor and through partnerships with weatherization program providers. The program is expected to operate according to the following administrative and total utility budget:

Total Program Budget

	Total Utility Budget		
Total Admin Costs	$993,729	$993,729	$993,729
Total Incentive Costs	$313,128	$313,128	$313,128
Total Utility Budget	**$1,306,858**	**$1,306,858**	**$1,306,858**

Cost-Effectiveness

The cost-effectiveness metrics of the Residential Income Qualified Weatherization program are as follows:

	Cost Effectiveness Tests			
Program	TRC Ratio	UCT Ratio	PCT Ratio	RIM Ratio
Res IQW	**0.61**	**0.61**	-	**0.48**

CHAPTER | 3

RESIDENTIAL AC LOAD MANAGEMENT PROGRAM

Program Description

The Residential AC Load Management program typically occurs during times of high peak demand or supply-side constraints. During an event, participants' equipment is controlled by a one-way remote switch

- The one-way remote switch is connected to the condensing unit of the AC. When activated by a control signal, the switch will not allow the equipment to operate for the duration of the event. The compressor is shut down up to 50% of the time in discrete cycles during an event while the fan continues to operate. This allows cool air to be circulated throughout the home while the compressor is disabled. The operation of the switch is usually controlled through a digital paging network.

The program has the following components:

- Switch Installation – A small device is installed on the outside of the home near the air conditioner. The switch is connected to the condensing unit of the AC and activated by a control signal.
- Bill Credit – Participants receive a $5 credit on their monthly bill from June to September.

Objectives

The purpose of the Residential AC Load Management program is to lower the peak demand usage in the IPL service territory to provide system and grid relief. The program provides financial incentives for customers as a means to not only promote energy efficient behavior, but also lower the cost of peak energy.

Projected Savings

The estimated energy and demand savings are given in terms of annual per-unit values, split out here for single family and multifamily customers. These values were applied to the estimated number of participating customers under the program each year. The savings noted in each year reflect the savings of the entire participant population.

Total Net Incremental Energy Savings (kWh)

	Total Net Incremental Energy Savings (kWh)		
Measure	2015	2016	2017
Res SF ACLM switch (50% True Cycle)	404,965	414,645	424,325
Res MF ACLM switch (50% True Cycle)	19,712	21,863	24,014
TOTAL	**424,677**	**436,508**	**448,339**

Total Net Incremental Demand Savings (kW)

	Total Net Incremental Deman avings (kW)		
Measure	2015	2016	2017
Res SF ACLM switch (50% True Cycle)	33,133.5	33,925.5	34,717.5
Res MF ACLM switch (50% True Cycle)	1,612.8	1,788.8	1,964.8
TOTAL	**34,746**	**35,714**	**36,682**

Administrative Requirements

The Residential AC Load Management program will be administered through an implementation contractor. The utility's role will be to ensure that:

- the implementation contractor performs all the activities associated with delivery of all components of the program

The program is expected to operate according to the following administrative and total utility budget:

Total Program Budget

	Total Utility Budget		
Total Admin Costs	$575,831	$591,750	$607,669
Total Incentive Costs	$1,445,231	$1,490,713	$1,536,196
Total Utility Budget	**$2,021,061**	**$2,082,463**	**$2,143,864**

Cost-Effectiveness

The cost-effectiveness metrics of the Residential New Construction program are as follows:

	Cost Effectiveness Tests			
Program	TRC Ratio	UCT Ratio	PCT Ratio	RIM Ratio
Res AC Load Management	**2.65**	**1.57**	**-**	**1.56**

CHAPTER | 4

RESIDENTIAL MULTI-FAMILY DIRECT INSTALL PROGRAM

Program Description	The Residential Multi-Family Direct Install program provides targeted, highly cost-effective measures to multifamily households in a quickly deployable program delivery mechanism. This will provide energy savings to the multifamily segment, which is typically an underserved market with respect to energy efficiency programs. This is largely because of the preponderance of rental units with the so-called split owner-renter barrier. In other words, since the landlord or owner does not pay the utility bill, there is very little incentive to install higher efficiency equipment. The program targets multifamily complexes with units that are both individually metered (residential ratepayers) and master metered (commercial ratepayers). The program is designed to go beyond providing financial incentives to multi-family households and aims to make them well-educated energy consumers. The services the program will provide, including in-home audits and referrals to contractors and financial resources, aim to help them gain a better understanding of their home energy use and achieve savings while also improving the comfort of their homes. As a program mainly designed to educate and empower multi-family customers to make energy-efficient home improvements, the program contains a set of direct install measures. The Residential Multi-Family Direct Install program has several components: • Walk-Through Audits—These are on-site inspections and tests used to identify energy efficiency opportunities; audit reports contain specific recommendations, including expected costs, energy savings, and resource referrals. • Direct Installation of Low-Cost Measures—During the audit visit, the auditor will install a package of low-cost energy-saving measures, at no additional charge to the customer, to immediately improve the energy performance of the house. • Assistance with Additional Measure Adoptions—the program will provide cash rebates to audit participants who install weatherization measures recommended from the audit, as well as assistance on how to access rebates offered as follow-on measures or under other programs.

Objectives

The purpose of the Residential Multi-Family Direct Install program is to help residential customers view the energy performance of their homes as more than the sum of independent decisions about individual components. It reflects the view that reducing residential energy use is more than a series of actions; it is an attitude and plan borne of knowledge. This is a "big picture" approach. The services are designed to bring customers to a more holistic view of home energy performance.

The program is part of a long-term strategy to raise awareness of home energy savings opportunities among residential customers and to help them take action using incentives offered by IPL's energy efficiency programs. The program will achieve several objectives:

- Improve customer understanding of how their homes use energy and how they can use it more effectively for less money
- Procure immediate energy savings through installation of low-cost energy-saving measures
- Encourage installation of additional energy-saving measures recommendations with additional incentives
- Aid residential customers' perception of IPL as their partner in reducing home energy use

Projected Savings

The estimated energy savings are given in terms of annual per-unit values. These values were applied to the estimated number of measures installed under the program each year. This does *not* include the impact of measures still in operation from previous years.

Total Net Incremental Energy Savings (kWh)

	Total Net Incremental Energy Savings (kWh)		
Measure	2015	2016	2017
Bath Faucet Aerator	312,420	312,420	312,420
Candelabra	165,100	165,100	165,100
CFL - 18W	1,613,400	1,613,400	1,613,400
CFL - Globe	806,700	806,700	806,700
Kitchen Faucet Aerator	620,400	620,400	620,400
LED Nightlight	136,000	136,000	136,000
Low Flow Showerhead	2,059,800	2,059,800	2,059,800
TOTAL	**5,713,820**	**5,713,820**	**5,713,820**

Total Net Incremental Demand Savings (kW)

	Total Net Incremental Demand Savings (kW)		
Measure	2015	2016	2017
Bath Faucet Aerator	48	48	48
Candelabra	60	60	60
CFL - 18W	360	360	360
CFL - Globe	180	180	180
Kitchen Faucet Aerator	48	48	48
LED Nightlight	-	-	-
Low Flow Showerhead	138	138	138
TOTAL	**834**	**834**	**834**

Administrative Requirements	IPL will administer the Residential Multi-Family Direct Install program through an implementation contractor. IPL' role will be to ensure that: • The implementation contractor performs all the activities associated with delivery of all components of the program, and • Educational and program messages are delivered accurately and clearly to ensure the effectiveness of program delivery and maximize customer satisfaction with the program. The program is expected to operate according to the following administrative and total utility budget:
Cost-Effectiveness	The cost-effectiveness metrics of the Residential Multi-Family Direct Install program are as follows:

Total Program Budget

	Total Utility Budget		
Total Admin Costs	$784,100	$784,100	$784,100
Total Incentive Costs	$386,000	$386,000	$386,000
Total Utility Budget	**$1,170,100**	**$1,170,100**	**$1,170,100**

	Cost Effectiveness Tests			
Program	TRC Ratio	UCT Ratio	PCT Ratio	RIM Ratio
Res MF Direct Install	**1.39**	**1.39**	**-**	**0.80**

CHAPTER | 5

RESIDENTIAL HOME ENERGY ASSESSMENT PROGRAM

Program Description	The Residential Home Energy Assessment program provides education, an on-site audit, and a suite of energy efficiency measures to help single family customers reduce their energy bills. The program is designed to go beyond providing financial incentives to residential customers and aims to make them well-educated energy consumers. The services the program will provide include in-home audits and direct-install measures like CFL light bulbs and low-flow water fixtures. The Residential Home Energy Assessment program has several components: • Walk-Through Audits—These are on-site inspections and tests used to identify energy efficiency opportunities; audit reports contain specific recommendations, including expected costs, energy savings, and resource referrals. • Direct Installation of Low-Cost Measures—During the audit visit, the auditor will install a package of low-cost energy-saving measures, at no additional charge to the customer, to immediately improve the energy performance of the house.
Objectives	The purpose of the Residential Home Energy Assessment program is to help residential customers view the energy performance of their homes as more than the sum of independent decisions about individual components. It reflects the view that reducing residential energy use is more than a series of actions; it is an attitude and plan borne of knowledge. This is a "big picture" approach. The services are designed to bring customers to a more holistic view of home energy performance. The program is part of a long-term strategy to raise awareness of home energy savings opportunities among residential customers and to help them take action using incentives offered by the utilities and State programs. The program will achieve several objectives: • Improve customer understanding of how their homes use energy and how they can use it more effectively for less money • Procure immediate energy savings through installation of low-cost energy-saving measures • Aid residential customers' perception of IPL as their partner in reducing home energy use

Projected Savings

The estimated energy savings are based on annual per-unit values. These values were applied to the estimated number of measures installed under the program each year. This does *not* include the impact of measures still in operation from previous years.

Total Net Incremental Energy Savings (kWh)

	Total Net Incremental Energy Savings (kWh)		
Measure	2015	2016	2017
Audit Recommendations	1,051,680	1,051,680	1,051,680
CFLs	1,915,760	1,915,760	1,915,760
Faucet Aerator	833,376	833,376	833,376
Low Flow Showerhead	1,729,248	1,729,248	1,729,248
Pipe Wrap	110,700	110,700	110,700
Tank Wrap (EF 0.88)	209,232	209,232	209,232
TOTAL	**5,849,996**	**5,849,996**	**5,849,996**

Total Net Incremental Demand Savings (kW)

	Total Net Incremental Demand Savings (kW)		
Measure	2015	2016	2017
Audit Recommendations	160	160	160
CFLs	-	-	-
Faucet Aerator	144	144	144
Low Flow Showerhead	-	-	-
Pipe Wrap	12	12	12
Tank Wrap (EF 0.88)	36	36	36
TOTAL	**352**	**352**	**352**

Administrative Requirements

IPL will administer the Residential Home Energy Assessment program through an implementation contractor. IPL' role will be to ensure that:

- The implementation contractor performs all the activities associated with delivery of all components of the program, and
- Educational and program messages are delivered accurately and clearly to ensure the effectiveness of program delivery and maximize customer satisfaction with the program.

The program is expected to operate according to the following administrative and total utility budget:

Total Program Budget

	Total Utility Budget		
Total Admin Costs	$1,339,944	$1,339,944	$1,339,944
Total Incentive Costs	$269,650	$269,650	$269,650
Total Utility Budget	**$1,609,594**	**$1,609,594**	**$1,609,594**

Cost-Effectiveness

The cost-effectiveness metrics of the Residential Home Energy Assessment program are as follows:

	Cost Effectiveness Tests			
Program	TRC Ratio	UCT Ratio	PCT Ratio	RIM Ratio
Res HEA	**1.15**	**1.15**	**-**	**0.69**

CHAPTER | 6

RESIDENTIAL SCHOOL KIT

Program Description

The Residential School Kit program incorporates an educational module provided to grade school students, along with a take-home kit of energy efficiency measures. Measures include CFLs and low-flow fixtures. It targets students to help them learn about energy efficiency and how they can apply it at school and at home. Participating schools will receive education in the classroom and take-home kits filled with energy efficiency saving devices. The program is designed to educate both the students and their parents about simple energy efficiency and conservation practices, driving grassroots market transformation throughout the service territory.

Objectives

The program has several objectives:

- Increase consumers' awareness of the breadth of energy efficiency opportunities in their homes.
- Lay the foundation for future energy stewardship by educating young students.
- Make significant contribution to portfolio energy savings goals.
- Strengthen customer trust in IPL as their partner in saving energy.

Projected Savings

The estimated energy savings are based on annual per-unit values. These values were applied to the estimated number of measures provided under the program each year. This does *not* include the impact of measures still in operation from previous years.

Total Net Incremental Energy Savings (kWh)

	Total Net Incremental Energy Savings (kWh)		
Measure	2015	2016	2017
CFL - 13W	578,700	578,700	578,700
CFL - 23W	479,655	479,655	479,655
Faucet Aerator	1,533,216	1,533,216	1,533,216
FilterTone Alarm	110,614	110,614	110,614
LED Nightlight	61,462	61,462	61,462
Low Flow Showerhead	1,317,820	1,317,820	1,317,820
TOTAL	**4,081,469**	**4,081,469**	**4,081,469**

Total Net Incremental Demand Savings (kW)

	Total Net Incremental Demand Savings (kW)		
Measure	2015	2016	2017
CFL - 13W	75.6	75.6	75.6
CFL - 23W	63.3	63.3	63.3
Faucet Aerator	30.2	30.2	30.2
FilterTone Alarm	171.4	171.4	171.4
LED Nightlight	-	-	-
Low Flow Showerhead	62.4	62.4	62.4
TOTAL	**403**	**403**	**403**

Administrative Requirements	The program administration role will be to ensure that: • The implementation contractor performs all the activities associated with delivery of all components of the program, and • IPL' educational and program messages are delivered accurately and clearly to ensure the effectiveness of program delivery and maximize customer satisfaction with the program. The program is expected to operate according to the following administrative and total utility budget: Total Program Budget

	Total Utility Budget		
Total Admin Costs	$401,628	$401,628	$401,628
Total Incentive Costs	$229,143	$229,143	$229,143
Total Utility Budget	**$630,771**	**$630,771**	**$630,771**

Cost-Effectiveness	The cost-effectiveness metrics of the Residential Schools program are as follows:

	Cost Effectiveness Tests			
Program	TRC R	UCT Ratio	PCT Ratio	RIM Ratio
Res School **Kit**	1.90	**1.90**	-	**0.90**

CHAPTER | 7

RESIDENTIAL ONLINE ENERGY ASSESSMENT PROGRAM

Program Description

The Residential Online Energy Assessment program is an online engagement activity that provides customers with education and information regarding their home energy use. Customer who visit IPL's website and complete the engagement activity will receive a kit of low cost energy efficiency measures.

Objectives

The purpose of this program is to increase the penetration of high-efficiency measures in the homes of residential customers and increase consumers' awareness of the breadth of energy efficiency opportunities available. It will also strengthen customer trust in IPL as their partner in saving energy.

Projected Savings

The estimated energy savings are given in terms of annual per-unit values. These values were applied to the estimated number of measures provided under the program each year. This does *not* include the impact of measures still in operation from previous years.

Total Net Incremental Energy Savings (kWh)

	Total Net Incremental Energy Savings (kWh)		
Measure	2015	2016	2017
Bath Aerator	40,090	44,099	46,304
CFL - 13W	112,242	123,466	129,639
CFL - 19W	133,738	147,112	154,468
Hot Water Thermometer	-	-	-
Kitchen Aerator	186,703	205,374	215,642
Low Flow Showerhead	486,057	534,662	561,395
Refrigerator Thermometer	-	-	-
TOTAL	**958,830**	**1,054,713**	**1,107,449**

Total Net Incremental Demand Savings (kW)

	Total Net Incremental Demand Savings (kW)		
Measure	2015	2016	2017
Bath Aerator	9.2	10.1	10.6
CFL - 13W	25.0	27.5	28.9
CFL - 19W	29.2	32.1	33.7
Hot Water Thermometer	-	-	-
Kitchen Aerator	10.7	11.8	12.4
Low Flow Showerhead	29.1	32.0	33.6
Refrigerator Thermometer	-	-	-
TOTAL	**103**	**114**	**119**

Administrative Requirements	The program administrative staff's role will be to ensure that: • The implementation contractor performs all the activities associated with delivery of all components of the program, and • IPL educational and program messages are delivered accurately and clearly to ensure the effectiveness of program delivery and maximize customer satisfaction with the program. The program is expected to operate according to the following administrative and total utility budget: <u>Total Program Budget</u>

	Total Utility Budget		
Total Admin Costs	$113,809	$121,690	$126,024
Total Incentive Costs	$87,565	$96,322	$101,138
Total Utility Budget	**$201,374**	**$218,012**	**$227,162**

Cost-Effectiveness	The cost-effectiveness metrics of the Residential Online Energy Assessment are as follows:

	Cost Effectiveness Tests			
Program	TRC Ratio	UCT Ratio	PCT Ratio	RIM Ratio
Res Online Energy Assessment	**1.33**	**1.33**	**-**	**0.76**

CHAPTER | 8

RESIDENTIAL APPLIANCE RECYCLING PROGRAM

Program Description	The Residential Appliance Recycling program achieves energy savings by offering a bounty payment to customers to remove their old, inefficient appliances and recycle them. It includes refrigerators, freezers and room AC units. The program offers free pickup of units from residences plus customer incentives and education about the benefits of secondary unit disposal, to encourage their participation. There are no costs to participating customers. The contractor will pick-up, disable, and recycle the units. Once IPL receives verification that the units have been recycled. The customer will receive a $40 incentive per refrigerator recycled and a $20 incentive per Room AC recycled. In addition to educating residential customers about the benefits of secondary unit disposal, the program provides services to enable disposal of the units. The two program components are: Customer Incentives • Pickup of units from homes will be by appointment directly with the program implementation contractor. • The program implementation contractor mails incentive checks to customers after units have been removed. • To qualify, refrigerator, freezer, or room air conditioning units must be in working condition, meet minimum size requirements, and be readily accessible for removal. Environmental Disposal of Units • Units will be removed to a collection facility and disassembled for environmentally responsible disposal of CFCs and recycling of remaining components.
Objectives	The purpose of the Residential Appliance Recycling program is to eliminate a very inefficient usage of electricity in homes: the retention of refrigerators, freezers, and room air conditioners for use as secondary units. This is a two-pronged goal: to remove existing secondary units from operation and to prevent existing primary refrigerators, freezers, and room air conditioners from being retained and used as secondary units when customers purchase new units. The program has several objectives: • Transform attitudes about retaining older, less efficient refrigerators, freezers, and room air conditioners as secondary units. • Accrue electricity consumption and demand savings toward IPL's savings achievements. • Demonstrate IPL's commitment to good stewardship of the environment by sponsoring proper disposal of units. Appliance Recycling is well-suited for accomplishing these objectives because: consumers are more willing than ever to help safeguard the environment and adopt behaviors that save energy without compromising their lifestyles. The program makes it

	convenient and cost-effective for customers to dispose of these older units, overcoming a past barrier to getting rid of them.
Projected Savings	The estimated energy savings are given in terms of annual per-unit values. These values were applied to the estimated number of appliances removed under the program each year. This does *not* include the impact of measures still in operation from previous years.

Total Net Incremental Energy Savings (kWh)

	Total Net Incremental Energy Savings (kWh)		
Measure	2015	2016	2017
Freezer Recycling	389,760	389,760	389,760
Refrigerator Recycling	1,879,360	1,879,360	1,879,360
Window AC unit Recycling	13,050	13,050	13,050
TOTAL	**2,282,170**	**2,282,170**	**2,282,170**

Total Net Incremental Demand Savings (kW)

	Total Net Incremental Demand Savings (kW)		
Measure	2015	2016	2017
Freezer Recycling	68.9	68.9	68.9
Refrigerator Recycling	327.0	327.0	327.0
Window AC unit Recycling	11.8	11.8	11.8
TOTAL	**408**	**408**	**408**

Administrative Requirements

IPL will administer the Residential Appliance Recycling program through an implementation contractor. IPL's role will be to ensure that:

- The implementation contractor performs all the activities associated with delivery of all components of the program, and
- IPL's educational and program messages are delivered accurately and clearly to ensure the effectiveness of program delivery and maximize customer satisfaction with the program.

The program is expected to operate according to the following administrative and total utility budget:

	Total Utility Budget		
Total Admin Costs	$153,479	$153,479	$153,479
Total Incentive Costs	$592,396	$592,396	$592,396
Total Utility Budget	**$745,875**	**$745,875**	**$745,875**

Cost-Effectiveness

The cost-effectiveness metrics of the Residential Appliance Recycling program are as follows:

	Cost Effectiveness Tests			
Program	TRC Ratio	UCT Ratio	PCT Ratio	RIM Ratio
Res Appliance Recycling	**1.42**	**1.21**	**-**	**0.75**

CHAPTER | 9

RESIDENTIAL PEER COMPARISON PROGRAM

Program Description

The Residential Peer Comparison program provides individualized Energy Reports that analyze their energy usage and offer recommendations on how to save energy and money by making small changes to their energy consumption. Reports are sent monthly or quarterly to customers throughout the year. A key component is a peer comparison, where they are shown energy usage relative to similar, nearby households. Peoples' intrinsic social competitiveness thereby increases the energy reductions and effectiveness of this program.

Objectives

The purpose of the Residential Peer Comparison program is to reduce energy consumption through socially-driven and information-driven behavioral change.

Another very important objective of the program is to raise general awareness regarding energy efficiency and to cross-sell and market other programs within the portfolio.

Projected Savings

The estimated energy savings are given in terms of annual per-unit values. . This does _not_ include the impact of measures still in operation from previous years.

Total Net Incremental Energy Savings (kWh)

	Total Net Incremental Energy vings (kWh)		
Measure	2015	2016	2017
Peer Comparison Reports	23,000,000	23,000,000	23,000,000
TOTAL	**23,000,000**	**23,000,000**	**23,000,000**

Total Net Incremental Demand Savings (kW)

	Total Net Incremental Deman Savings (kW)		
Measure	2015	2016	2017
Peer Comparison Reports	6,762	6,762	6,762
TOTAL	**6,762**	**6,762**	**6,762**

Administrative Requirements

IPL will administer the Residential Peer Comparison program through an implementation contractor. IPL's role will be to ensure that:

- The implementation contractor performs all the activities associated with delivery of all components of the program, and
- IPL's educational and program messages are delivered accurately and clearly to ensure the effectiveness of program delivery and maximize customer satisfaction with the program.

The program is expected to operate according to the following administrative and total utility budget:

Total Program Budget

	Total Utility Budget		
Total Admin Costs	$101,800	$101,800	$101,800
Total Incentive Costs	$1,336,000	$1,336,000	$1,336,000
Total Utility Budget	**$1,437,800**	**$1,437,800**	**$1,437,800**

Cost-Effectiveness	The cost-effectiveness metrics of the Residential Behavioral Feedback Tools program are as follows:

	Cost Effectiveness Tests			
Program	**TRC Ratio**	**UCT Ratio**	**PCT Ratio**	**RIM Ratio**
Res Peer Comparison	**1.04**	**1.04**	**-**	**0.71**

CHAPTER | 10

BUSINESS PRESCRIPTIVE PROGRAM

Program Description	The Business Prescriptive program is designed to encourage and assist non-residential customers in improving the energy efficiency of their existing facilities through a broad range of energy efficiency options that address all major end uses and processes. This program offers incentives to customers who install high-efficiency electric equipment and engages equipment suppliers and contractors to promote the incentive-eligible equipment. This program, along with the Business Custom program, is likely to provide the bulk of the energy savings from business customers. It should be noted that since business energy efficiency efforts are very project-centric, there are many projects that may fit partially under both the Prescriptive and Custom programs. Therefore, a flexible delivery approach should be employed, with a method to share or allocate projects between the two programs. The program has the following components to accommodate the variety of customer needs and facilities in this sector: • Prescriptive Incentives—deemed per-unit savings for itemized measures; easy and appropriate for relatively low-cost or simple measures. • Specialized outreach to promote and enable prescriptive measures best suited to smaller facilities. • Customer referrals to qualified energy audit providers who can help customers identify appropriate and cost-effective retrofit opportunities. <u>Prescriptive Measure Incentives</u> • Quick and easy incentive application for measures with known and reliable energy savings. No pre-approval required. • Customers purchase and install qualified products from retailers and/or contractors. • Customers or their contractors submit incentive form to IPL's energy service provider with information that documents the qualifying sale/installation. The form allows customers to see the exact incentive they can receive. IPL mails rebate checks to customers or their contractors. • The prescriptive incentives are cash-back rebates that generally cover a portion of the incremental cost of the qualifying models; that is, the cost premium of qualifying models over less-efficient models available. In additional to prescriptive rebates for customers, the program will engage in upstream "buydowns" of certain products such as compact fluorescent lamps so that customers pay a lower price at the point of purchase without needing to apply for a rebate. The upstream buydown activity is a component of the program's focus on market transformation that will increase the demand for high efficiency products, and eventually decrease the availability of lower-efficiency products in the marketplace.
Objectives	The purpose of the Business Prescriptive program is to increase awareness of energy savings opportunities and assist customers in acting on those opportunities to decrease energy usage in commercial and industrial facilities and in master-metered multifamily residential buildings. This program is designed for retrofit and replacement projects.

The program has several objectives:

- Increase consumers' awareness and understanding of the breadth of energy efficiency opportunities in their facilities.
- Make it easier for customers to adopt more energy-efficient equipment and equipment maintenance.
- Make a significant contribution to attainment of IPL's energy savings achievements.
- Demonstrate IPL's commitment to and confidence in the measures' performance and their ability to reduce business customer energy use.
- Strengthen customer trust in IPL as their partners in saving energy.

Projected Savings

The estimated energy savings are given in terms of annual per-unit values. These values were applied to the estimated number of measures rebated under the program each year. The savings noted in each year reflect incremental or annual savings from measures installed by customers through the program in that year. This does *not* include the impact of measures still in operation from previous years.

Total Net Incremental Energy Savings (kWh)

	Total Net Incremental Energy Savings (kWh)		
Measure	2015	2016	2017
Bus Prescriptive Measures	40,140,145	42,147,152	44,254,510
TOTAL	**40,140,145**	**42,147,152**	**44,254,510**

Total Net Incremental Demand Savings (kW)

	Total Net Incremental Demand Savings (kW)		
Measure	2015	2016	2017
Bus Prescriptive Measures	7,326	7,692	8,077
TOTAL	**7,326**	**7,692**	**8,077**

Administrative Requirements

Program administrative staff's role will be to ensure that:

- The implementation contractor performs all the activities associated with delivery of all components of the program, and
- Educational and program messages are delivered accurately and clearly to ensure the effectiveness of program delivery and maximize customer satisfaction with the program.

The program is expected to operate according to the following administrative and total utility budget:

Total Program Budget

	Total Utility Budget		
Total Admin Costs	$1,672,038	$1,746,739	$1,825,760
Total Incentive Costs	$3,917,596	$4,104,348	$4,301,899
Total Utility Budget	**$5,589,634**	**$5,851,088**	**$6,127,659**

Cost-Effectiveness

The cost-effectiveness metrics of the Business Prescriptive program are as follows:

	Cost Effectiveness Tests			
Program	TRC Ratio	UCT Ratio	PCT Ratio	RIM Ratio
Bus Prescriptive	**1.51**	**3.47**	**4.49**	**0.79**

CHAPTER | 11

BUSINESS CUSTOM INCENTIVES PROGRAM

Program Description	The Business Custom Incentives program is designed to encourage and assist nonresidential customers to save energy through customizable projects that are too complex to fit in the standard rebate offering. The program will promote the purchase and installation of efficient technologies and/or implementation of process improvements by working directly with key end-use customers and market providers. This program, along with the Business Prescriptive program, is likely to provide the bulk of the energy savings from business customers. It should be noted that since business energy efficiency efforts are very project-centric, there are many projects that may fit partially under both the Prescriptive and Custom programs. Therefore, a flexible delivery approach should be employed, with a method to share or allocate projects between the two programs.
	The program has the following components, to accommodate the variety of customer needs and facilities in this sector:
	• Custom Incentives—paid on fixed dollar per first-year-kWh-saved basis; appropriate for large and complex projects, often with multiple measures.
	• Emphasis on flexibility of custom projects to address variety of business and industrial process energy improvements.
	• Customer referrals to qualified energy audit providers who can help customers identify appropriate and cost-effective retrofit opportunities.
	Custom Project Incentives
	• Provides financial incentives on projects not suitable for prescriptive incentives because of size or multiple types of equipment involved.
	• More complex offering, with the following services and requirements:
	  o Review design/specification and savings estimates for completeness and applicability of incentives
	  o Pre- and post-project inspections to estimate and verify savings
	  o Incentives paid on a fixed $/kWh basis
	• Examples of custom projects include energy management systems, air compressor system optimization, building envelope improvements, and experimental technologies.

Objectives	The purpose of the Business Custom Incentives program is to increase awareness of energy savings opportunities and assist customers in acting on those opportunities to decrease energy usage in commercial and industrial facilities and in master-metered multifamily residential buildings. This program is designed for retrofit and replacement projects. The program has several objectives: • Increase consumers' awareness and understanding of the breadth of energy efficiency opportunities in their facilities.

- Make it easier for customers to adopt more energy-efficient equipment and equipment maintenance.
- Make a significant contribution to attainment of IPL's energy savings achievements.
- Strengthen customer trust in IPL as their partner in saving energy.

Projected Savings

The estimated energy savings are given in terms of annual per-unit values. These values were applied to the estimated number of projects rebated under the program each year. This does *not* include the impact of measures still in operation from previous years.

Total Net Incremental Energy Savings (kWh)

	Total Net Incremental Energy Savings (kWh)		
Measure	2015	2016	2017
Large Projects >$5K	15,000,000	15,750,000	16,537,500
Small Projects - $1-5K	2,083,333	2,187,500	2,296,875
TOTAL	**17,083,333**	**17,937,500**	**18,834,375**

Total Net Incremental Demand Savings (kW)

	Total Net I emental Demand Savings (kW)		
easure	2015	2016	2017
Large Projects >$5K	3,000	3,150	3,308
Small Projects - $1-5K	417	438	459
TOTAL	**3,417**	**3,588**	**3,767**

Administrative Requirements

Program administrative staff's role will be to ensure that:

- The implementation contractor performs all the activities associated with delivery of all components of the program, and
- Educational and program messages are delivered accurately and clearly to ensure the effectiveness of program delivery and maximize customer satisfaction with the program.

The program is expected to operate according to the following administrative and total utility budget:

Total Program Budget

	Total Utility Budget		
Total Admin Costs	$1,335,000	$1,396,500	$1,461,075
Total Incentive Costs	$2,050,000	$2,152,500	$2,260,125
Total Utility Budget	**$3,385,000**	**$3,549,000**	**$3,721,200**

Cost-Effectiveness

The cost-effectiveness metrics of the Business Custom Incentives program are as follows:

	Cost Effectiveness Tests			
Program	TRC Ratio	UCT Ratio	PCT Ratio	RIM Ratio
Bus Custom Incentives	**1.45**	**2.89**	**4.73**	**0.78**

CHAPTER | 12

SMALL BUSINESS DIRECT INSTALL PROGRAM

Program Description	The Business Direct Install program provides a suite of targeted, highly cost-effective measures to small businesses in a quickly deployable program delivery mechanism, along with education and program support to help business customers reduce their energy bills. The program will provide several direct-install measures at no additional cost to participants, such as lighting replacements, programmable thermostats, occupancy sensors, vending machine controls, and low-flow water fixtures. The program also connects customers with other programs in the portfolio and a network of qualified trade allies/contractors that can install follow-on measures to provide deeper energy savings. The Business Direct Install program has several components: • Walk-Through Audits—These are on-site assessments used to identify energy efficiency opportunities; audit reports contain specific recommendations, including expected costs, energy savings, and resource referrals. • Direct Installation of Measures—During the audit visit, the auditor will install a package of low-cost energy-saving measures, at no additional charge to the customer, to immediately improve the energy performance of the building. • Assistance with Additional Measure Adoption—IPL will usher participants into other business efficiency program offerings to provide cash rebates to participants who install additional measures recommended from the audit.
Objectives	The program is part of a long-term strategy to raise awareness of energy savings opportunities among business customers and to help them take action using incentives offered by IPL's energy efficiency programs. The program will achieve several objectives: • Improve customer understanding of how their buildings use energy and how they can use it more effectively for less money • Procure immediate energy savings through installation of energy-saving measures • Encourage installation of additional energy-saving measures recommendations with additional incentives • Aid business customers' perception of IPL as their partner in reducing energy use
Projected Savings	The estimated energy savings are given in terms of annual per-unit values. These values were applied to the estimated number of measures rebated under the program each year. This does *not* include the impact of measures still in operation from previous years.

Total Net Incremental Electricity Savings (kWh)

	Total Net Incremental Energy Savings (kWh)		
Measure	2015	2016	2017
CFL - 18W	1,400,140	1,540,154	1,617,162
LED Exit Sign	41,500	45,650	47,933
Occupancy Sensors	634,100	697,510	732,386
Programmable Thermostat	226,333	248,966	261,414
Vending Machine Timer	708,390	779,229	818,190
T8 lamps	463,083	509,391	534,860
RTU - Maintenance	7,150	7,865	8,258
Water Heater - Faucet Aerator Low Flow Nozzle	1,396,000	1,535,600	1,612,380
TOTAL	**4,876,695**	**5,364,365**	**5,632,583**

Total Net Incremental Demand Savings (kW)

	Total Net Incremental Demand Savings (kW)		
Measure	2015	2016	2017
CFL - 18W	435.4	478.9	502.9
LED Exit Sign	5.0	5.5	5.8
Occupancy Sensors	11.5	12.7	13.3
Programmable Thermostat	-	-	-
Vending Machine Timer	-	-	-
T8 lamps	119.6	131.5	138.1
RTU - Maintenance	-	-	-
Water Heater - Faucet Aerator Low Flow Nozzle	116.0	127.6	134.0
TOTAL	**687**	**756**	**794**

Administrative Requirements

Program administrative staff's role will be to ensure that:

- The implementation contractor performs all the activities associated with delivery of all components of the program, and
- Educational and program messages are delivered accurately and clearly to ensure the effectiveness of program delivery and maximize customer satisfaction with the program.

The program is expected to operate according to the following administrative and total utility budget:

Total Program Budget

	Total Utility Budget		
Total Admin Costs	$1,024,600	$1,120,060	$1,172,563
Total Incentive Costs	$444,000	$488,400	$512,820
Total Utility Budget	**$1,468,600**	**$1,608,460**	**$1,685,383**

Cost-Effectiveness

The cost-effectiveness metrics of the Business Custom Incentives program are as follows:

	Cost Effectiveness Tests			
Program	TRC Ratio	UCT Ratio	PCT Ratio	RIM Ratio
Bus Small Business Direct Install	**1.04**	**1.04**	**-**	**0.49**

CHAPTER | **13**

BUSINESS AC LOAD MANAGEMENT PROGRAM

Program Description	The Business AC Load Management program typically occurs during times of high peak demand or supply-side constraints. During an event, participants' equipment is controlled by a one-way remote switch • The one-way remote switch is connected to the condensing unit of an AC. When activated by a control signal, the switch will not allow the equipment to operate for the duration of the event. The compressor is shut down up to 50% of the time in discrete cycles during an event while the fan continues to operate. This allows cool air to be circulated throughout the building while the compressor is disabled. The operation of the switch is usually controlled through a digital paging network. The program has the following components: • Switch Installation – A small device is installed on the outside of the building near the air conditioner. The switch is connected to the condensing unit of the AC and activated by a control signal. • Bill Credit – Participants receive a credit on their monthly bill from June to September.
Objectives	The purpose of the Business AC Load Management program is to lower the peak demand usage in the IPL service territory to provide system and grid relief. The program provides financial incentives for customers as a means to not only promote energy efficient behavior, but also lower the cost of peak energy.
Projected Savings	The estimated energy savings are given in terms of annual per-unit values. These values were applied to the estimated number of participating customers under the program each year. The savings noted in each year reflect incremental or annual savings for the entire participant population.

Total Net Incremental Energy Savings (kWh)

	Total Net Incremental Energy Savings (kWh)		
Measure	**2015**	**2016**	**2017**
C&I ACLM switch (50% True Cycle)	22,820	24,214	25,608
TOTAL	**22,820**	**24,214**	**25,608**

Total Net Incremental Demand Savings (kW)

	Total Net Incremental Demand Savings (kW)		
Measure	**2015**	**2016**	**2017**
C&I ACLM switch (50% True Cycle)	1,781	1,889	1,998
TOTAL	**1,781**	**1,889**	**1,998**

Administrative Requirements	This program will be administered through an implementation contractor. The Utility's role will be to ensure that: • The implementation contractor performs all the activities associated with delivery of all components of the program, and • IPL's educational and programmatic messages are delivered accurately and clearly to ensure the effectiveness of program delivery and maximize customer satisfaction with the program. The program is expected to operate according to the following administrative and total utility budget: Total Program Budget

	Total Utility Budget		
Total Admin Costs	$103,032	$107,187	$111,343
Total Incentive Costs	$123,694	$131,250	$138,806
Total Utility Budget	**$226,726**	**$238,437**	**$250,149**

Cost-Effectiveness	The cost-effectiveness metrics of the Business AC Load Management program are as follows:

	Cost Effectiveness Tests			
Program	TRC Ratio	UCT Ratio	PCT Ratio	RIM Ratio
Bus AC Load Management	**1.40**	**0.73**	-	**0.72**

About EnerNOC Utility Solutions Consulting

EnerNOC Utility Solutions Consulting is part of EnerNOC Utility Solutions group, which provides a comprehensive suite of demand-side management (DSM) services to utilities and grid operators worldwide. Hundreds of utilities have leveraged our technology, our people, and our proven processes to make their energy efficiency (EE) and demand response (DR) initiatives a success. Utilities trust EnerNOC to work with them at every stage of the DSM program lifecycle – assessing market potential, designing effective programs, implementing those programs, and measuring program results.

EnerNOC Utility Solutions delivers value to our utility clients through two separate practice areas – Program Implementation and EnerNOC Utility Solutions Consulting.

- Our Program Implementation team leverages EnerNOC's deep "behind-the-meter expertise" and world-class technology platform to help utilities create and manage DR and EE programs that deliver reliable and cost-effective energy savings. We focus exclusively on the commercial and industrial (C&I) customer segments, with a track record of successful partnerships that spans more than a decade. Through a focus on high quality, measurable savings, EnerNOC has successfully delivered hundreds of thousands of MWh of energy efficiency for our utility clients, and we have thousands of MW of demand response capacity under management.
- The EnerNOC Utility Solutions Consulting team provides expertise and analysis to support a broad range of utility DSM activities, including: potential assessments; end-use forecasts; integrated resource planning; EE, DR, and smart grid pilot and program design and administration; load research; technology assessments and demonstrations; evaluation, measurement and verification; and regulatory support.

The EnerNOC Utility Solutions Consulting team has decades of combined experience in the utility DSM industry. The staff is comprised of professional electrical, mechanical, chemical, civil, industrial, and environmental engineers as well as economists, business planners, project managers, market researchers, load research professionals, and statisticians. Utilities view our experts as trusted advisors, and we work together collaboratively to make any DSM initiative a success.

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Indianapolis Power & Light Company
DSM Status Report
July 1, 2014

2014 IRP Attachment 4.2

CORE PROGRAMS	End Note	Gross MWh Savings 2010 Ex-ante*	2010 Verified**	2011 Ex-ante*	2011 Verified**	2012 Ex-ante*	2012 Verified**	2013 Ex-ante*	2013 Verified**	2014 YTD thru 5/31/14	2014 Forecast Year End
Prescriptive Lighting	1	1,735	1,735	12,459	17,161	20,790	16,392	31,416	28,250	10,653	15,993
Home Energy Assessment	2	678	363	3,844	2,279	10,680	5,691	26,829	24,950	8,698	16,729
Income Qualified Weatherization	2	375	375	272	195	1,051	446	1,454	1,154	1,337	2,767
Energy Efficient Schools - Kits	3	1,686	1,686	1,956	1,956	4,127	3,910	5,047	4,832	2,885	4,127
C&I Prescriptive	4	675	675	21,602	21,602	30,397	20,785	45,620	36,600	31,463	54,298
C&I Energy Efficient Schools - Audits		0	0	0	0	0	0	1,492	1,459	541	793
Total Core Programs By Year		5,149	4,834	40,134	43,193	67,046	47,224	111,858	97,245	55,577	94,707

CORE PROGRAMS	Gross kW Savings 2010 Ex-ante*	2010 Verified**	2011 Ex-ante*	2011 Verified**	2012 Ex-ante*	2012 Verified**	2013 Ex-ante*	2013 Verified**	2014 YTD thru 5/31/14	2014 Forecast Year End	Program Expenditures (000's) excluding lost revenues and/or performance incentives 2010	2011	2012	2013	2014 YTD thru 5/31/14	2014 Forecast Year End	Verified Gross MWh Savings By Program 2010-2014
Prescriptive Lighting	1,361	1,361	9,772	1,943	3,323	2,609	5,021	3,379	1,268	1,798	$114	$409	$1,229	$1,684	$639	$851	79,531
Home Energy Assessment	178	43	1,010	271	4,758	2,568	12,260	5,097	1,259	5,623	$127	$967	$3,690	$8,616	$2,930	$4,276	50,012
Income Qualified Weatherization	66	66	48	14	454	262	621	371	128	723	$289	$416	$717	$820	$856	$1,206	4,937
Energy Efficient Schools - Kits	125	125	126	0	0	0	0	0	0	0	$147	$119	$819	$990	$764	$540	16,511
C&I Prescriptive	138	138	4,804	4,804	6,611	3,664	6,196	6,876	5,167	33,210	$141	$1,373	$2,079	$6,509	$6,145	$12,945	133,960
C&I Energy Efficient Schools - Audits	0	0	0	0	0		54	89	38	56	$0	$43	$294	$343	$183	$389	2,252
Total Core Programs By Year	1,868	1,733	15,759	7,032	15,146	9,103	24,152	15,812	7,860	41,410	$818	$3,326	$8,828	$18,962	$11,517	$20,207	287,203

CORE PLUS PROGRAMS		2010 Ex-ante*	2010 Verified**	2011 Ex-ante*	2011 Verified**	2012 Ex-ante*	2012 Verified**	2013 Ex-ante*	2013 Verified**	2014 YTD thru 5/31/14	2014 Forecast Year End
Residential-Appliance Recycling	5	760	760	959	711	2,235	2,235	2,366	2,306	524	2,273
Residential-Room AC Pickup and Recycling	6	0	0	0	0	6	6	see note	see note	see note	see note
Residential-New Construction		101	136	353	433	216	210	62	62	0	187
Residential-Energy Assessment		1,398	2,394	2,032	1,080	668	646	765	667	407	1,819
Residential-Renewable Energy Incentives		5	7	5	17	14	14	52	52	6	102
Res-Air Conditioning Load Management	7	41	41	40	89	23	23	370	370	374	429
Residential-High Efficiency HVAC Incentives		0	0	0	0	658	724	1,456	1,396	0	0
Residential-Peer Comparison Energy Reports	8	0	0	0	0	4,724	5,580	12,958	13,420	11,465	29,045
Residential-Multi-Family Direct Install		0	0	11,616	14,194	13,845	12,763	9,340	8,544	1,866	7,491
C&I Business Energy Incentive		0	0	7,702	6,353	13,806	13,806	18,494	18,093	6,530	20,071
C&I Air Conditioning Load Management	7	1	1	6	4	6	6	2	2	2	29
C&I Renewable Energy Incentives		10	7	14	28	6	6	19	18	19	32
On-line Energy Feedback		0	0	0	0	0	0	0	0	0	0
Indirect Costs attributable to all Core Plus programs											
Total Core Plus Programs By Year		2,316	3,346	22,726	22,909	36,208	36,019	45,884	44,930	21,193	61,478

CORE PLUS PROGRAMS	2010 Ex-ante*	2010 Verified**	2011 Ex-ante*	2011 Verified**	2012 Ex-ante*	2012 Verified**	2013 Ex-ante*	2013 Verified**	2014 YTD thru 5/31/14	2014 Forecast Year End	2010	2011	2012	2013	2014 YTD thru 5/31/14	2014 Forecast Year End	
Residential-Appliance Recycling	168	168	183	113	419	419	397	400	94	399	$122	$161	$499	$387	$105	$516	8,285
Residential-Room AC Pickup and Recycling	0	0	0	0	32	32	see note	see note	see note	see note	$0	$0	$5	see note	see note	see note	
Residential-New Construction	8	21	29	64	37	38	5	4	0	85	$46	$52	$114	$71	$28	$172	1,028
Residential-Energy Assessment	186	277	316	125	105	89	85	75	41	173	$120	$221	$214	$134	$37	$196	6,606
Residential-Renewable Energy Incentives	3	1	18	3	12	12	9	9	1	17	$32	$14	$36	$54	$12	$111	192
Res-Air Conditioning Load Management	3,752	3,752	3,599	17,325	2,126	2,126	29,925	29,925	30,301	34,936	$1,338	$1,317	$1,309	$1,325	$215	$2,046	952
Residential-High Efficiency HVAC Incentives	0	0	0	0	112	139	247	210	0	0	$0	$0	$515	$699	$0	$0	2,120
Residential-Peer Comparison Energy Reports	0	0	0	0	351	351	1,782	1,845	0	0	$0	$0	$293	$813	$721	$1,785	48,045
Residential-Multi-Family Direct Install	0	0	1,471	480	1,768	1,589	1,134	993	218	908	$0	$510	$657	$871	$228	$1,037	42,992
C&I Business Energy Incentive	0	0	2	2,208	2,425	2,425	3,598	3,528	1,159	3,540	$49	$562	$1,125	$1,750	$997	$2,830	58,323
C&I Air Conditioning Load Management	132	132	1	74	497	497	191	191	382	2,276	$21	$96	$134	$77	$12	$287	42
C&I Renewable Energy Incentives	6	1	0	5	5	5	3	3	3	6	$7	$30	$16	$14	$6	$38	91
On-line Energy Feedback	0	0	0	0	0	0	0	0	0	0	$0	$0	$432	$152	$7	$136	0
Indirect Costs attributable to all Core Plus programs											$212	$412	$689	$807	$277	$1,168	0
Total Core Plus Programs By Year	4,254	4,352	5,619	20,397	7,889	7,722	37,376	37,183	32,199	42,340	$1,947	$3,377	$6,038	$7,154	$2,645	$10,322	168,676

Portfolio Summary		**2010** Ex-ante*	Verified**	**2011** Ex-ante*	Verified**	**2012** Ex-ante*	Verified**	**2013** Ex-ante*	Verified**	**2014 YTD thru 5/31/14**	**2014 Forecast Year End**	**2010 - 2014 Summary View**
Total Gross MWh Core & Core Plus		7,465	8,180	62,860	66,102	103,254	83,243	157,742	142,175	76,770	156,185	455,885
Core & Core Plus MWh Generic Target		44,205		72,224		98,865		126,264			155,079	496,637
Total Program Expenditures Core & Core Plus		$2,765		$6,703		$14,866		$26,116		$14,162	$30,529	$80,978

*Ex-Ante savings are the savings reported by third party administrator and/or utility. Ex-Ante savings are a before the fact engineering review to determine deemed savings, and are used for planning and reported purposes.
**Verified Gross Savings per EM&V reports where available. Ex-ante savings used for programs that have not been evaluated.

Future Avoided Production and Capacity Costs Used to Evaluate DSM Programs		
Year	Energy Avoided Cost $ per MWh	Capacity Avoided Cost $ per KW
2015	[redacted]	
2016		
2017		
2018		
2019		
2020		
2021		
2022		
2023		
2024		
2025		
2026		
2027		
2028		
2029		
2030		
2031		
2032		
2033		
2034		

Notes:
1. All values expressed in real 2014$.
2. Avoided Energy cost from Ventyx Fall 2013 Reference Case - MISO-IN .
3. Avoided Capacity cost based on Levelized Avoided Cost of CT using Ventyx cost estimates for CT and includes avoided Fixed O&M and adjustment for system losses.
4. Avoided Capacity reflects a 10% adder to account for avoided T&D investment.

Indianapolis Power Light Company
2014 Integrated Resource Plan

Standard DSM Benefit/Cost Tests

DSM test objectives and valuation equation and components

	Standard Benefit / Cost Tests				
	RIM	TRC	UC	CBT	Participant
Goal/Impact of test					
Minimizes Utility costs			X		
Minimizes Customer rate impacts	X				
Achieves Customer fairness	X				
Minimizes Overall/Societal costs		X		X	
Maximizes Participant benefit					X
Test Benefit and Cost Components					
Benefits					
Production Cost Savings (energy)	X	X	X	X	
Capacity Cost Savings	X	X	X	X	
Participant Bill Savings					X
Costs					
Lost Revenue to Utility (Customer base)	X			X	
Incentives paid by Utility	X		X	X	
Program Administrative Costs	X	X	X	X	
Participant Costs (investment)		X		X	X

B/C test ratio (equation)

Benefit/Cost test equation is ratio of marked ("X" above). Benefits and Costs expressed as present values.

Benefit/Cost Ratios by Program and Market Segment (IURC Cause No. 44497)

Program	RIM	PCT	UCT	TRC	CBT
Residential Lighting	1.00	2.23	2.25	1.05	21.21
Income Qualified Weatherization	0.48		0.61	0.61	-0.59
Residential Air Conditioning Load Management	1.56		1.57	2.65	1.72
Multi-Family Direct Install	0.80		1.39	1.39	1.10
Home Energy Assessment	0.69		1.15	1.15	0.30
School Kits	0.90		1.90	1.90	4.24
Online Energy Assessment Kits	0.76		1.33	1.33	0.78
Appliance Recycling	0.75		1.21	1.42	0.91
Peer Comparison Reports	0.71		1.04	1.04	0.11
Residential Segment	**0.82**		**1.25**	**1.14**	**N/A**
Business Prescriptive	0.79	3.27	3.47	1.51	1.25
Business Custom	0.78	3.32	2.89	1.45	1.08
Small Business Direct Install	0.49		1.04	1.04	0.04
Business Air Conditioning Load Mgmt	0.72		0.73	1.40	0.75
Business Segment	**0.75**	**3.49**	**2.81**	**1.44**	**N/A**
Total Programs Only	0.80		2.16	1.39	N/A
Portfolio Level Including Indirect Costs + Shared Savings	**0.77**	**3.88**	**1.99**	**1.32**	**N/A**

Net Present Value Of DSM Program Benefits (UCT – Life Cycle)

	TRC Benefits	TRC Costs	Levelized UCT Cost $/kWh	Levelized UCT Cost $/kW
Res Lighting	$11,931,249	$11,312,525	$ 0.018	$ 152.48
Res Renewables	$61,777	$652,966	$ -	$ -
Res IQW	$2,142,414	$3,538,726	$ 0.077	$ 293.98
Res New Construction	$242,758	$1,477,383	$ -	$ -
Res AC Load Management	$8,867,246	$3,352,050	$ 4.302	$ 52.58
Res MF Direct Install	$4,402,647	$3,168,412	$ 0.031	$ 227.13
Res HEA	$5,015,531	$4,358,481	$ 0.032	$ 345.91
Res School Kit	$3,250,195	$1,708,010	$ 0.020	$ 262.89
Res Online Energy Assessment	$773,460	$582,372	$ 0.030	$ 290.54
Res Appliance Recycling	$2,434,207	$1,712,353	$ 0.037	$ 210.21
Res Peer Comparison	$4,067,063	$3,893,294	$ 0.056	$ 191.92
Bus Prescriptive	$54,939,336	$36,456,981	$ 0.012	$ 67.66
Bus Custom Incentives	$27,781,730	$19,121,551	$ 0.015	$ 74.29
Bus Schools Program	$226,899	$1,755,083	$ -	$ -
Bus Small Business Direct Install	$4,473,780	$4,288,469	$ 0.040	$ 278.98
Bus Renewables	$20,934	$280,838	$ -	$ -
Bus AC Load Management	$468,740	$334,717	$ 8.873	$ 113.71
Portfolio Total:	**$131,099,964**	**$97,994,212**	**$ 0.021**	**$ 98.82**

Program	Total Utility Costs (000$)			Total Net Energy Savings (MWh)			Total Net Demand Savings (MW)		
	2015	2016	2017	2015	2016	2017	2015	2016	2017
Res Lighting	1,963	1,967	1,943	16,369	16,492	16,616			
Res IQW	1,307	1,307	1,307	2,057	2,057	2,057			
Res ACLM	2,021	2,082	2,144	425	437	448			
Res Multi Family Direct Install	1,170	1,170	1,170	5,714	5,714	5,714			
Res HEA	1,610	1,610	1,610	5,850	5,850	5,850			
Res School Kit	631	631	631	4081	4081	4081			
Res Online Energy Assessment	201	218	227	959	1055	1107			
Res Appliance Recycling	746	746	746	2282	2282	2282			
Res Peer Comparison	1,438	1,438	1,438	23,000	23,000	23,000			
Bus Prescriptive	5,590	5,851	6,128	40,140	42,147	44,255			
Bus Custom Incentives	3,385	3,549	3,721	17,083	17,938	18,834			
Small Business Direct Install	1,469	1,608	1,685	4,877	5,364	5,633			
Bus AC Load Management	227	238	250	23	24	26			
Residential Total:	11,087	11,169	11,216	60,737	60,968	61,156			
Business Total:	10,670	11,247	11,784	62,123	65,473	68,747			
Portfolio Total:	**21,757**	**22,416**	**23,000**	**122,860**	**126,441**	**129,903**			

Indianapolis Power & Light Company

Demand-Side Management Potential Forecast

For 2018-2034

October 31, 2014

ipl an AES company

IPL engaged Applied Energy Group ("AEG") to complete a Demand-Side Management ("DSM") Potential Forecast for 2018-2034 for inclusion in the Company's 2014 Integrated Resource Plan.

IPL notes:

- AEG's forecast represents the market potential from a 2014 viewpoint
- IPL's future DSM filings and results will likely vary from the forecast
- Legislation and public policy will help shape future DSM
- Customer behavior including additional large customer opt-outs will affect outcomes
- Programs were included in the forecast based on a Total Resource Cost (TRC) threshold result of 1 or greater, while IPL's DSM portfolio offerings typically have an aggregate TRC value greater than 1

AEG's report is provided herein.

INDIANAPOLIS POWER & LIGHT DEMAND-SIDE MANAGEMENT POTENTIAL FORECAST FOR 2015-2034

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Presented on:
October 15, 2014

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CHAPTER | 1

Introduction

This study represents an update to the prior report "Energy Efficiency Market Potential Study and Action Plan" dated December 21, 2012 (2012 MPS).[1] This report focuses on the work we did to update that analysis for Indianapolis Power & Light (IPL) to create forecasts of demand-side management (DSM) potential from 2015 to 2034 as part of the development of their integrated resource plan (IRP). For a detailed description of the analysis approach for the DSM potential forecasts, please refer to the 2012 MPS. In Chapter 2, Analysis Approach, we focus primarily on updates and revisions to the previous study.

The updated analysis Applied Energy Group (AEG) presents in this report identifies achievable potential based on cost-effectiveness criteria provided by IPL. It also delivers estimates of program costs, energy savings, and demand savings associated with the DSM programs and measures. Further, these estimates are calibrated to align with the DSM Action Plan (2015-2017) that were developed separately for IPL by AEG. IPL is using the Action Plan in its DSM filing to seek approval of DSM programs for 2015-2016.

Definitions of Potential

Unless otherwise noted, the DSM savings estimates provided in this report represent net savings[2] developed into three types of potential: technical potential, economic potential, and achievable potential. Technical and economic potential are both theoretical limits to efficiency savings. Achievable potential embodies a set of assumptions about the decisions consumers make regarding the efficiency of the equipment they purchase, the maintenance activities they undertake, the controls they use for energy-consuming equipment, and the elements of building construction. The various levels are described below.

- **Technical potential** is defined as the theoretical upper limit of DSM potential. It assumes that customers adopt all feasible measures regardless of their cost. At the time of existing equipment failure, customers replace their equipment with the most efficient option available. In new construction, customers and developers also choose the most efficient equipment option. Technical potential also assumes the adoption of every other available measure, where applicable. For example, it includes installation of high-efficiency windows in all new construction opportunities and furnace maintenance in all existing buildings with furnace systems. These retrofit measures are phased in over a number of years, which is longer for higher-cost and complex measures.
- **Economic potential** represents the adoption of all ***cost-effective*** DSM measures. In this analysis, the cost effectiveness is measured by the total resource cost (TRC) test, which compares lifetime energy and capacity benefits to the incremental cost of the measure. If the benefits outweigh the costs (that is, if the TRC ratio is greater than 1.0), a given measure is considered in the economic potential. Customers are then assumed to purchase the most cost-effective option applicable to them at any decision juncture.
- **Realistic Achievable potential** estimates customer adoption of economic measures when delivered through DSM programs under typical market, implementation, and customer preference conditions. The delivery environment in this analysis projects the current state of

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[1] The 2012 report was completed by EnerNOC Utility Solutions Consulting Group, which has since been acquired by Applied Energy Group. The same team members completed the analysis in both studies.

[2] Savings in "net" terms instead of "gross" means that the savings do not include program "free riders" and that the baseline forecast includes naturally occurring efficiency. In other words, the baseline assumes that natural early adopters continue to make purchases of equipment and measures at efficiency levels higher than the minimum standard.

the DSM market in IPL's service territory and projects typical levels of expansion and increased awareness over time.

Abbreviations and Acronyms

Throughout the report we use several abbreviations and acronyms. Table 1-1 shows the abbreviation or acronym, along with an explanation.

Table 1-1 Explanation of Abbreviations and Acronyms

Acronym	Explanation
ACS	American Community Survey
AEO	Annual Energy Outlook forecast developed annually by EIA
AHAM	Association of Home Appliance Manufacturers
B/C Ratio	Benefit to cost ratio
BEST	AEG's Building Energy Simulation Tool
CAC	Central air conditioning
C&I	Commercial and industrial
CFL	Compact fluorescent lamp
DEEM	AEG's Database of Energy Efficiency Measures
DEER	State of California Database for Energy-Efficient Resources
DSM	Demand side management
EE	Energy efficiency
EIA	Energy Information Administration
EISA	Energy Efficiency and Security Act of 2007
EPACT	Energy Policy Act of 2005
EPRI	Electric Power Research Institute
EUEA	Efficient Use of Energy Act
EUI	Energy-use index
HH	Household
HID	High intensity discharge lamps
HPWH	Heat pump water heater
IURC	Indiana Utility Regulatory Commission
LED	Light emitting diode lamp
LoadMAP	AEG's Load Management Analysis and Planning™ tool
OUCC	Indiana Office of Utility Consumer Counselor
RAP	Realistic Achievable Potential
RTU	Roof top unit
Sq. ft.	Square feet
TRC	Total resource cost
UEC	Unit energy consumption

CHAPTER 2

Analysis Approach

In this section, we summarize our analysis approach and modeling tool, focusing on updates made to the original analysis from the 2012 MPS.

Overview of Analysis Approach

To develop the DSM potential forecasts, AEG used a bottom-up analysis approach following the major steps listed below. Following this, we describe our modeling tool and then focus briefly on each step, describing the areas where updates or revisions were applied. For a more detailed description of the analysis approach, please refer to the 2012 MPS.

1. Performed a market characterization to describe sector-level electricity use for the residential, commercial, and industrial sectors for the base year, 2011 within IPL's service territory. This included existing information contained in prior Indiana studies, specific updates to the IPL customer database since the 2012 MPS, AEG's own databases and tools, and other secondary data sources such as the American Community Survey (ACS) and the Energy Information Administration (EIA).
2. Developed a baseline projection of energy consumption and peak demand by sector, segment, and end use for 2011 through 2034. This 20-year timeframe was a requirement for the IPL integrated resource plan, and had not been developed in the 2012 MPS or previous Action Plans, which only focused on years through 2017.
3. Defined and characterized several hundred DSM measures to be applied to all sectors, segments, and end uses.
4. Estimated the Technical, Economic, and Realistic Achievable potential from the efficiency measures. This involved a step to calibrate the participation, savings, and spending levels of Realistic Achievable potential to align with those filed in IPL's 2015-2017 DSM Action Plan.

LoadMAP Model

For the DSM potential analysis, we used AEG's Load Management Analysis and Planning tool (LoadMAP™) version 3.0 to develop both the baseline projection and the estimates of potential. AEG developed LoadMAP in 2007 and has enhanced it over time through application to numerous national, regional, and utility-specific forecasting and potential studies. Built in Excel, the LoadMAP framework is both accessible and transparent and has the following key features.

- Embodies the basic principles of rigorous end-use models (such as EPRI's REEPS and COMMEND) but in a more simplified, accessible form.
- Includes stock-accounting algorithms that treat older, less efficient appliance/equipment stock separately from newer, more efficient equipment. Equipment is replaced according to the measure life and appliance vintage distributions defined by the user.
- Balances the competing needs of simplicity and robustness by incorporating important modeling details related to equipment saturations, efficiencies, vintage, and the like, where market data are available, and treats end uses separately to account for varying importance and availability of data resources.
- Isolates new construction from existing equipment and buildings and treats purchase decisions for new construction and existing buildings separately.
- Uses a simple logic for appliance and equipment decisions. Other models available for this purpose embody complex decision choice algorithms or diffusion assumptions, and the model

parameters tend to be difficult to estimate or observe and sometimes produce anomalous results that require calibration or even overriding. The LoadMAP approach allows the user to drive the appliance and equipment choices year by year directly in the model. This flexible approach allows users to import the results from diffusion models or to input individual assumptions. The framework also facilitates sensitivity analysis.

- Includes appliance and equipment models customized by end use. For example, the logic for lighting is distinct from refrigerators and freezers.
- Can accommodate various levels of segmentation. Analysis can be performed at the sector level (e.g., total residential) or for customized segments within sectors (e.g., housing type or income level).

Consistent with the segmentation scheme and the market profiles we describe below, the LoadMAP model provides forecasts of baseline energy use by sector, segment, end use, and technology for existing and new buildings. It also provides forecasts of total energy use and DSM savings associated with the various types of potential.

Market Characterization

AEG used the market characterization from the 2012 MPS for this study as a starting point. It describes electricity consumption for IPL's residential, commercial, and industrial sectors for the base year of 2011, which was developed using prior Indiana studies, in AEG's own databases and tools, and in other secondary data sources such as the American Community Survey (ACS) and the Energy Information Administration (EIA).

To update the market characterization within the LoadMAP files, IPL provided the following data updates that had been completed since the publication of the prior report:

- Historical billing data of customer counts by sector
- Historical billing data of annual energy consumption and system peak demand by sector
- Updates to NAICS codes on the billing system

As a result of these additional data, particularly NAICS codes, we refined the split between commercial and industrial customers. Using the IPL system peak data together with AEG's end-use load shape library, we developed estimates of peak demand by sector, segment and end use. We calibrated the values to IPL's system peak.

Baseline Projection

AEG used the existing LoadMAP model from the 2012 MPS and applied updates we made to the market characterization as the basis for a projection of baseline electricity use by sector, segment, and end use beginning in the base year of 2011 and ending in 2034. AEG applied the latest data sources regarding codes and standards, market conditions, and customer purchase decisions that had evolved since the 2012 MPS. The model was calibrated to exactly match IPL's actual sales for 2012 and 2013, and then compared and aligned to the official IPL load forecast through 2034. Similar to the 2012 MPS and most of the potential studies we conduct, the LoadMAP forecast does not exactly match IPL's official load forecast in every year, but is within a small, acceptable range that does not materially affect the results of the study.

This current study also developed a baseline end-use projection for peak demand by applying the end-use peak factors to the annual projection by segment and end use. The summary of the peak demand forecast is presented in Chapter 4.

DSM Measure Characterization

AEG used the measure characterization from the 2012 MPS and updated assumptions that have evolved in the marketplace since the completion of the previous work, primarily the projected cost and performance of LED lighting. Additionally, changes were made to the television market baseline to reflect that more efficient LCD and LED televisions have become available and are being purchased. Similarly, set-top-boxes have undergone a transformation through a manufacturer agreement and those savings are included in the baseline projection in 2017 and beyond.

We also added measures to represent the residential peer comparison program and air conditioning direct load control programs.

Estimate DSM Potential

AEG used the LoadMAP model as described above to estimate three levels of DSM potential: Technical, Economic, and Realistic Achievable. The DSM potential estimates incorporated updated avoided cost data and discount rates as provided by IPL.

For this analysis, we excluded potential savings associated with the large commercial and industrial (C&I) customers that have chosen to opt out of DSM programs. This was done by calibrating the participation and savings levels in the DSM potential forecast for the years 2015 through 2017 to the latest DSM Action Plan filed by IPL. In the 2015-2017 Action Plan, participation and savings levels exclude 25% of C&I customers based on current opt-out rates.

Calibration to IPL's 2015-2017 DSM Action Plan

AEG calibrated savings and costs in the first three years of the Achievable Potential forecast to align with the savings and costs in the 2015-2017 DSM Action Plan. This process involved adjusting participation rates by a constant so that measure savings matched the levels of the DSM Action Plan for 2015-2017. Due to variance in market segmentation, measure bundling, naming conventions, and other factors, the specific measures present in the LoadMAP models do not exactly match those in the 2015-2017 DSM Action Plan. As a result, the alignment and calibration of costs and savings do not produce an exact match in every year, but it is within an acceptable range that does not materially affect the results of the study. This process is described in more detail in Appendix A.

CHAPTER | 3

Market Characterization

This section summarizes how customers in the IPL service territory use electricity in the base year of the study, 2011. It begins with a high-level summary of energy use by sector and then delves into each sector in detail.

Overall Energy Use

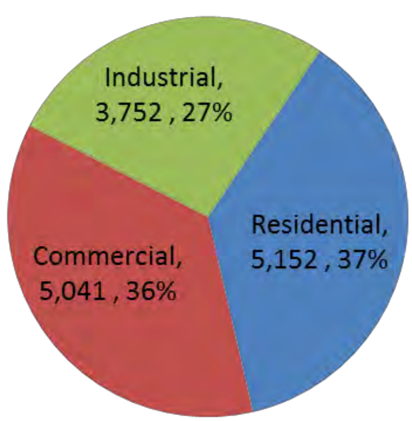
Total electricity use for the residential, commercial and industrial sectors for IPL in 2011 was 13,946 GWh. As shown in Table 3-1 and Figure 3-1, the largest sector is residential, which accounts for 37% of load at 5,152 GWh. Commercial accounts for 36% of the load at 5,041 GWh. The remaining use is in the industrial sector, at 3,752 GWh.

In this study, we used enhanced customer information and updates to NAICS codes in the IPL billing system to reclassify commercial and industrial accounts. This results in a different allocation of energy use to the commercial and industrial sectors. The current analysis shows that the commercial sector, at 36% of total use, is higher than the industrial, with 27% of total use.

Table 3-1 Sector-Level Electricity Use, 2011

Segment	Annual Use (GWh)	% of Sales
Residential	5,152	37%
Commercial	5,041	36%
Industrial	3,752	27%
Total	**13,946**	**100%**

Figure 3-1 Sector-Level Electricity Use, 2011



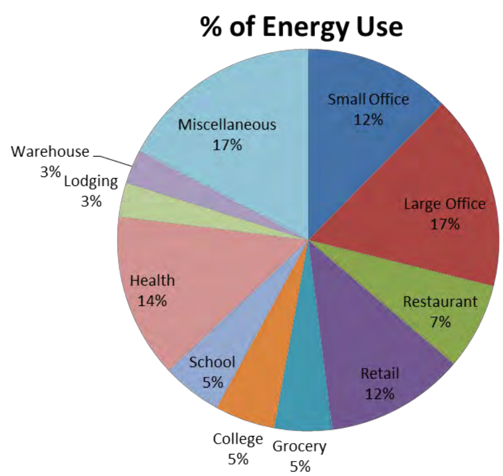
Commercial Sector Use by Building Type

In addition to revised sector-level control totals for the commercial and industrial sectors, the additional IPL data were used to develop refined energy use estimates for the eleven building-type identified for the analysis: Small Office, Large Office, Restaurant, Retail, Grocery, College, School, Health, Lodging, Warehouse, and Miscellaneous.

The values are shown in Table 3-2 below.

Table 3-2 Commercial Electricity Use by End Use and Segment (2011)

Segment	Electricity Use (GWh)	Intensity (kWh/SqFt)	Floor Space (million SqFt)
Small Office	624	15.2	41
Large Office	832	18.0	46
Restaurant	370	38.7	10
Retail	594	13.9	43
Grocery	245	48.9	5
College	257	11.5	22
School	257	8.0	32
Health	701	24.6	29
Lodging	145	13.7	11
Warehouse	145	6.4	23
Miscellaneous	870	7.6	114
Total	5,041	13.5	375

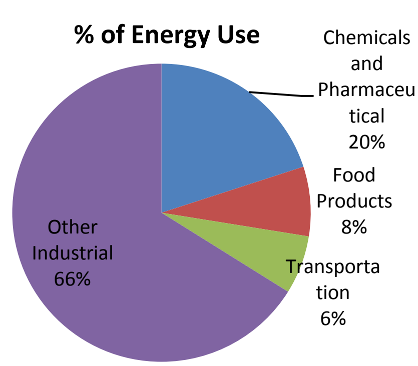


Industrial Sector Use by Industry

Similar to the commercial sector, we used the additional IPL data to develop refined energy use estimates for the four industries identified for the analysis: Chemical and Pharmaceutical (considered as one segment due to similarities in energy use and production methods), Transportation, and Food – with the remaining customers classified as Other Industrial. The values are shown in Table 3-3 below.

Table 3-3 Industrial Electricity Use by End Use and Segment (2011)

Segment	Electricity Use (GWh)	Number of Employees
Chemical and Pharmaceutical	751	3,079
Food Products	283	3,592
Transportation	238	4,054
Other Industrial	2,481	90,634
Total	**3,752**	**101,358**



CHAPTER | 4

Baseline Projection

Prior to developing estimates of DSM potential, we developed a baseline end-use projection to quantify what consumption is likely to be in the future in absence of new DSM programs. The baseline projection serves as the metric against which DSM potentials are measured. This chapter presents the baseline forecast for electricity for each sector. As mentioned above, we used the models from the 2012 MPS with a base year of 2011. To calibrate and exactly match the actual sales data from 2012 and 2013 that had become available since the 2012 study, we adjusted for actual weather, trends in exogenous forecast variables, and miscellaneous usage. The remainder of the forecast years, 2014 through 2034, were projected by the LoadMAP forecasting engine.

Residential Sector

The baseline projection incorporates assumptions about economic growth, electricity prices, equipment standards, building codes and naturally occurring energy efficiency.

Table 4-1 and Figure 4-1 present the baseline projection for electricity consumption for select years at the end-use level for the residential sector as a whole. Overall, residential use increases slightly from 5,152 GWh in 2011 to 6,266 GWh in 2034, an increase of 21.6%, or an average growth rate of 0.9% per year. This reflects the impact of the EISA lighting standard, additional appliance standards adopted in 2011, and modest customer growth. Fluctuations in the early years illustrate the calibration process to actual load data that was available for 2011 to 2013.

Table 4-1 Residential Electricity Baseline Projection by End Use (GWh)

End Use	2011	2015	2016	2017	2020
Cooling	785	804	813	820	843
Heating	978	1,021	1,037	1,049	1,084
Water Heating	462	465	466	463	452
Interior Lighting	653	577	543	537	517
Exterior Lighting	95	71	65	65	58
Appliances	1,107	1,004	987	971	941
Electronics	606	695	719	730	771
Miscellaneous	466	627	697	730	834
Total	**5,152**	**5,263**	**5,326**	**5,365**	**5,500**
End Use	2025	2029	2034	% Change 2011-2034	Avg. Growth Rate 2011-2034
Cooling	886	907	931	19%	0.7%
Heating	1,137	1,160	1,189	22%	0.8%
Water Heating	435	420	420	-9%	-0.4%
Interior Lighting	473	486	502	-23%	-1.1%
Exterior Lighting	42	42	43	-55%	-3.5%
Appliances	934	943	963	-13%	-0.6%
Electronics	841	856	876	45%	1.6%
Miscellaneous	997	1,153	1,343	188%	4.6%
Total	**5,744**	**5,966**	**6,266**	**21.6%**	**0.9%**

Figure 4-1 Residential Electricity Baseline Projection by End Use (MWh)

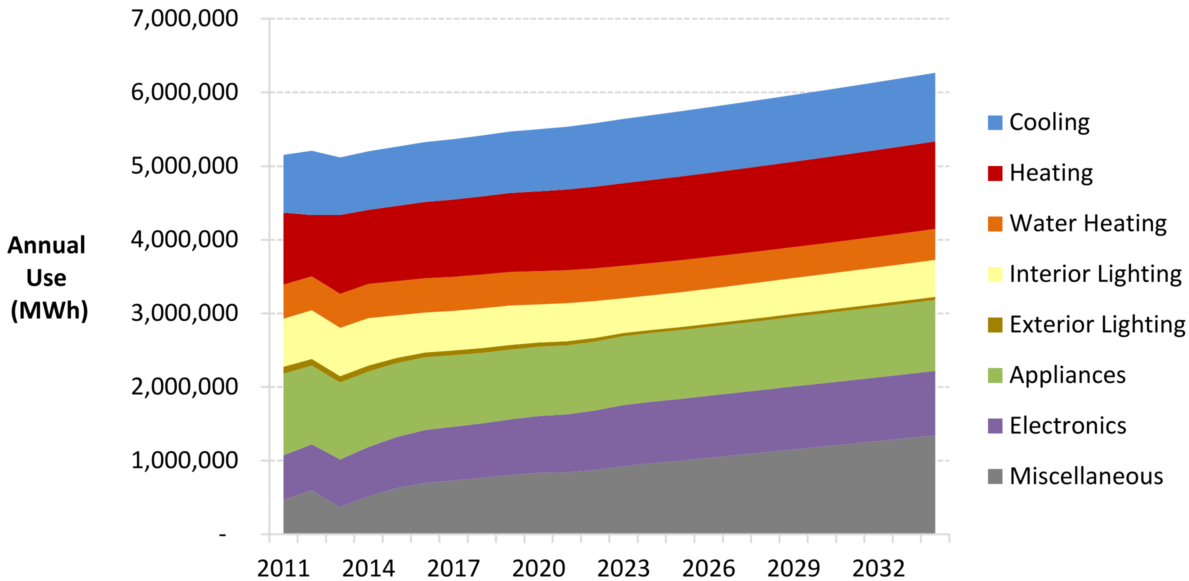
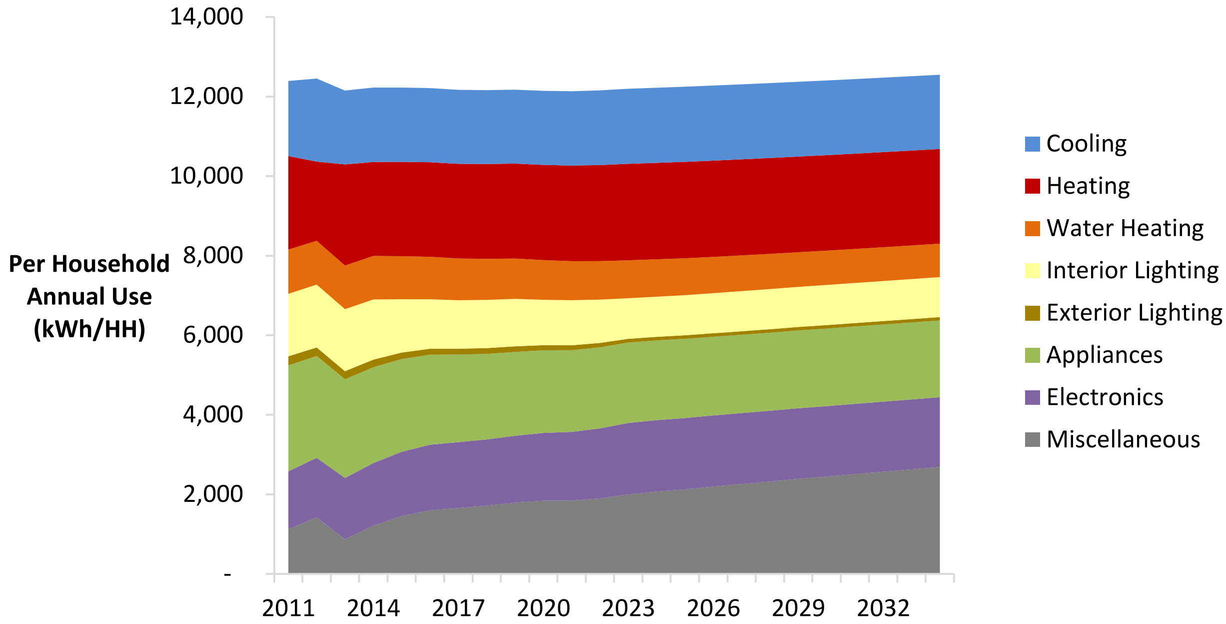


Table 4-2 and Figure 4-2 presents the forecast of use per household for select years. Most noticeable is that lighting use decreases significantly throughout the time period as the lighting efficiency standards from EISA come into effect.

Table 4-2 Residential Electricity Use per Household by End Use (kWh per HH)

End Use	2011	2015	2016	2017	2020
Cooling	1,887	1,868	1,864	1,859	1,861
Heating	2,351	2,371	2,377	2,380	2,394
Water Heating	1,112	1,081	1,068	1,050	997
Interior Lighting	1,571	1,341	1,244	1,218	1,142
Exterior Lighting	228	164	149	147	128
Appliances	2,664	2,331	2,263	2,201	2,077
Electronics	1,458	1,614	1,649	1,656	1,702
Miscellaneous	1,121	1,455	1,599	1,657	1,842
Total	**12,392**	**12,226**	**12,213**	**12,169**	**12,145**
End Use	2025	2029	2034	% Change 2011-2034	Avg. Growth Rate 2011-2034
Cooling	1,889	1,880	1,865	-1%	-0.1%
Heating	2,425	2,405	2,380	1%	0.1%
Water Heating	927	871	841	-24%	-1.2%
Interior Lighting	1,008	1,007	1,004	-36%	-1.9%
Exterior Lighting	89	87	85	-63%	-4.3%
Appliances	1,992	1,955	1,929	-28%	-1.4%
Electronics	1,793	1,775	1,754	20%	0.8%
Miscellaneous	2,125	2,390	2,689	140%	3.8%
Total	**12,248**	**12,372**	**12,549**	**1%**	**0.1%**

Figure 4-2 Residential Electricity Use per Household by End Use (kWh per HH)



Commercial Sector

The commercial baseline projection also incorporates assumptions about economic growth, electricity prices, equipment standards, building codes and naturally occurring efficiency.

Figure 4-3 and Table 4-3 present the baseline forecast for electricity for select years at the end-use level for the commercial sector as a whole. Overall, commercial use increases slightly from 5,041 GWh in 2011 to 5,722 GWh in 2034, an increase of 14%, or an average growth rate of 0.6% per year.

Figure 4-3 Commercial Electricity Baseline Forecast by End Use

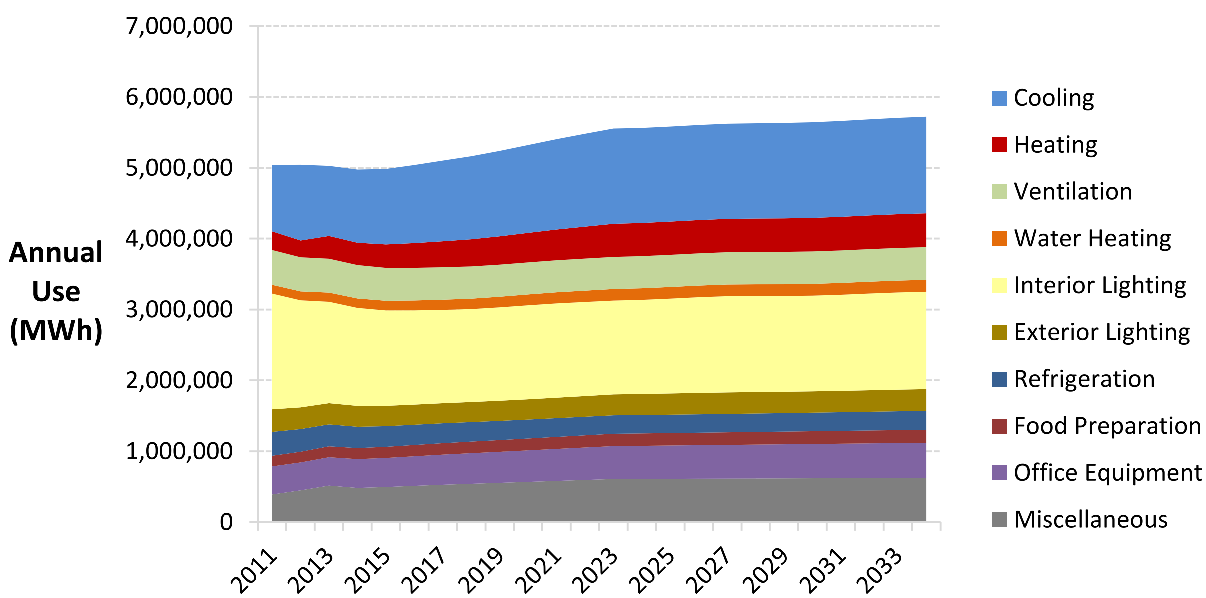


Table 4-3 Commercial Electricity Consumption by End Use (GWh)

End Use	2011	2015	2016	2017	2020
Cooling	938	1,066	1,102	1,139	1,240
Heating	263	330	348	366	416
Ventilation	492	465	461	459	453
Water Heating	123	136	140	143	153
Interior Lighting	1,633	1,347	1,330	1,318	1,327
Exterior Lighting	319	287	284	283	286
Refrigeration	337	292	286	281	267
Food Preparation	150	157	159	161	167
Office Equipment	396	410	418	425	445
Miscellaneous	390	495	511	527	568
Total	**5,041**	**4,984**	**5,040**	**5,102**	**5,322**
End Use	**2025**	**2029**	**2034**	**% Change 2011-2034**	**Avg. Growth Rate 2011-2034**
Cooling	1,341	1,347	1,364	45%	1.6%
Heating	469	472	477	81%	2.6%
Ventilation	455	458	462	-6%	-0.3%
Water Heating	163	165	168	36%	1.3%
Interior Lighting	1,339	1,352	1,375	-16%	-0.7%
Exterior Lighting	299	301	306	-4%	-0.2%
Refrigeration	259	261	267	-21%	-1.0%
Food Preparation	176	179	184	23%	0.9%
Office Equipment	470	481	494	25%	1.0%
Miscellaneous	611	617	625	60%	2.1%
Total	**5,582**	**5,634**	**5,722**	**14%**	**0.6%**

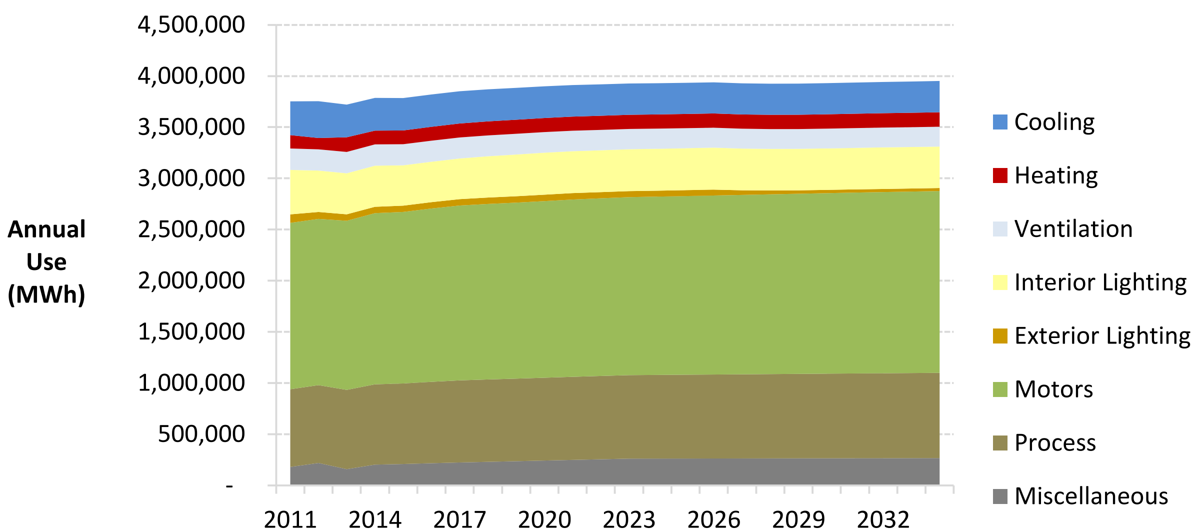
Industrial Sector

The baseline forecast incorporates assumptions about economic growth, electricity prices, equipment standards, building codes and naturally occurring energy efficiency. Table 4-4 and Figure 4-4 present the baseline forecast for electricity for select years at the end-use level for the industrial sector as a whole. Overall, industrial use increases slightly from 3,752 GWh in 2011 to 3,952 GWh in 2034, an increase of 5%, or an average growth rate of 0.2% per year.

Table 4-4 Industrial Electricity Consumption by End Use (GWh)

End Use	2011	2015	2016	2017	2020
Cooling	330	317	316	315	310
Heating	130	134	136	137	138
Ventilation	210	206	206	205	201
Interior Lighting	434	394	395	397	410
Exterior Lighting	83	61	62	62	63
Motors	1,626	1,676	1,694	1,709	1,726
Process	759	787	795	802	809
Miscellaneous	180	208	216	223	242
Total	**3,752**	**3,785**	**3,820**	**3,851**	**3,899**
End Use	2025	2029	2034	% Change 2011-2034	Avg. Growth Rate 2011-2034
Cooling	304	304	306	-7%	-0.3%
Heating	139	140	141	8%	0.3%
Ventilation	196	193	194	-7%	-0.3%
Interior Lighting	410	406	405	-7%	-0.3%
Exterior Lighting	58	33	29	-65%	-4.5%
Motors	1,746	1,760	1,777	9%	0.4%
Process	819	825	833	10%	0.4%
Miscellaneous	262	264	266	48%	1.7%
Total	**3,934**	**3,926**	**3,952**	**5%**	**0.2%**

Figure 4-4 Industrial Electricity Baseline Forecast by End Use



Baseline Projection Summary

Table 4-5 and Figure 4-5 provide a summary of the baseline forecast for electricity by sector for the entire IPL service territory. Overall, the forecast shows a 14.3% increase from 2011 to 2034 with an average annual growth rate of 0.6%. Most of the increase is attributed to the residential sector, followed by commercial, and then industrial. Table 4-6 and Figure 4-6 show the peak demand forecast for each sector.

Table 4-5 Electricity Projection by Sector (GWh)

Sector	2011	2015	2016	2017	2020
Residential	5,152	5,263	5,326	5,365	5,500
Commercial	5,041	4,984	5,040	5,102	5,322
Industrial	3,752	3,785	3,820	3,851	3,899
Total	**13,946**	**14,033**	**14,186**	**14,319**	**14,722**
Sector	2025	2029	2034	% Change 2011-2034	Avg. Growth Rate 2011-2034
Residential	5,744	5,966	6,266	21.6%	0.9%
Commercial	5,582	5,634	5,722	13.5%	0.6%
Industrial	3,934	3,926	3,952	5.3%	0.2%
Total	**15,260**	**15,526**	**15,940**	**14.3%**	**0.6%**

Figure 4-5 Electricity Baseline Projection Summary (GWh)

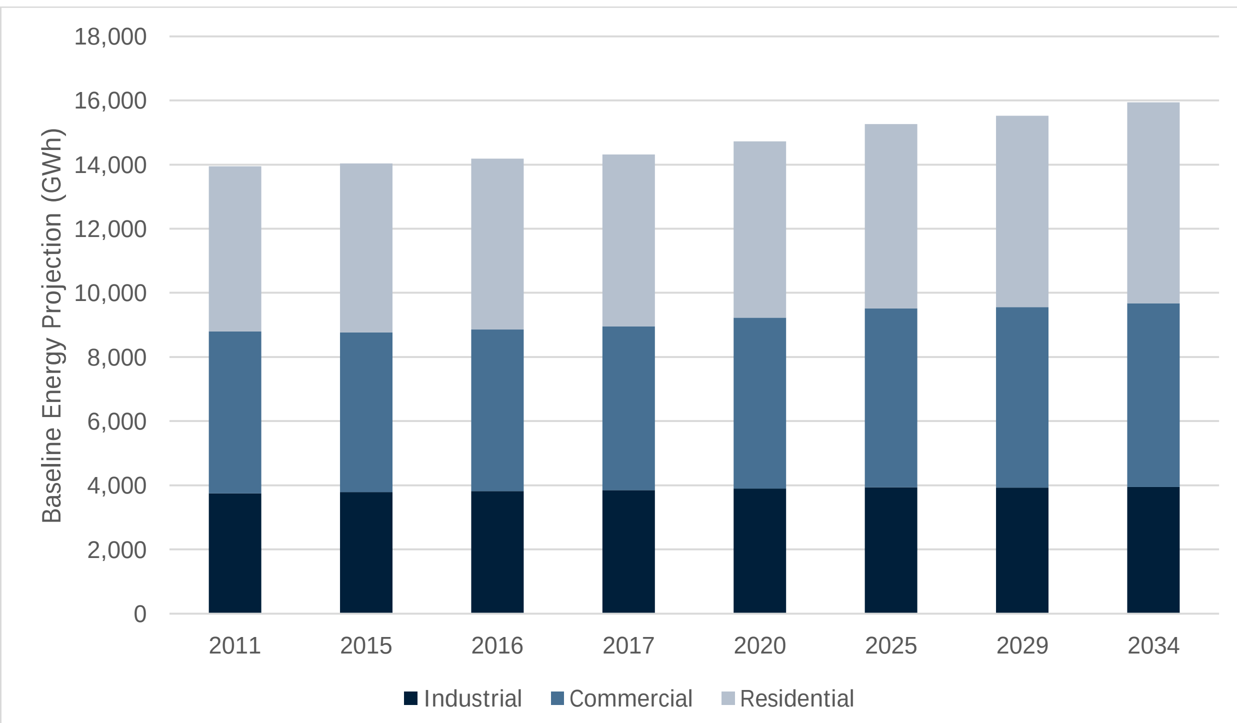
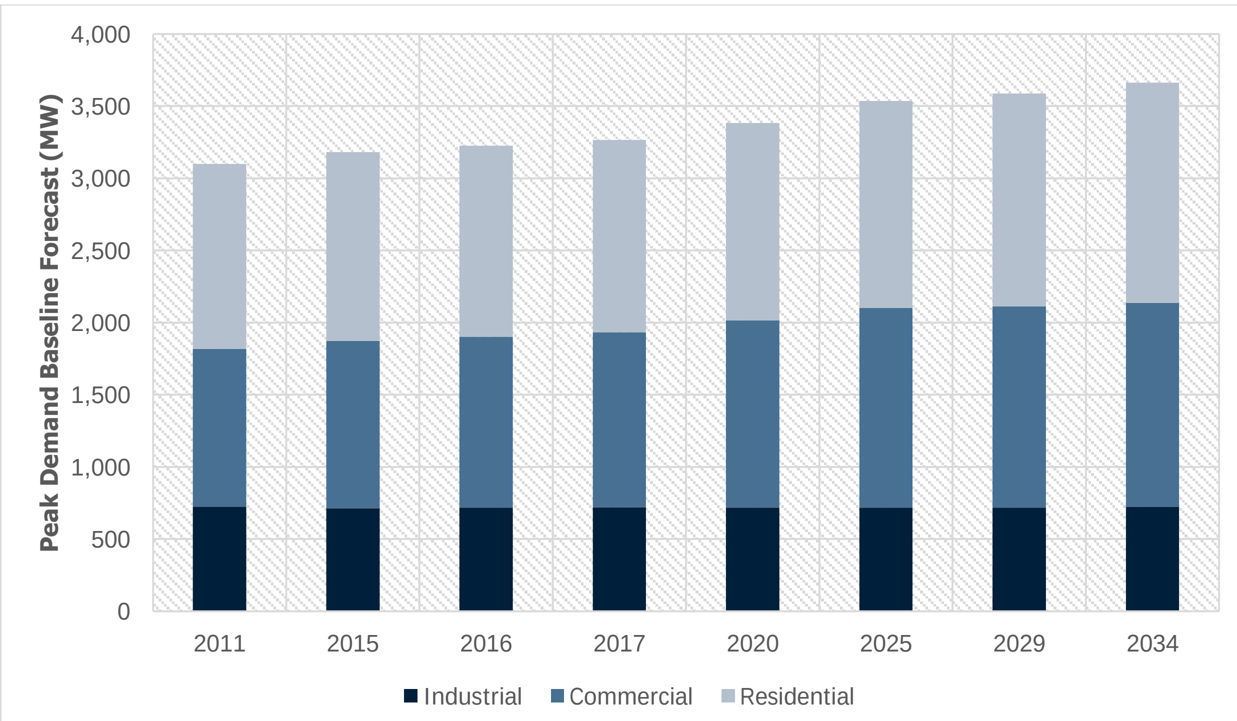


Table 4-6 and Figure 4-6 show the peak demand forecast for each sector.

Table 4-6 Peak Demand Consumption by Sector (MW)

Sector	2011	2015	2016	2017	2020
Residential	1,282	1,309	1,323	1,333	1,368
Commercial	1,094	1,158	1,185	1,213	1,297
Industrial	724	714	717	719	718
Total	**3,100**	**3,181**	**3,225**	**3,265**	**3,383**
Sector	2025	2029	2034	% Change 2011-2034	Avg. Growth Rate 2011-2034
Residential	1,434	1,474	1,525	19.0%	0.8%
Commercial	1,385	1,394	1,414	29.2%	1.1%
Industrial	717	718	723	-0.2%	0.0%
Total	**3,535**	**3,586**	**3,662**	**18.1%**	**0.7%**

Figure 4-6 Peak Demand Baseline Forecast Summary (MW)



CHAPTER | 5

DSM Potential – Overall Results

Table 5-1 and Figure 5-1 summarize the DSM savings for the different levels of potential relative to the baseline projection. Figure 5-2 displays the DSM potential forecasts in a line graph representing electricity consumption under the various analysis cases considered here. Potential forecasts in the model begin in 2013, but results here focus on the 2015-2017 time frame that corresponds to the latest IPL Action Plan, as well as milestone years through 2034, which represents the final year of consideration in IPL's IRP development.

By 2034, the cumulative energy savings under the Realistic Achievable Potential case are 10.4% of the baseline projection, or 1,665 net GWh.

Table 5-1 Summary of Overall DSM Potential

	2015	2016	2017	2020	2025	2029	2034
Baseline Forecast (GWh)	14,033	14,186	14,319	14,722	15,260	15,526	15,940
Cumulative Savings (GWh)							
Realistic Achievable	234	320	412	706	1,125	1,378	1,665
Economic Potential	1,163	1,323	1,495	2,057	2,914	3,438	3,911
Technical Potential	1,509	1,770	2,034	2,877	4,030	4,681	5,172
Energy Savings (% of Baseline)							
Realistic Achievable	1.7%	2.3%	2.9%	4.8%	7.4%	8.9%	10.4%
Economic Potential	8.3%	9.3%	10.4%	14.0%	19.1%	22.1%	24.5%
Technical Potential	10.8%	12.5%	14.2%	19.5%	26.4%	30.2%	32.4%

Figure 5-1 Summary of Energy Savings

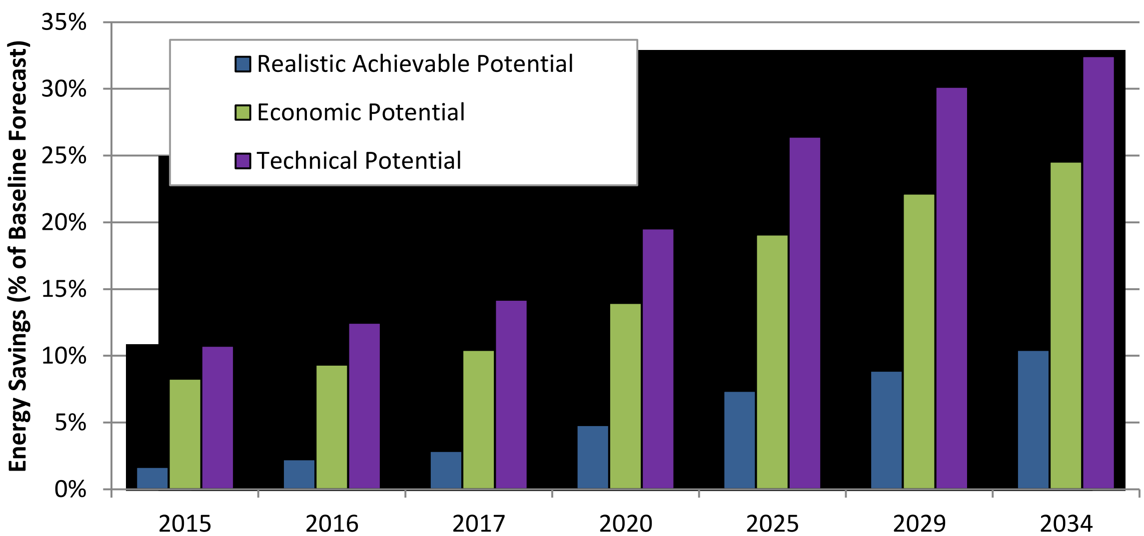


Figure 5-2 Forecasts of Potential (GWh)

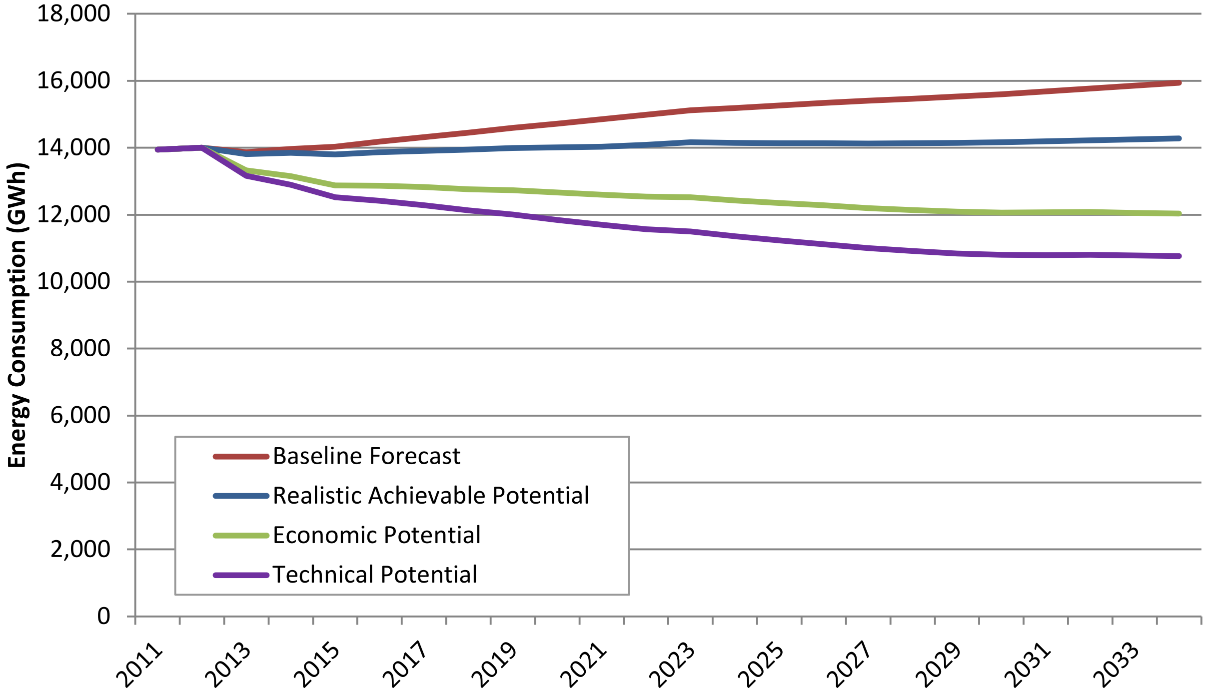
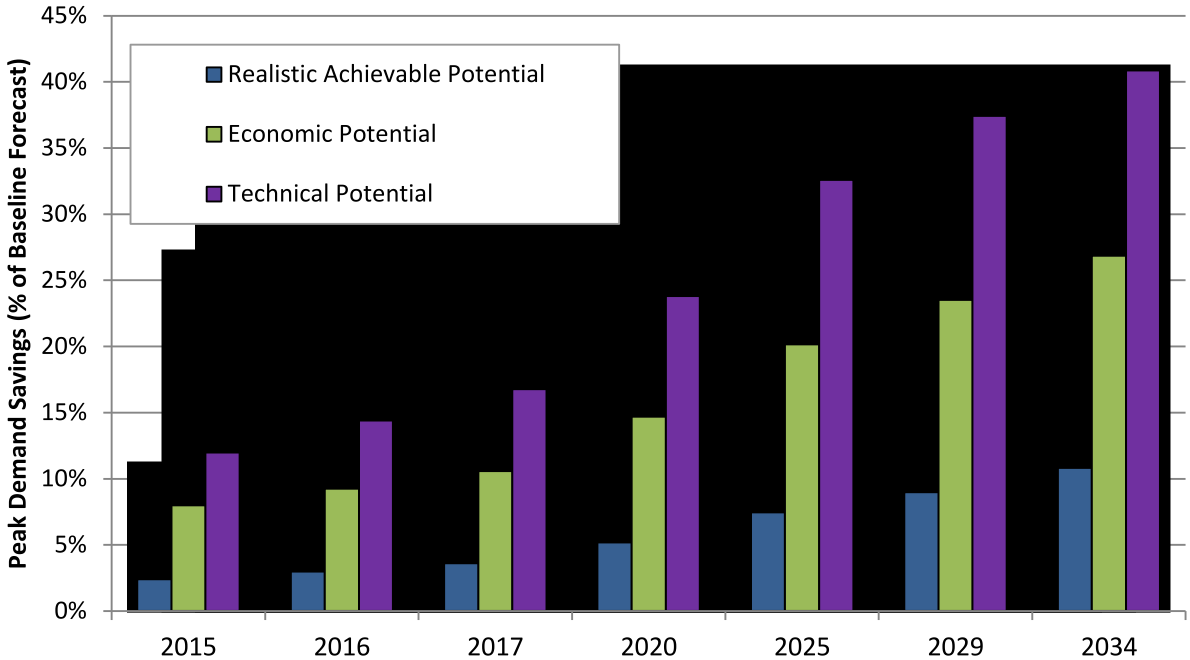


Table 5-2 and Figure 5-3 summarize the electric peak demand savings for the different levels of potential relative to the baseline forecast. By 2034, the cumulative peak demand savings under the Realistic Achievable Potential case are 10.8% of the baseline projection, or 396 net MW.

Table 5-2 Summary of Peak Demand Potential

	2015	2016	2017	2020	2025	2029	2034
Baseline Forecast (MW)	3,181	3,225	3,265	3,383	3,535	3,586	3,662
Cumulative Savings (MW)							
Realistic Achievable	76	96	117	175	263	322	396
Economic Potential	254	298	345	497	712	843	983
Technical Potential	381	464	547	805	1,152	1,342	1,495
Energy Savings (% of Baseline)							
Realistic Achievable	2.4%	3.0%	3.6%	5.2%	7.5%	9.0%	10.8%
Economic Potential	8.0%	9.2%	10.6%	14.7%	20.1%	23.5%	26.8%
Technical Potential	12.0%	14.4%	16.8%	23.8%	32.6%	37.4%	40.8%

Figure 5-3 Summary of Electric Peak Demand Savings



Overview of DSM Potential by Sector

Table 5-3 and Figure 5-4 summarize the realistic achievable electric energy savings potential by sector. The commercial sector accounts for the largest portion of the savings, followed by residential, and then industrial.

Table 5-3 Realistic Achievable Energy Savings by Sector (GWh)

	2015	2016	2017	2020	2025	2029	2034
Realistic Achievable Savings (GWh)							
Residential	95.5	122.6	141.3	223.2	291.7	368.9	472.5
Commercial	101.2	140.9	187.3	333.1	582.5	724.0	870.4
Industrial	37.2	56.3	83.2	149.8	250.5	285.2	322.0
Total	**234.0**	**319.8**	**411.9**	**706.2**	**1,124.8**	**1,378.1**	**1,664.9**

Figure 5-4 Realistic Achievable Energy Savings Potential by Sector (GWh)

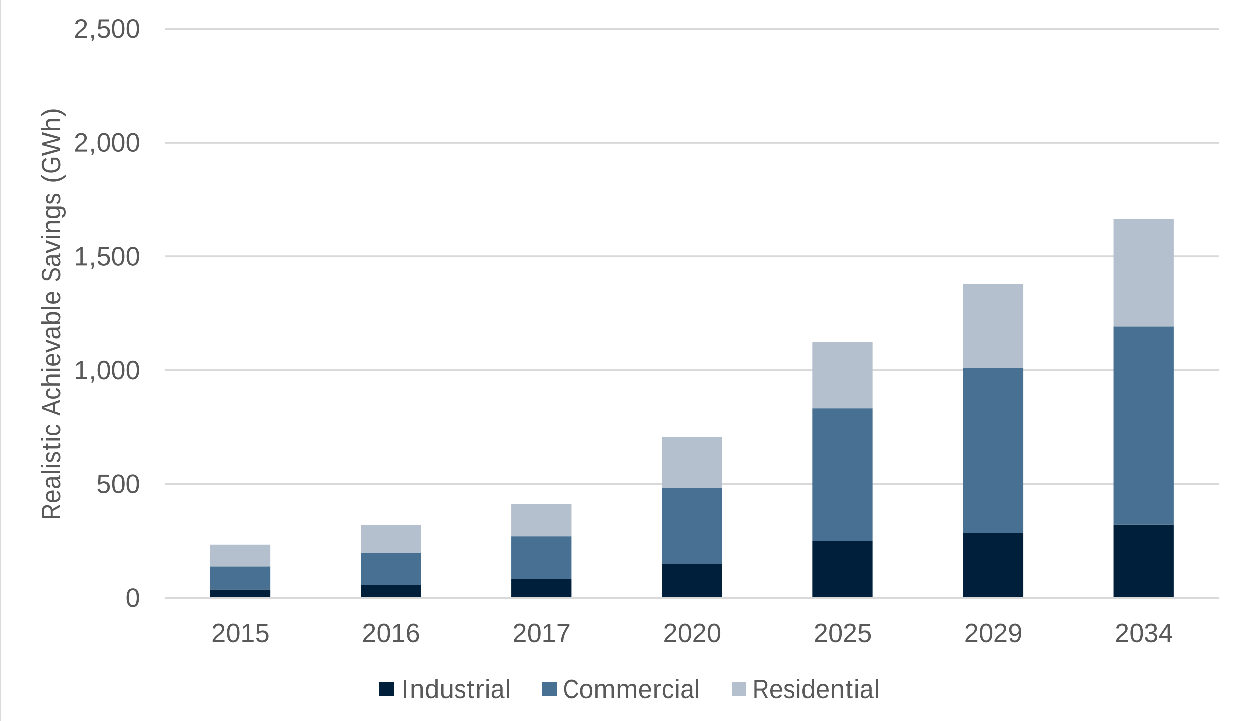
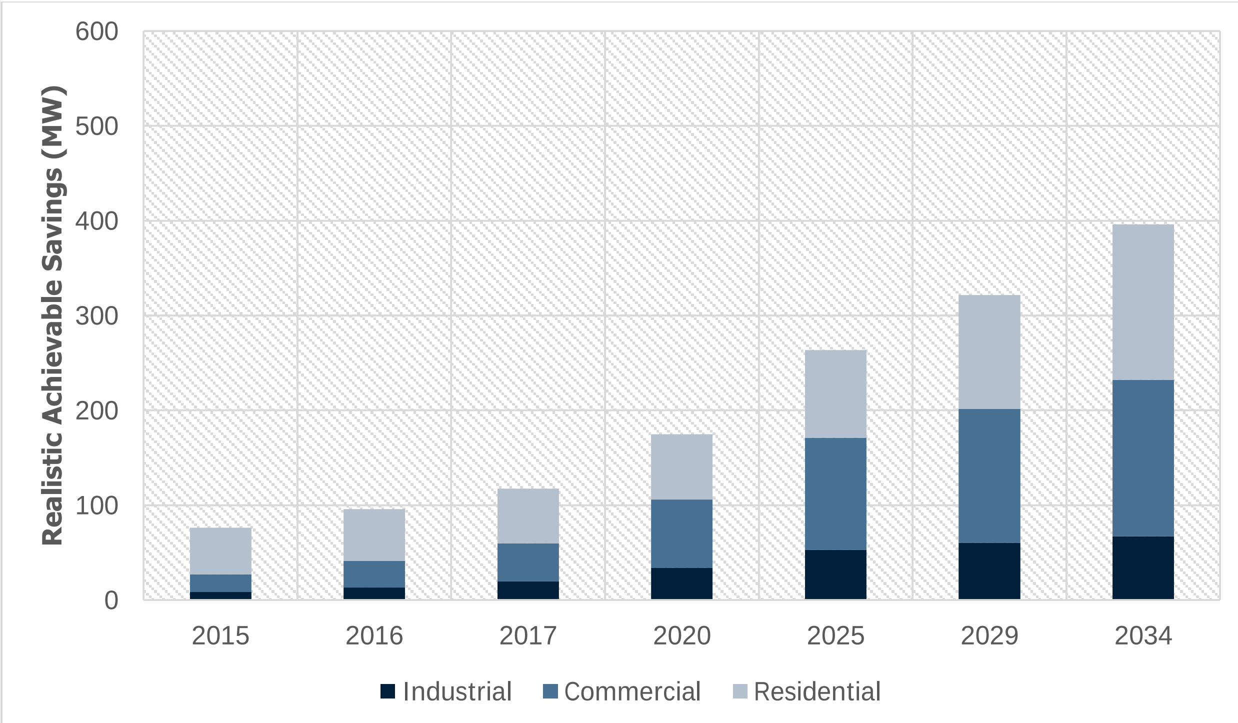


Table 5-4 and Figure 5-5 summarize the realistic achievable electric peak demand potential by sector. The commercial and residential sectors account for the largest portion of the savings, followed by industrial.

Table 5-4 Realistic Achievable Peak Demand Savings by Sector (MW)

	2015	2016	2017	2020	2029	2034
Realistic Achievable Savings (MW)						
Residential	49.4	54.8	57.8	68.9	120.3	163.9
Commercial	18.7	28.0	40.0	71.8	140.9	165.1
Industrial	8.3	13.1	19.7	34.1	60.4	67.1
Total	**76.4**	**95.9**	**117.5**	**174.8**	**321.6**	**396.1**

Figure 5-5 Realistic Achievable Peak Demand Savings Potential by Sector (MW)



Detailed potential results for each sector are presented in the following chapter.

CHAPTER | 6

DSM Potential By Sector

This chapter presents the results of the DSM potential analysis at the sector level. First, the residential potential is presented, followed by the commercial and industrial.

Residential Electricity Potential

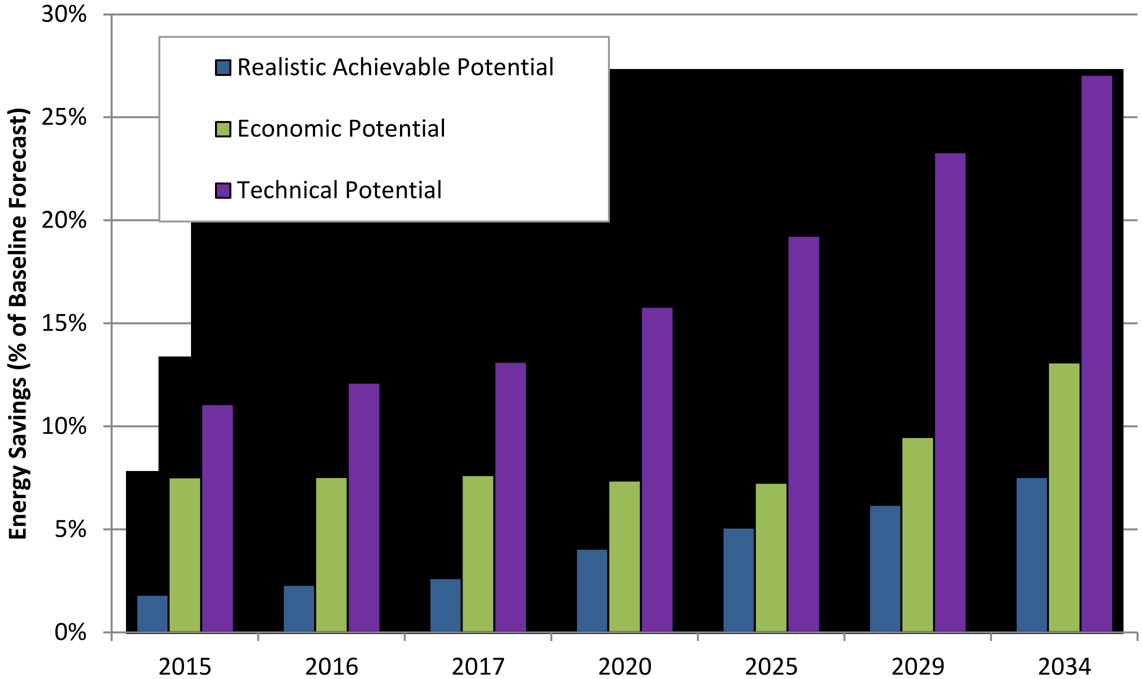
Table 6-1 presents estimates for the three types of energy savings potential for the residential electricity sector. Figure 6-1 depicts these potential energy savings estimates graphically.

- **Realistic Achievable potential** projects 473 GWh of energy savings in 2034, or 7.5% of the baseline forecast at that time.
- **Economic potential,** which reflects a theoretical limit to savings when all cost-effective measures are taken, is 820 GWh in 2034, representing 13.1% of the baseline energy forecast.
- **Technical potential,** which reflects the adoption of all DSM measures regardless of cost, is a theoretical upper bound on savings. By 2034, technical potential reaches 1,695 GWh, 27.1% of the baseline energy forecast.

Table 6-1 DSM Energy Savings Potential for the Residential Sector

	2015	2016	2017	2020	2025	2029	2034
Baseline Forecast (GWh)	5,263	5,326	5,365	5,500	5,744	5,966	6,266
Cumulative Savings (GWh)							
Realistic Achievable	96	123	141	223	292	369	473
Economic Potential	396	401	410	405	417	565	820
Technical Potential	583	645	704	869	1,106	1,391	1,695
Energy Savings (% of Baseline)							
Realistic Achievable	1.8%	2.3%	2.6%	4.1%	5.1%	6.2%	7.5%
Economic Potential	7.5%	7.5%	7.6%	7.4%	7.3%	9.5%	13.1%
Technical Potential	11.1%	12.1%	13.1%	15.8%	19.2%	23.3%	27.1%

Figure 6-1 Residential DSM Energy Savings Potential



Residential Electric Potential by End Use

Figure 6-2 focuses on the end-use break out for residential energy savings in 2034 under the Realistic Achievable Potential case. Lighting equipment replacements account for the highest portion of the energy savings, while cooling, heating, and water heating measures also make substantial contributions. Figure 6-3 shows the residential Realistic Achievable peak demand potential in 2034 by end use. It shows how cooling contributes the lion's share of savings because it is most peak coincident. Figure 6-4 and Figure 6-5 show how the cumulative energy and peak demand potential evolve by end use over time.

The key measures comprising the potential are listed below:

- Lighting: CFL lamps and specialty bulbs in the near term, but LED lamps going forward. While LED technologies are just becoming cost-effective, historic and forward-looking research indicates that performance and cost trends will continue to improve dramatically. We have incorporated these trends in our modeling and show that lighting opportunities will become dominated by LED lamps over the next 20 years.
- Demand Response: Direct load control of central air conditioning equipment is a prominent measure in the portfolio of peak demand savings.
- Removal of second refrigerator
- HVAC: efficient air conditioners, ducting repair/sealing, insulation, behavioral programs and programmable thermostats
- Water heating: efficient water heaters, low-flow showerheads, and faucet aerators.

Figure 6-2 Residential Realistic Achievable Potential by End Use in 2034 (Energy Savings)

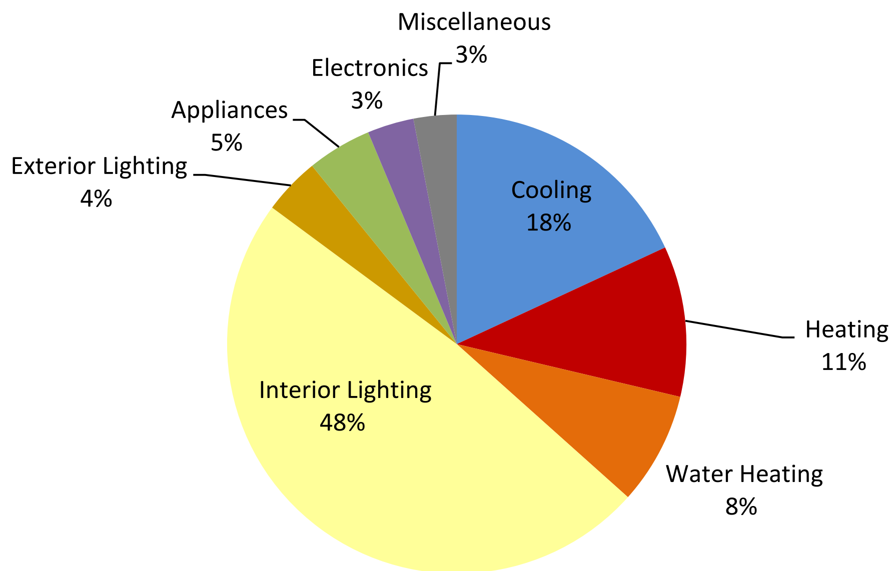


Figure 6-3 Residential Realistic Achievable Potential by End Use in 2034 (Peak Savings)

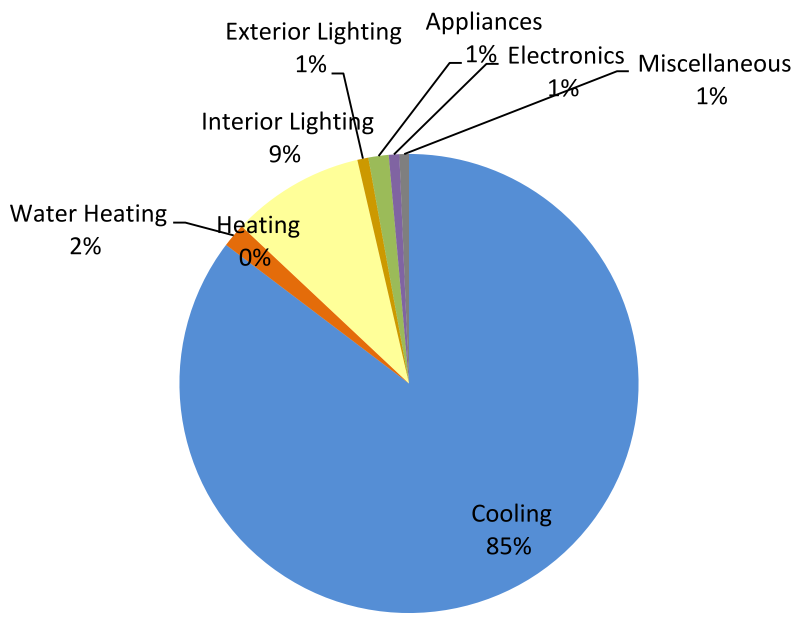


Figure 6-4 Residential % of Cumulative Achievable Energy Savings Potential by End Use Over Time

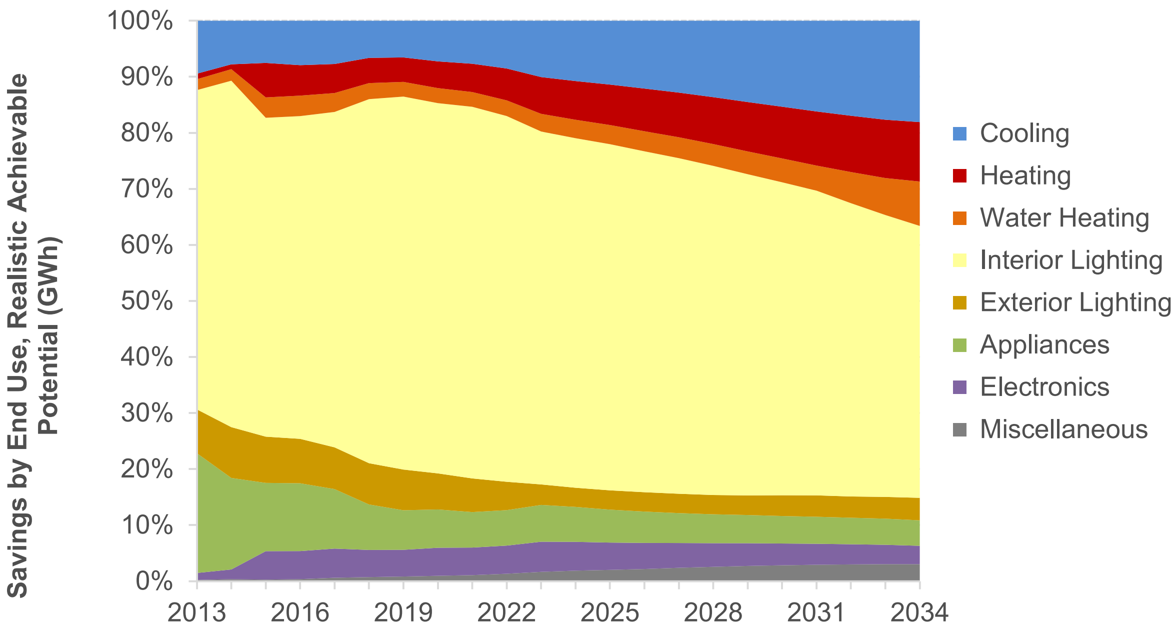
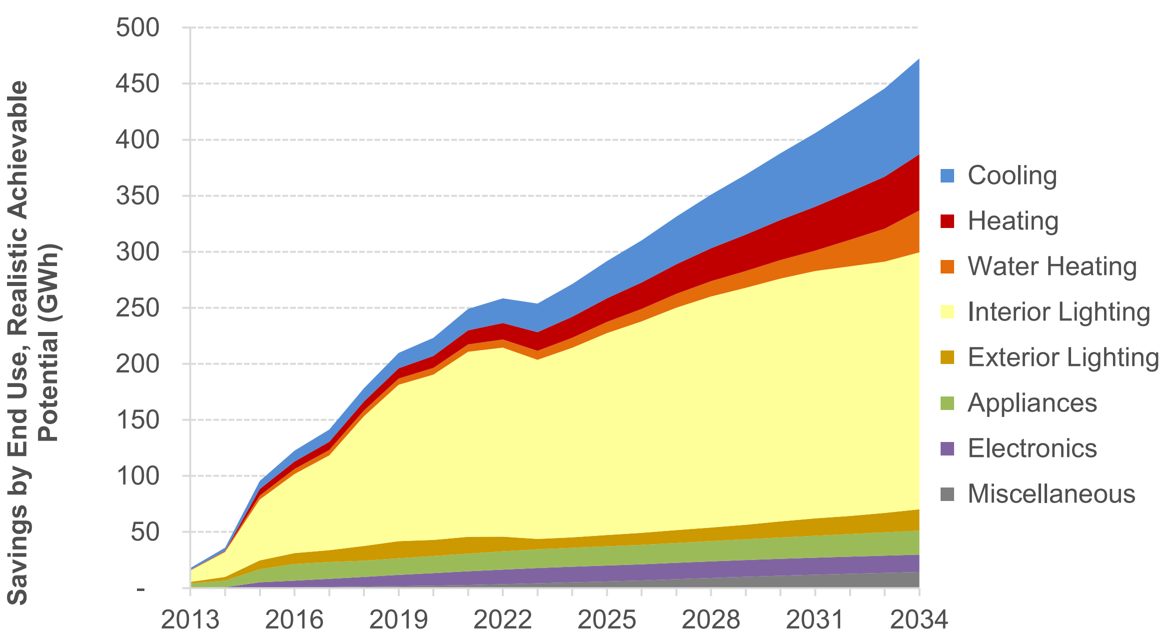


Figure 6-5 Residential Cumulative Achievable Energy Savings Potential by End Use Over Time (GWh)



Commercial DSM Potential

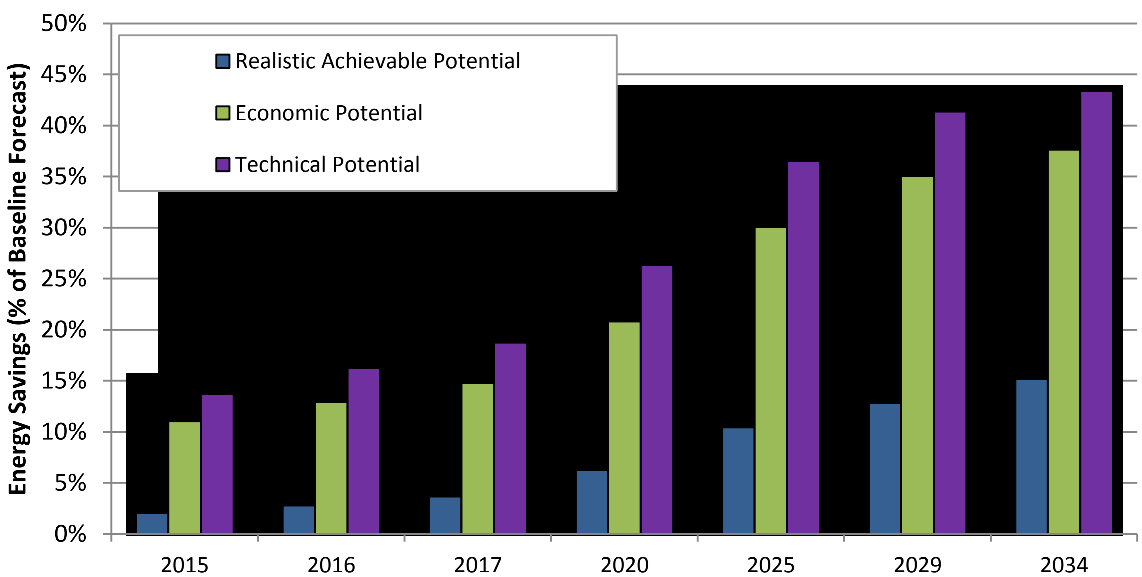
The commercial sector accounts for 36% of energy consumption, making for prime efficiency opportunities. Table 6-2 presents estimates for the three types of potential for the commercial electricity sector. Figure 6-6 depicts these potential energy savings estimates graphically.

- **Realistic Achievable potential** projects 870 GWh of energy savings in 2034, or 15.2% of the baseline forecast at that time.
- **Economic potential,** which reflects a theoretical limit to savings when all cost-effective measures are taken, is 2,154 GWh in 2034, representing 37.6% of the baseline energy forecast.
- **Technical potential,** which reflects the adoption of all DSM measures regardless of cost, is a theoretical upper bound on savings. By 2034, technical potential reaches 2,484 GWh, 43.4% of the baseline energy forecast.

Table 6-2 DSM Energy Savings Potential for the Commercial Sector

	2015	2016	2017	2020	2025	2029	2034
Baseline Forecast (GWh)	4,984	5,040	5,102	5,322	5,582	5,634	5,722
Cumulative Savings (GWh)							
Realistic Achievable	101	141	187	333	583	724	870
Economic Potential	550	652	752	1,107	1,679	1,973	2,154
Technical Potential	682	820	956	1,400	2,040	2,330	2,484
Energy Savings (% of Baseline)							
Realistic Achievable	2.0%	2.8%	3.7%	6.3%	10.4%	12.9%	15.2%
Economic Potential	11.0%	12.9%	14.7%	20.8%	30.1%	35.0%	37.6%
Technical Potential	13.7%	16.3%	18.7%	26.3%	36.5%	41.4%	43.4%

Figure 6-6 Commercial DSM Energy Savings Potential



Commercial Potential by End Use

Figure 6-7 focuses on achievable potential savings by end use. Not surprisingly, interior lighting delivers the highest achievable savings throughout the study period. In 2034, exterior lighting is second, and cooling is third. Figure 6-8 shows the peak demand potential in 2034. Cooling and lighting end uses hold the largest shares of peak coincident demand savings. Figure 6-9 and Figure 6-10 show how cumulative energy and peak demand potential evolves by end use over time.

The key measures comprising the potential are listed below:

- Lighting – LED lamps in screw-in, linear fluorescent, and high-bay style applications. While LED technologies are just becoming cost-effective, historic and forward-looking research indicates that performance and cost trends will continue to improve. We have incorporated these trends in our modeling and show that lighting opportunities will become dominated by LED lamps over the next 20 years.
- Cooling, HVAC, and Ventilation equipment replacements and controls/optimizations (e.g. variable speed controls)
- Energy management systems
- Refrigeration – efficient equipment, control systems, decommissioning

Figure 6-7 Commercial Realistic Achievable Potential by End Use in 2034 (Energy Savings)

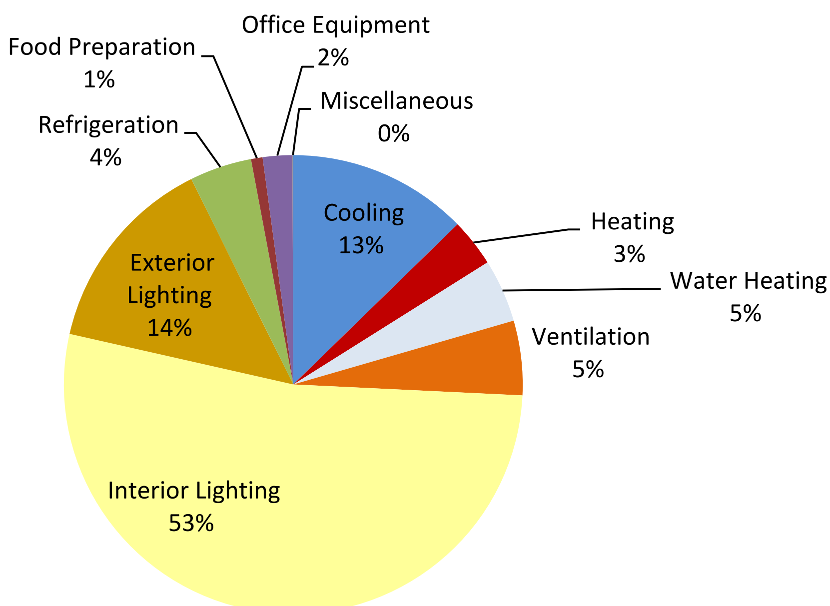


Figure 6-8 Commercial Realistic Achievable Potential by End Use in 2034 (Peak Savings)

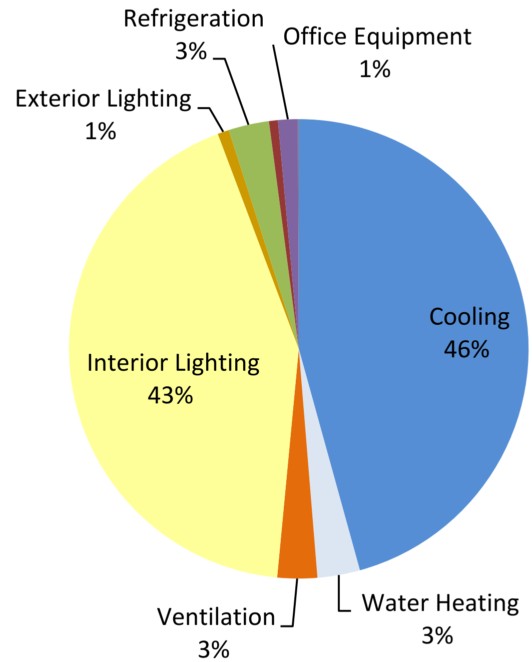


Figure 6-9 Commercial % of Cumulative Achievable Energy Savings Potential by End Use in 2034

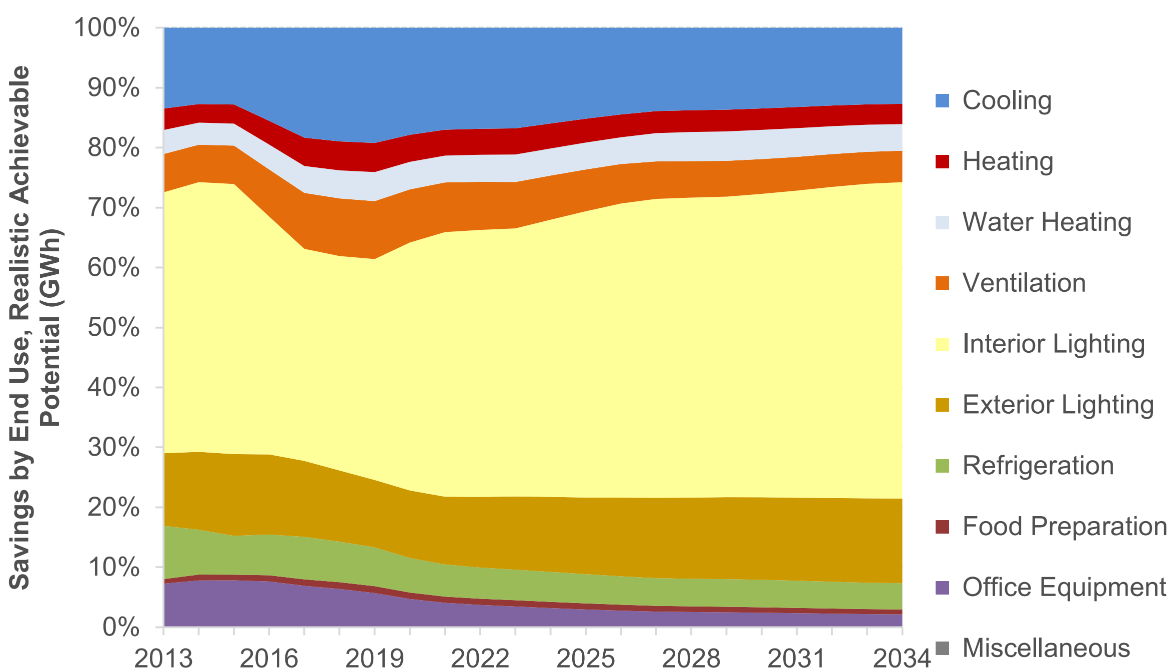
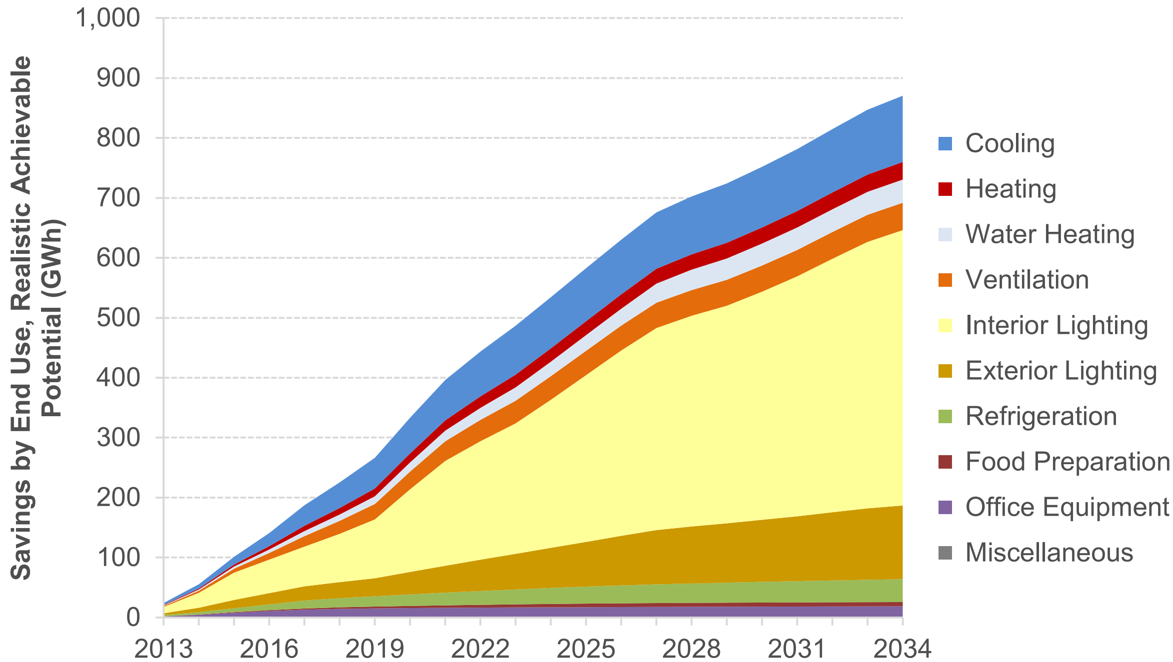


Figure 6-10 Commercial Cumulative Achievable Energy Savings Potential by End Use in 2034 (GWh)



Industrial Electricity Potential

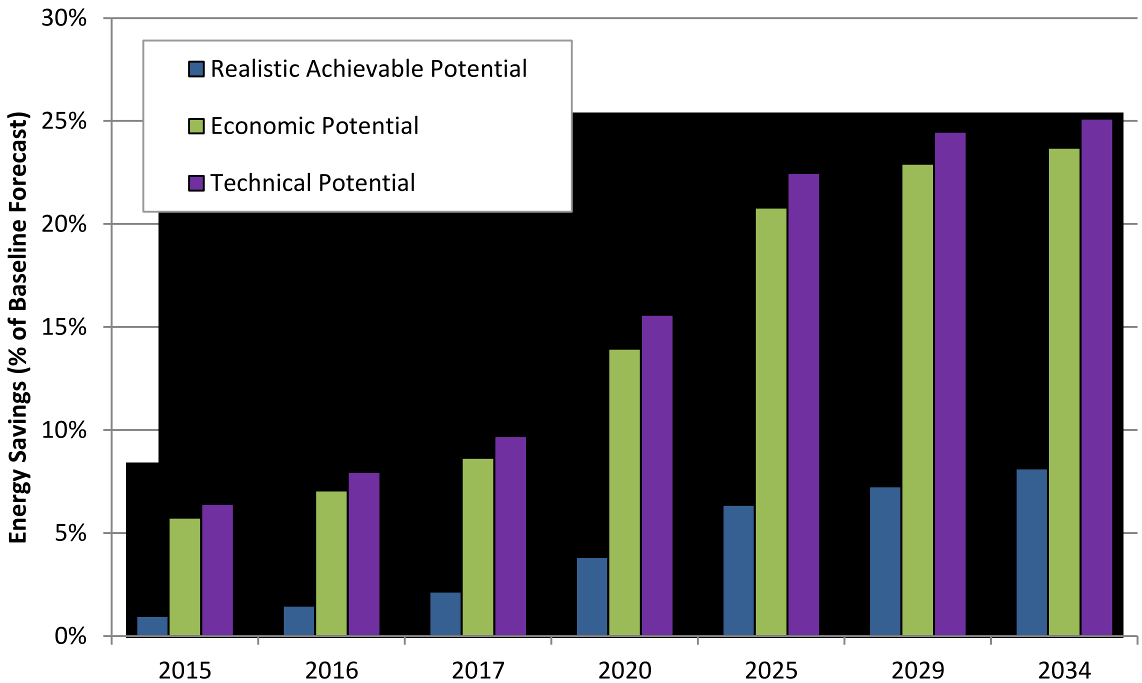
The IPL industrial sector accounts for 27% of total energy consumption. Table 6-3 and Figure 6-11 present the savings for the various types of potential considered in this study.

- **Realistic Achievable potential** projects 322 GWh of energy savings in 2034, or 8.1% of the baseline forecast at that time.
- **Economic potential,** which reflects a theoretical limit to savings when all cost-effective measures are taken, is 937 GWh in 2034, representing 23.7% of the baseline energy forecast.
- **Technical potential,** which reflects the adoption of all DSM measures regardless of cost, is a theoretical upper bound on savings. By 2034, technical potential reaches 993 GWh, 25.1% of the baseline energy forecast.

Table 6-3 DSM Energy Savings Potential for the Industrial Sector

	2015	2016	2017	2020	2025	2029	2034
Baseline Forecast (GWh)	3,785	3,820	3,851	3,899	3,934	3,926	3,952
Cumulative Savings (GWh)							
Realistic Achievable	37	56	83	150	251	285	322
Economic Potential	217	270	333	544	818	900	937
Technical Potential	243	305	374	608	884	961	993
Energy Savings (% of Baseline)							
Realistic Achievable	1.0%	1.5%	2.2%	3.8%	6.4%	7.3%	8.1%
Economic Potential	5.7%	7.1%	8.7%	13.9%	20.8%	22.9%	23.7%
Technical Potential	6.4%	8.0%	9.7%	15.6%	22.5%	24.5%	25.1%

Figure 6-11 Industrial DSM Energy Savings Potential



Industrial Potential by End Use

Figure 6-12 illustrates the achievable potential savings by electric end use in 2034 for the industrial sector. The largest shares of savings opportunities are in lighting and motors. For fluorescent lighting, efficient T5s and T8s transition to LEDs as the study progresses. For motors, potential savings for equipment replacements at end-of-life have been effectively eliminated due to the National Electrical Manufacturer's Association (NEMA) standards, which now mandate premium efficiency motors as the baseline efficiency unit. As a result, potential savings are incrementally small to upgrade to even more efficient levels. Many of the savings opportunities in this end use come from controls, timers, and variable speed drives, which improve system efficiencies where motors are utilized. Figure 6-13 shows the peak coincident end uses with the majority in cooling, followed by lighting and motors. Figure 6-14 and Figure 6-15 show how cumulative energy and peak demand potential evolve by end use over time.

The key measures comprising the potential are listed below:

- Efficient lighting technologies, primarily LED, for screw-in, fluorescent-style, high-bay, and HID applications
- Motor drives and controls, optimization
- Process timers and controls
- Application of optimization and controls for fans, pumps, compressed air
- Energy management systems & programmable thermostats

Figure 6-12 Industrial Realistic Achievable Potential by End Use in 2034 (Energy Savings)

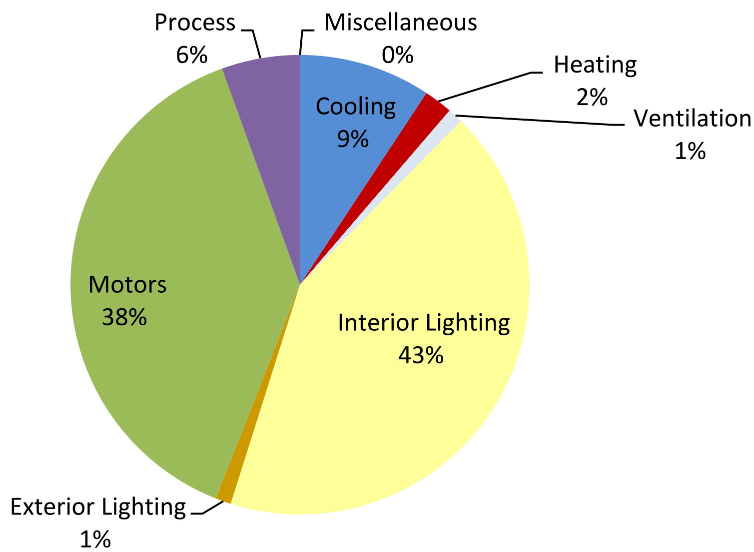


Figure 6-13 Industrial Realistic Achievable Potential by End Use in 2034 (Peak Savings)

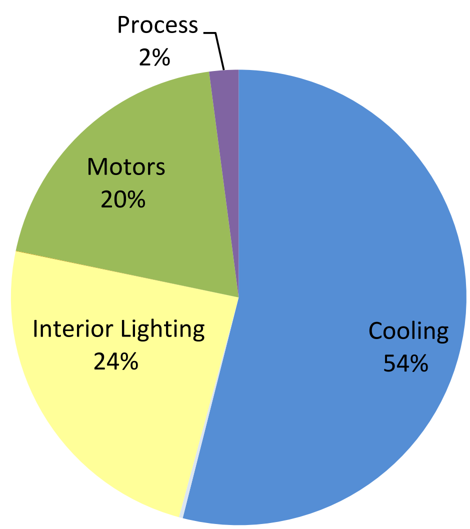


Figure 6-14 Industrial % of Cumulative Achievable Energy Savings Potential by End Use in 2034

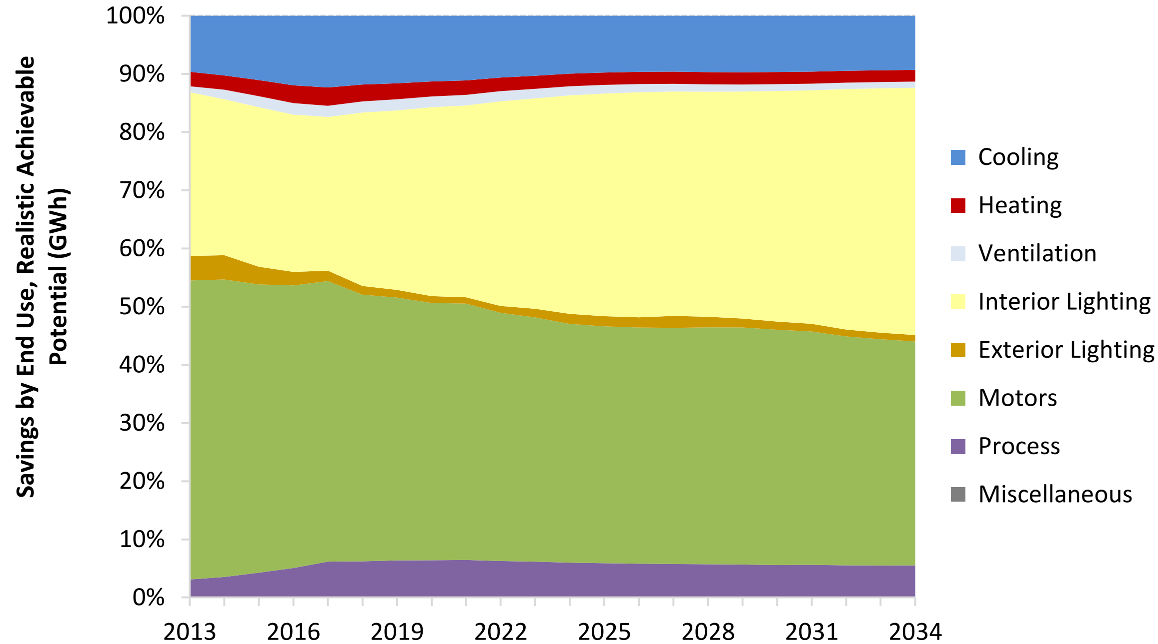
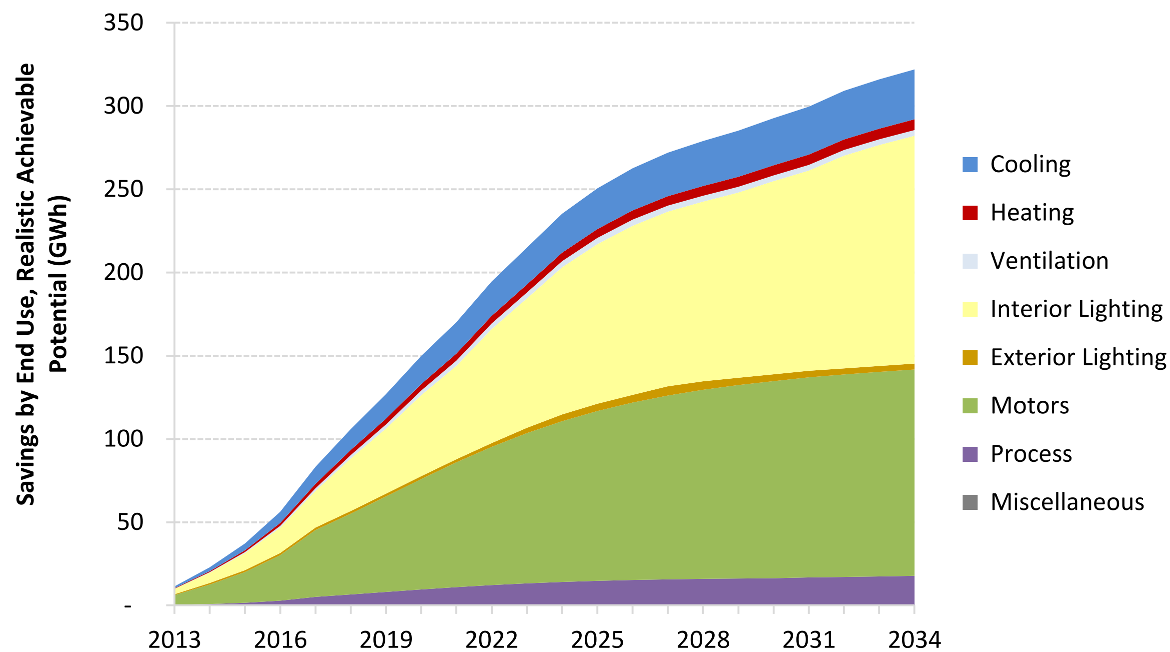


Figure 6-15 Industrial Cumulative Achievable Energy Savings Potential by End Use in 2034 (GWh)



APPENDIX | A

Calibration to Filed 2015-2017 IPL DSM Action Plan

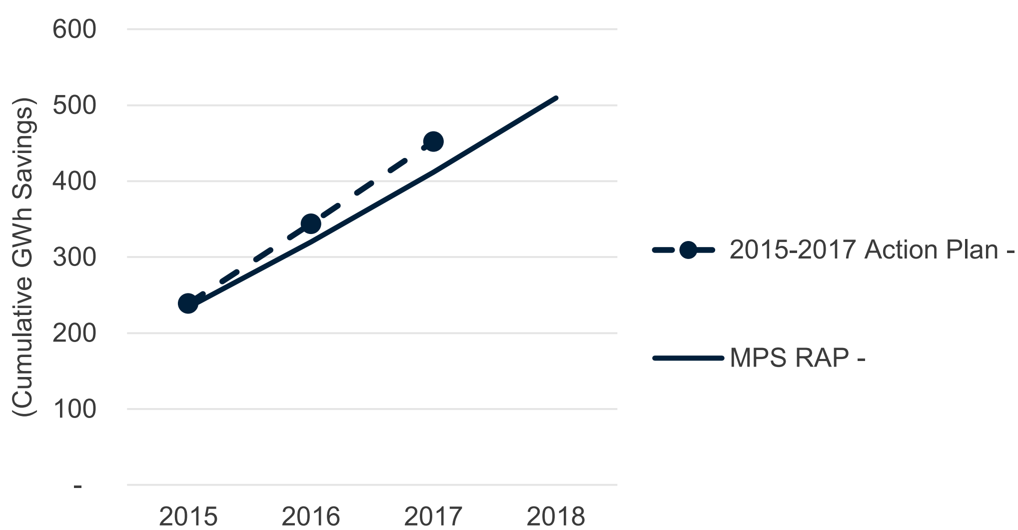
As mentioned in Chapter 2, this analysis also included a step to calibrate participation, savings, and spending levels to those filed in IPL's 2015-2017 Action Plan[3]. The 2015-2017 DSM Action Plan is based on the best available information from IPL programs currently in the field, as well as appropriate benchmarking information for comparable utility DSM programs. The implication is that we adjusted the participation rates, incentive amounts, and administrative cost assumptions that were in the 2012 MPS to be more specifically aligned with IPL past efforts and projected activity.

Another result of this calibration is that this analysis implicitly includes current opt-out levels of large commercial and industrial customers. In the 2015-2017 Action Plan, the planned levels for C&I programs were reduced relative to planned levels of Residential program activity in order to match current levels of program activity and reflect the amount of C&I customer load that had chosen to opt out of DSM programs. Aligning to the Action Plan means that these participation assumptions are incorporated into the DSM potential forecasts as they continue beyond 2017. This appendix shows the results of the calibration process.

The calibration was conducted on the separate but interconnected variables of energy savings, peak demand savings, and program budget; all of which underwent changes to their bottom-up composition in the modeling as described in previous sections, so an exact match with the 2015-2017 DSM Action Plan was neither obtainable nor required.

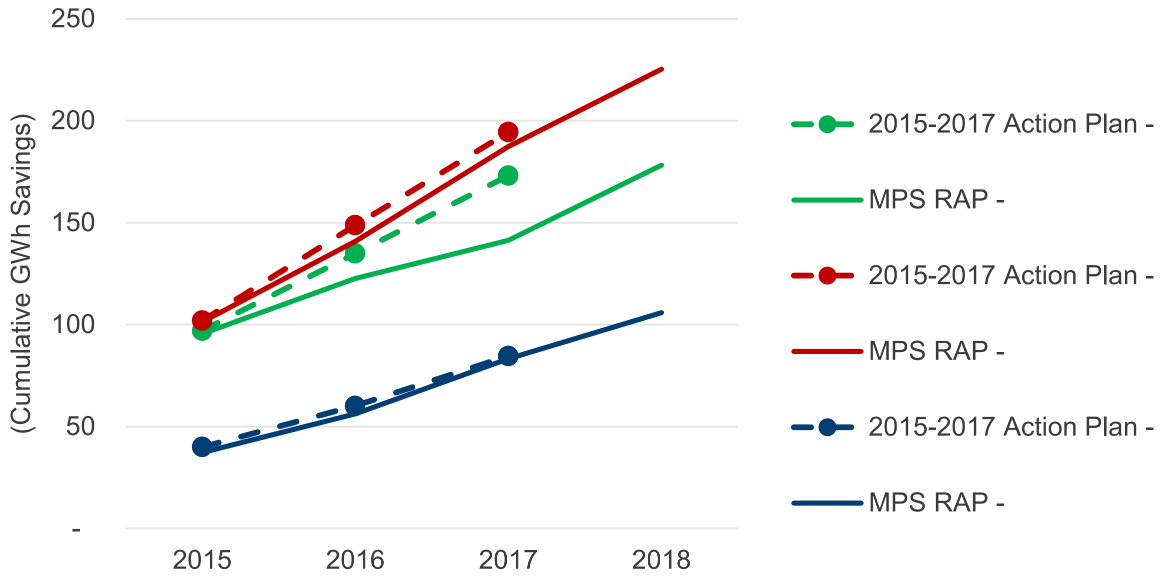
As shown in Figure A-1 and Figure A-2 below, the DSM Potential Forecasts of energy from the current analysis are a close match to the dotted line of the Action Plan for overlapping years. The first figure illustrates the calibration at the overall portfolio level, while the second shows the sector breakdown. The alignment was obtained by applying a constant scalar factor to participation levels in all years such that all measures within a given sector would align with the Action Plan. We then projected these trends into the future to 2034, which is the timeframe required for support of IPL's integrated resource planning process.

Figure A-1 Comparison of DSM Potential Forecast (RAP) and 2015-2017 Action Plan – Energy



[3] See Petitioners Exhibit ZE-2, Cause No. 44497 as filed on May 30, 2014.

Figure A-2 Comparison of DSM Potential Forecast (RAP) and 2015-2017 Action Plan - Energy by Sector



As shown in Figure A-3 and Figure A-4 below, the DSM Potential Forecasts for peak MW from the current study are a close match to the dotted lines of the Action Plan for overlapping years. We then projected these trends into the future to 2034, which is the timeframe required for support of IPL's integrated resource planning process. The first figure illustrates the calibration at the overall portfolio level, while the second shows the sector breakdown.

Figure A-3 Comparison of DSM Potential Forecast (RAP) and 2015-2017 Action Plan – Peak Demand

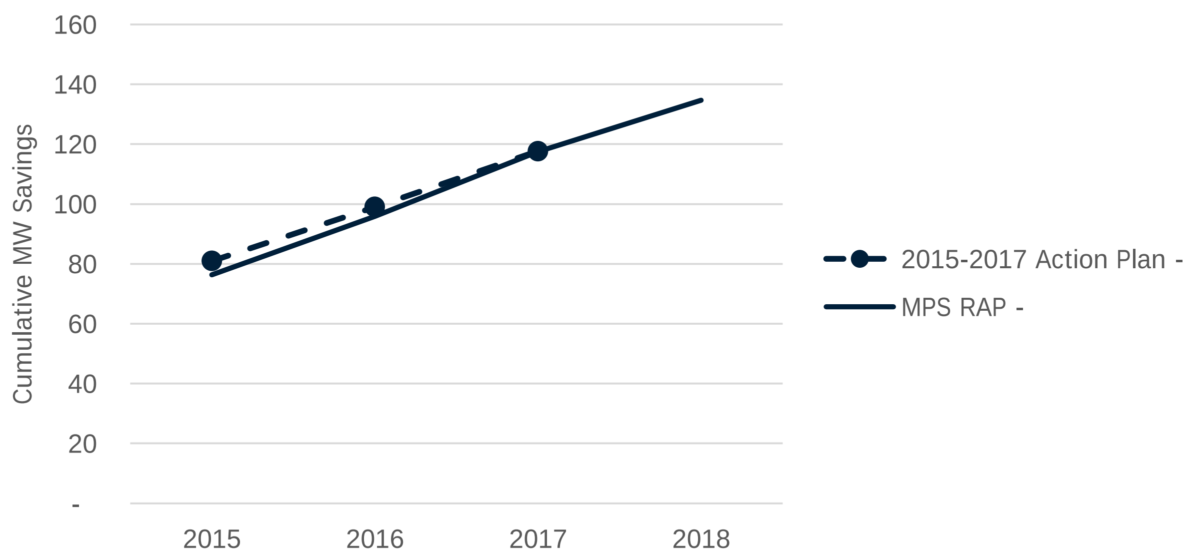
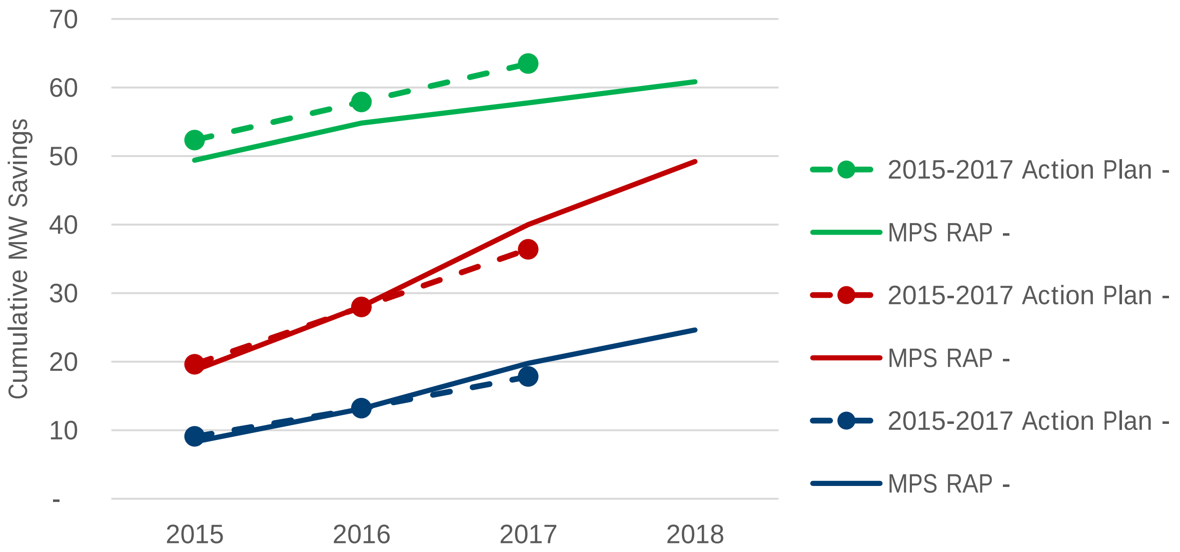


Figure A-4 Comparison of DSM Potential Forecast (RAP) and 2015-2017 Action Plan – Peak Demand by Sector



Finally, as shown in Figure A-5 and Figure A-6 below, utility budgets for the current study are also a close match to the Action Plan for overlapping years. We then project these trends into the future. The first figure illustrates the calibration at the overall portfolio level, while the second shows the sector breakdown. The figures represents a three-year moving average for spending to smooth some of the spikes introduced as an artifact of the modeling process. Dollar figures are given in real terms as of the study base year (2011).

Figure A-5 Comparison of DSM Potential Forecast (RAP) and 2015-2017 Action Plan – Utility Budget

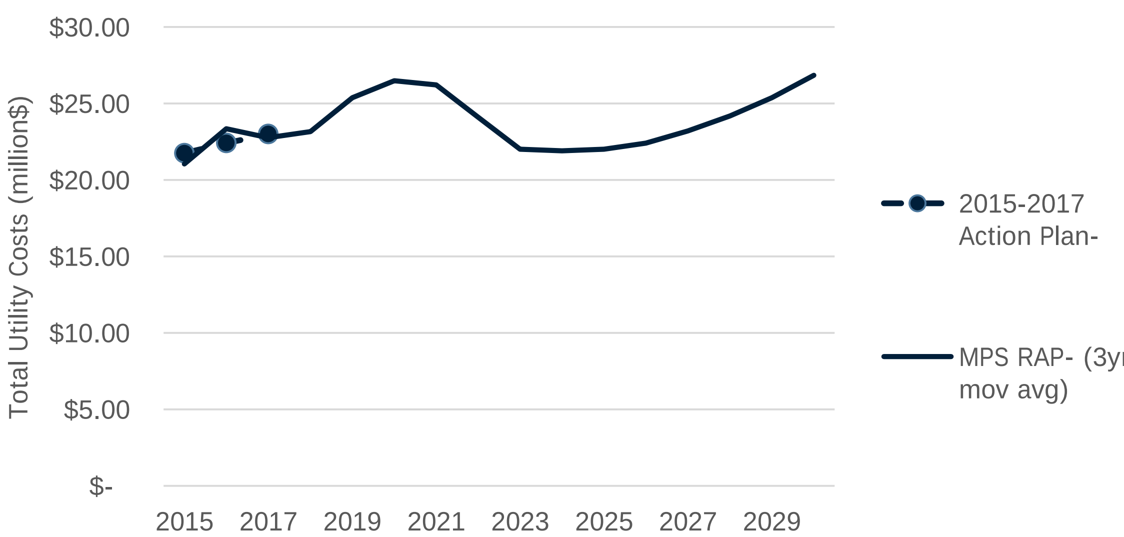


Figure A-6 Comparison of DSM Potential Forecast (RAP) and 2015-2017 Action Plan – Utility Budget by Sector

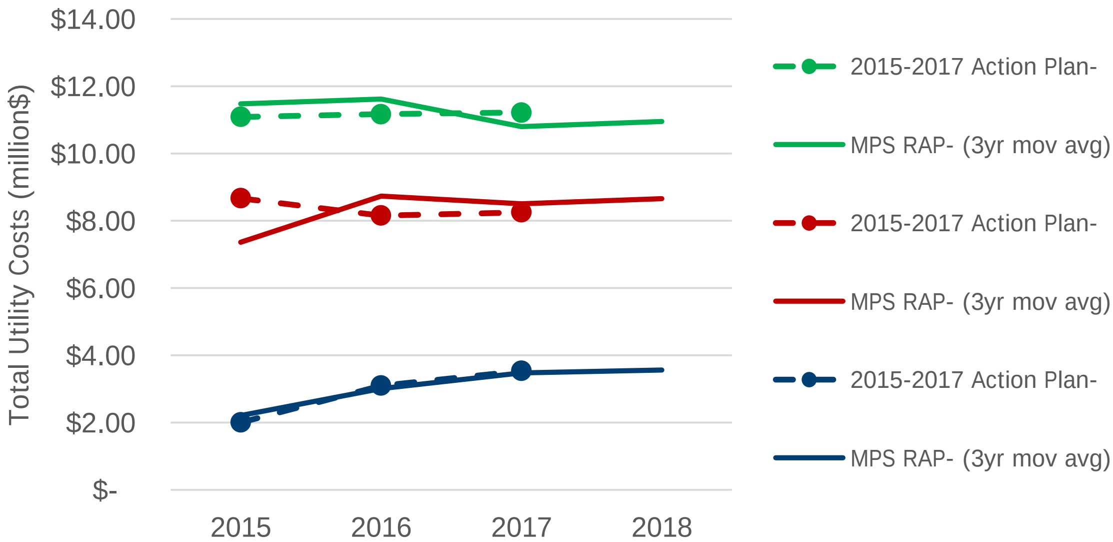
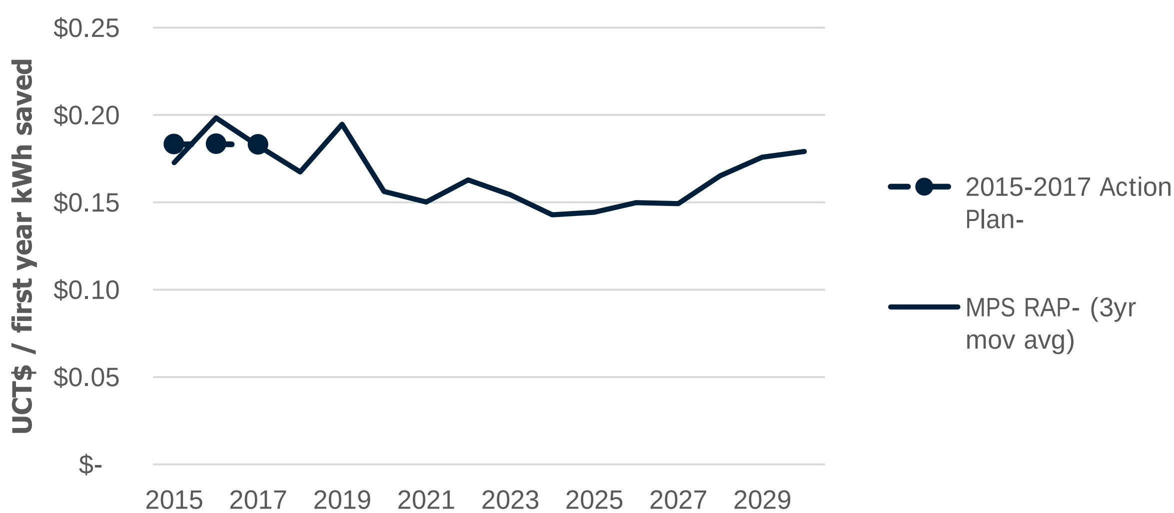


Figure A-7 below provides a view of the utility spending on a per-unit basis, where the unit is the number of kWh savings in the first year from newly installed measures. The utility budget consists of all program spending, including incentives and non-incentive or administrative costs. The data below represents a 3-year moving average of Utility Cost per first-year kWh saved, again to smooth some of the spikes introduced as an artifact of the modeling process. Dollar figures are given in real terms as of the study base year (2011).

Figure A-7 Comparison of DSM Potential Forecast (RAP) and 2015-2017 Action Plan – Utility Budget per First Year kWh Saved



Interpretation of this metric ($/first-year-kWh-saved) is subject to the following caveats: This metric includes programs with both short lives (like behavioral programs at 1 year) and long lives (like building shell or LED measures at 15+ years), so lifetime effects are difficult to gauge from first-year spending alone. Also, this metric includes spending on demand response programs, whose productivity is aimed at peak kW reductions rather than kWh energy reductions. It is an imperfect metric, but we note that the overall projections represent a rate and productivity of spending that is relatively stable over the 20 year time horizon.

APPENDIX | B

Annual Forecast Savings and Program Budgets

Table B-1 below shows the annual values for net cumulative energy savings, net cumulative peak demand savings, and the total utility program costs. Program costs are given in real terms as of the study base year (2011) on a 3-year moving average basis as explained in Appendix A above.

Table BB-1 Annual Forecast Savings and Program Budgets

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Net Cumulative Energy Savings (GWh)																						
Residential	18	36	96	123	141	178	210	223	249	258	254	271	292	310	331	351	369	388	406	426	446	473
Commercial	24	56	101	141	187	225	266	333	396	444	487	534	583	630	676	702	724	752	781	815	847	870
Industrial	11	23	37	56	83	106	127	150	170	195	215	235	251	263	272	279	285	293	300	309	316	322
TOTAL	**53**	**114**	**234**	**320**	**412**	**509**	**603**	**706**	**815**	**897**	**955**	**1,041**	**1,125**	**1,203**	**1,279**	**1,332**	**1,378**	**1,432**	**1,487**	**1,549**	**1,609**	**1,665**
Net Cumulative Peak Demand Savings (MW)																						
Residential	4	6	49	55	58	61	66	69	74	78	82	87	92	98	105	113	120	128	137	145	154	164
Commercial	5	10	19	28	40	49	59	72	84	94	103	110	118	125	132	137	141	146	150	156	161	165
Industrial	2	5	8	13	20	25	29	34	38	43	47	50	53	55	57	59	60	62	63	65	66	67
TOTAL	**10**	**21**	**76**	**96**	**117**	**135**	**154**	**175**	**197**	**215**	**231**	**248**	**263**	**279**	**295**	**308**	**322**	**336**	**350**	**366**	**382**	**396**
Total Utility Program Cost ($Millions, 3-year moving average)[4]																						
Residential	*N/A*	*N/A*	$11.48	$11.61	$10.80	$10.95	$12.74	$12.63	$11.86	$10.65	$9.52	$9.54	$9.71	$9.99	$10.80	$11.67	$12.97	$13.80	$14.80	$16.10	$18.13	$19.42
Commercial	*N/A*	*N/A*	$7.36	$8.73	$8.51	$8.66	$9.29	$10.54	$10.83	$9.90	$8.88	$8.95	$9.02	$9.15	$9.16	$9.25	$9.32	$9.82	$10.60	$11.62	$12.34	$12.80
Industrial	*N/A*	*N/A*	$2.21	$3.01	$3.47	$3.56	$3.36	$3.33	$3.54	$3.55	$3.60	$3.42	$3.29	$3.28	$3.25	$3.28	$3.09	$3.23	$3.50	$4.05	$4.38	$4.59
TOTAL	***N/A***	***N/A***	**$21.05**	**$23.36**	**$22.78**	**$23.17**	**$25.39**	**$26.50**	**$26.23**	**$24.11**	**$22.01**	**$21.92**	**$22.02**	**$22.42**	**$23.20**	**$24.20**	**$25.39**	**$26.85**	**$28.90**	**$31.78**	**$34.85**	**$36.81**

[4] Dollars are in real terms as of the study base year (2011).

About Applied Energy Group (AEG)

Founded in 1982, AEG is a multi-disciplinary technical, economic and management consulting firm that offers a comprehensive suite of demand-side management (DSM) services designed to address the evolving needs of utilities, government bodies, and grid operators worldwide. Hundreds of such clients have leveraged our people, our technology, and our proven processes to make their energy efficiency (EE), demand response (DR), and distributed generation (DG) initiatives a success. Clients trust AEG to work with them at every stage of the DSM program lifecycle – assessing market potential, designing effective programs, supporting the implementation of the programs, and evaluating program results.

The AEG team has decades of combined experience in the utility DSM industry. We provide expertise, insight and analysis to support a broad range of utility DSM activities, including: potential assessments; end-use forecasts; integrated resource planning; EE, DR, DG, and smart grid pilot and program design and administration; load research; technology assessments and demonstrations; project reviews; program evaluations; and regulatory support.

Our consulting engagements are managed and delivered by a seasoned, interdisciplinary team comprised of analysts, engineers, economists, business planners, project managers, market researchers, load research professionals, and statisticians. Clients view AEG's experts as trusted advisors, and we work together collaboratively to make any DSM initiative a success.

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IPL 2014 IRP

Attachment 4.8 (2012 MPS) is provided electronically.

Appendix B

Summary of Equations and Glossary of Symbols

Basic Equations

Participant Test

NPVP	=	BP - CP	
NPVavp	=	(BP - CP) / P	
BCRP	=	BP/CP	
DPP	=	min j such that Bj > Cj	

Ratepayer Impact Measure Test

LRIRIM	=	(CRIM - BRIM) / E	
FRIRIM	=	(CRIM - BRIM) / E	for t = 1
ARIRIMt	=	FRIRIM	for t = 1
	=	(CRIMt- BRIMt)/Et	for t=2,... ,N
NPVRIM	=	BRIM — CRIM	
BCRRIM	=	BRIM /CRIM	

Total Resource Cost Test

NPVTRC	=	BTRC - CTRC
BCRTRC	=	BTRC / CTRC
LCTRC	=	LCRC / IMP

Program Administrator Cost Test

NPVpa	=	Bpa - Cpa
BCRpa	=	Bpa / Cpa
LCpa	=	LCpa / IMP

Benefits and Costs

Participant Test

$$Bp = \sum_{t=1}^{N} \frac{BR_t + TC_t + INC_t}{(1+d)^{t-1}} + \sum_{t=1}^{N} \frac{AB_{at} + PAC_{at}}{(1+d)^{t-1}}$$

$$Cp \sum_{t=1}^{N} \frac{PC_t + BI_t}{(1+d)^{t-1}}$$

Ratepayer Impact Measure Test

$$B_{RIM} = \sum_{t=1}^{N} \frac{UAC_t + RG_t}{(1+d)^{t-1}} + \sum_{t=1}^{N} \frac{UAC_{at}}{(1+d)^{t-1}}$$

$$C_{RIM} = \sum_{t=1}^{N} \frac{UIC_t + RL_t + PRC_t + INC_t}{(1+d)^{t-1}} + \sum_{t=1}^{N} \frac{RL_{at}}{(1+d)^{t-1}}$$

$$E = \sum_{t=1}^{N} \frac{E_t}{(1+d)^{t-1}}$$

Total Resource Cost Test

$$B_{TRC} = \sum_{t=1}^{N} \frac{UAC_t + TC_t}{(1+d)^{t-1}} + \sum_{t=1}^{N} \frac{UAC_{at} + PAC_{at}}{(1+d)^{t-1}}$$

$$C_{TRC} = \sum_{t=1}^{N} \frac{PRC_t + PCN_t + UIC_t}{(1+d)^{t-1}}$$

$$L_{TRC} = \sum_{t=1}^{N} \frac{PRC_t + PCN_t - TC_t}{(1+d)^{t-1}}$$

$$IMP = \frac{\sum_{t=1}^{n} \left[(\sum_{i=1}^{n} \Delta EN_{it}) \; or \; (\Delta DN_{it} \; where \; I = peak \; period) \right]}{(1+d)^{t-1}}$$

Program Administrator Cost Test

$$B_{pa} = \sum_{t=1}^{N} \frac{UAC_t}{(1+d)^{t-1}} + \sum_{t=1}^{N} \frac{UAC_{at}}{(1+d)^{t-1}}$$

$$C_{pa} = \sum_{t=1}^{N} \frac{PRC_t + INC_t + UIC_t}{(1+d)^{t-1}}$$

$$LCPA = \sum_{t=1}^{N} \frac{PRC_t + INC_t}{(1+d)^{t-1}}$$

Glossary of Symbols

Abat	=	Avoided bill reductions on bill from alternate fuel in year t
AC:Dit	=	Rate charged for demand in costing period i in year t
AC:Eit	=	Rate charged for energy in costing period i in year t
ARIRIM	=	Stream of cumulative annual revenue impacts of the program per unit of energy, demand, or per customer. Note that the terms in the ARI formula are not discounted, thus they are the nominal cumulative revenue impacts. Discounted cumulative revenue impacts may be calculated and submitted if they are indicated as such. Note also that the sum of the discounted stream of cumulative revenue impacts does not equal the LRIRIM*
BCRp	=	Benefit-cost ratio to participants
BCRRIM	=	Benefit-cost ratio for rate levels
BCRTRC	=	Benefit-cost ratio of total costs of the resource
BCRpa	=	Benefit-cost ratio of program administrator and utility costs
BIt	=	Bill increases in year t
Bj	=	Cumulative benefits to participants in year j
Bp	=	Benefit to participants
BRIM	=	Benefits to rate levels or customer bills
BRt	=	Bill reductions in year t
BTRC	=	Benefits of the program
Bpa	=	Benefits of the program
Cj	=	Cumulative costs to participants in year i

Cp	=	Costs to participants
CRIM	=	Costs to rate levels or customer bills
CTRC	=	Costs of the program
Cpa	=	Costs of the program
D	=	discount rate
ΔDgit	=	Reduction in gross billing demand in costing period i in year t
ΔDnit	=	Reduction in net demand in costing period i in year t
DPp	=	Discounted payback in years
E	=	Discounted stream of system energy sales-(kWh or therms) or demand sales (kW) or first-year customers
ΔEgit	=	Reduction in gross energy use in costing period i in year t
ΔEnit	=	Reduction in net energy use in costing period i in year t
Et	=	System sales in kWh, kW or therms in year t or first year customers
FRIRIM	=	First-year revenue impact of the program per unit of energy, demand, or per customer.
IMP	=	Total discounted load impacts of the program
INCt	=	Incentives paid to the participant by the sponsoring utility in year t First year in which cumulative benefits are > cumulative costs.
Kit	=	1 when ΔEGit or ΔDGit is positive (a reduction) in costing period i in year t, and zero otherwise
LCRC	=	Total resource costs used for levelizing
LCTRC	=	Levelized cost per unit of the total cost of the resource
LCPA	=	Total Program Administrator costs used for levelizing
Lcpa	=	Levelized cost per unit of program administrator cost of the resource
LRIRIM	=	Lifecycle revenue impact of the program per unit of energy (kWh or therm) or demand (kW)-the one-time change in rates-or per customer-the change in customer bills over the life of the program.
MC:Dit	=	Marginal cost of demand in costing period i in year t
MC:Eit	=	Marginal cost of energy in costing period i in year t
NPVavp	=	Net present value to the average participant
NPVP	=	Net present value to all participants
NPVRIM	=	Net present value levels
NPVTRC	=	Net present value of total costs of the resource
NPVpa	=	Net present value of program administrator costs
OBIt	=	Other bill increases (i.e., customer charges, standby rates)
OBRt	=	Other bill reductions or avoided bill payments (e.g., customer charges, standby rates).
P	=	Number of program participants
PACat	=	Participant avoided costs in year t for alternate fuel devices

PCt	=	Participant costs in year t to include: • Initial capital costs, including sales tax • Ongoing operation and maintenance costs • Removal costs, less salvage value • Value of the customer's time in arranging for installation, if significant
PRCt	=	Program Administrator program costs in year t
PCN	=	Net Participant Costs
RGt	=	Revenue gain from increased sales in year t
RLat	=	Revenue loss from avoided bill payments for alternate fuel in year t (i.e., device not chosen in a fuel substitution program)
RLt	=	Revenue loss from reduced sales in year t
TCt	=	Tax credits in year t
UACat	=	Utility avoided supply costs for the alternate fuel in year t
UACt	=	Utility avoided supply costs in year t
PAt	=	Program Administrator costs in year t
UICt	=	Utility increased supply costs in year t

Indianapolis Power & Light Company
Annual Estimate - Based on 2015-2017 Action Plan (Cause No. 44497)
Reflects 2015 Annual Information - which is representative for each of the 3 years in the planning period

	Per Participant					
Program	**Estimated Participant Annual Bill Reduction**	**Participant Costs**	**Participant Incentive**	**Net Energy (kWh)**	**Net Demand (kW)**	**Estimated Penetration Rate**
Residential Lighting	$ 41	$ 61	$ 41	452	0.1	8.6%
Residential Income Qualified Weatherization	$ 75	NA	$ 125	823	0.2	0.6%
Residential Air Conditioning Load Management	$ 1	NA	$ 20	10	0.9	9.7%
Residential Multi Family Direct Install	$ 52	NA	$ 39	571	0.1	2.4%
Residential Home Energy Assessment	$ 133	NA	$ 67	1462	0.1	0.9%
Residential School Kits	$ 41	NA	$ 25	453	0.0	2.1%
Residential Online Energy Assessment	$ 37	NA	$ 37	409	0.0	0.6%
Residential Appliance Recycling	$ 74	NA	$ 212	815	0.1	0.7%
Residential Peer Comparison Reports	$ 10	NA	$ 7	115	0.0	47.5%
Business Energy Incentives – Prescriptive - PER MEASURE	$ 17	$ 39	$ 21	218	0.0	Varies
Business Energy Incentives – Custom	$ 4,136	$ 10,311	$ 6,308	52564	10.5	<0.1%
Small Business Direct Install - PER MEASURE	$ 17	NA	$ 20	222	0.0	Varies
Business Air Conditioning Load Management (TONS)	$ 0	NA	$ 28	5	0.4	<0.1%

IPL 2014 IRP

Confidential Attachment 5.1 (Ventyx IPL – IRP 2014 Report) is only available in the Confidential IRP.

IPL 2014 IRP

Attachment 6.1 (10 Yr Energy and Peak Forecast) is provided electronically.

IPL 2014 IRP

Attachment 6.2 (20 Yr Energy and Peak Forecast) is provided electronically.

IPL 2014 IRP

Confidential Attachment 6.3 (End Use Modeling Technique) is only available in the Confidential IRP.

IPL 2014 IRP

Confidential Attachment 6.4 (EIA End Use Data) is provided electronically.

IPL 2014 IRP

Confidential Attachment 6.5 (Energy – Forecast Drivers) is provided electronically.

IPL 2014 IRP

Attachment 6.6 (Energy – Input Data Set 1) is provided electronically.

IPL 2014 IRP

Attachment 6.7 (Energy – Input Data Set 2) is provided electronically.

IPL 2014 IRP

Attachment 6.8 (Energy – Input Data Set 3) is provided electronically.

IPL 2014 IRP

Attachment 6.9 (Peak – Forecast Drivers and Input Data) is provided electronically.

IPL 2014 IRP

Confidential Attachment 6.10 (Model Performance – Statistical Measures) is only available in the Confidential IRP.

IPL 2014 IRP

Attachment 6.11 (Forecast Error Analysis) is provided electronically.

INDIANAPOLIS POWER & LIGHT COMPANY

2014 Integrated Resource Plan Public Summary

What's Inside

- Existing Generation
- Public Advisory Process
- Capacity Position
- IRP Scenarios
- Planning Assumptions
- Preferred Portfolio
- Short Term Action Plan

October 31, 2014

IPL participates in an Integrated Resource Planning (IRP) process as required by the Indiana Administrative Code[1] (IAC) to identify a resource plan to reliably serve its customers for a forward looking twenty year period. Biannually, the IRP is filed with the Indiana Utility Regulatory Commission (IURC). The combination of projected customer load, existing resources, projected operating costs, anticipated environmental and other regulatory requirements, potential supply options and demand side resources are analyzed within the context of the risks of uncertain future landscapes to plan to provide electricity service in the most cost-effective and reliable way possible.

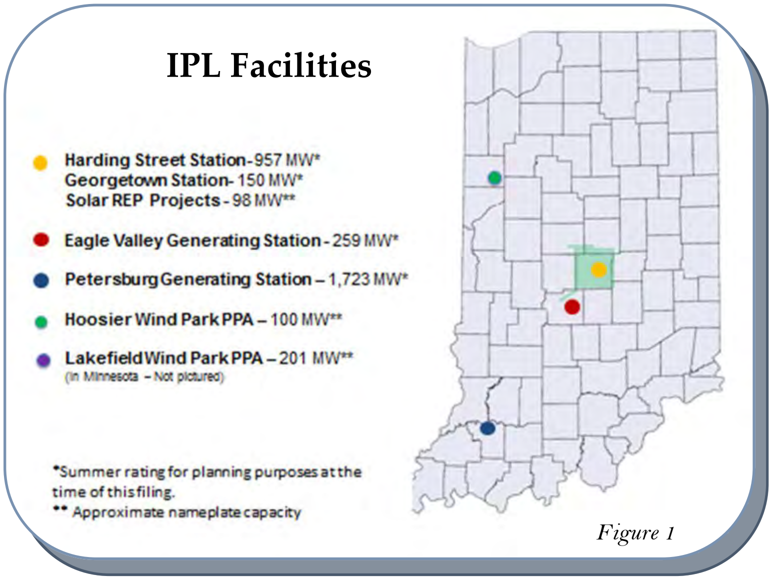


Figure 1

- ◊ IPL serves approximately 470,000 households and businesses in ten counties in Central Indiana, mainly in Marion County and adjoining counties.
- ◊ About 88% of IPL's customers are residential, yet the largest percentage of the Company's energy usage is from the Large Commercial and Industrial customers.

IPL owns and efficiently operates approximately 3,089 MW[2] of generation at four plants, over 800 miles of transmission lines, and over 11,600 miles of distribution lines as a vertically integrated investor owned utility.

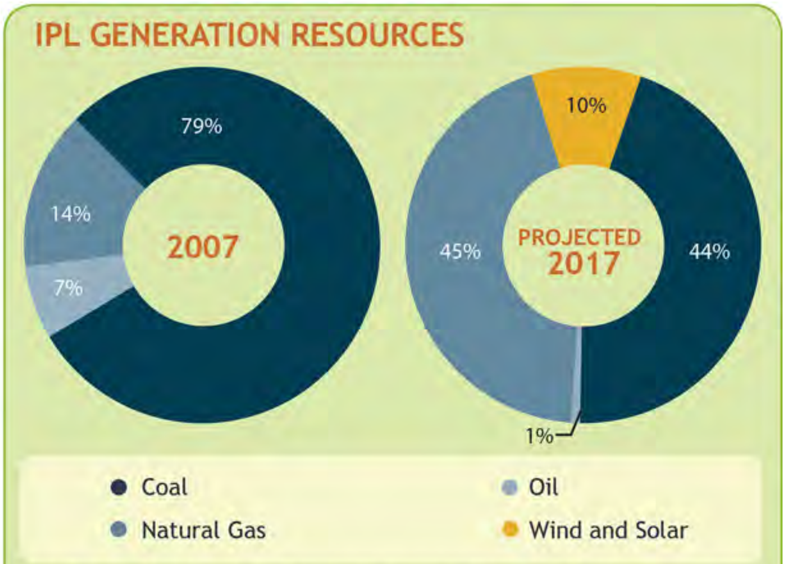
See *Figure 1* for generation sites and IPL's service territory. IPL also has purchase power agreements for approximately 98 MW of local solar generation and approximately 300 MW of wind generation.

[1]http://www.in.gov/legislative/iac/T01700/A00040.PDF

[2]Summer rating for planning purposes at the time of this filing

Projected 2017 Resource Portfolio

IPL has made great strides to diversify its portfolio by changing the fuel mix from 79% coal and 14% natural gas in 2007 to the projected mix of 44% coal and 45% natural gas in 2017. The Company has also added 10% wind and solar resources to its portfolio since 2007. See *Figure 2* for detail. The shift in IPL's generation mix is due to the Company's new 671 MW Eagle Valley CCGT and the refueling of Harding Street units 5 through 7[1] from coal to natural gas to ensure compliance with new environmental regulations.



2007: Resources based on maximum summer rated capacity.
2017: Resources based on maximum summer rated capacity.
Includes existing long- term purchase agreements for wind as well as solar power under contract per Rate REP (Renewable Energy Production). Also reflects the proposed refuel of HSS Unit 7 from coal to natural gas.

Figure 2

[1]HSS 7 refuel is pending IURC approval in Cause No. 44540

Public Advisory Process

As part of a new public advisory process with our stakeholders, IPL conducted three stakeholder workshops to discuss the IRP process with interested parties and gather feedback. With the guidance of a third party facilitator, IPL provided information to and gathered information from stakeholders. After the first workshop, the Company responded to 112 comments and questions and an additional 29 comments and questions following the second meeting. The modifications made as a result of stakeholder participation are highlighted in the second presentation and incorporated in the third presentation. The three workshops and related agendas are summarized below:

May 16, 2014

◊ Introduction to IPL and Integrated Resource Planning Process
◊ Energy and Peak Forecasts
◊ Demand Side Management: Energy Efficiency and Demand Response
◊ Planning Reserve Margin
◊ Generation Overview
◊ Environmental Overview
◊ Distributed Energy Resources
◊ Proposed Modeling Assumptions

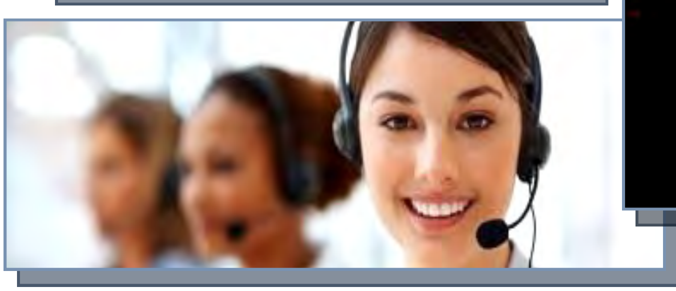
July 18, 2014

◊ Demand Side Management Update
◊ Environmental Update
◊ Incorporating Stakeholder Input
◊ Presentation of Initial Scenario Results

October 10, 2014

◊ Waste Water Analysis Results
◊ Updated Modeling Assumptions
◊ Presentation of Scenario Results
◊ Short Term Action Plan

Meeting materials, stakeholder comments and questions, and meeting summaries are available at https://www.iplpower.com/irp/.



IPL's energy and peak load requirements are expected to grow at a compound annual growth rate of 0.8% and 0.9%, respectively, through 2033. IPL is required to maintain an adequate reserve margin to satisfy its load obligation as a retail jurisdictional utility in Indiana and as a member of the Midcontinent Independent System Operator (MISO).

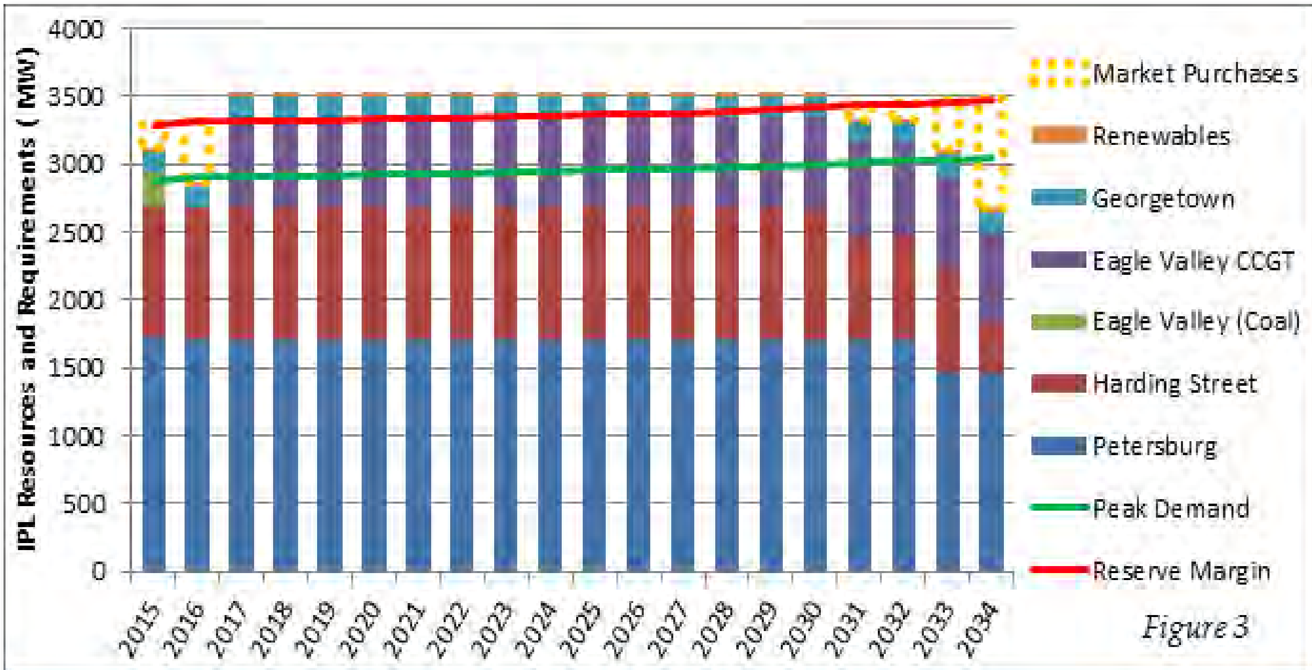


Figure 3

Figure 3 shows IPL's projected reserve margin compared to the available resources, assuming no resource additions other than those proposed and approved by the IURC as described on page 3. The capacity deficit prior to 2017 is met by market purchases. Once refueling and new generation construction is complete in 2017, IPL does not experience a capacity shortfall until 2030.

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.

IPL, with assistance from its stakeholders and consultants, created eight scenarios (depicted below in *Figure 4*) to target three major resource drivers– potential Greenhouse Gas regulation, natural gas prices, and load variation. Potential Greenhouse Gas regulation is quantified using four distinct CO_2 costs: IPL-EPA Shadow price (Moderate-EPA), Federal legislation Ventyx Fall 2013 price (High), Mass Cap ICF price (Moderate-ICF), and a zero cost scenario (Low). Additionally, high, low, and base forecasts were used for natural gas and load forecasts.

> The use of multiple scenarios allows IPL to identify a Preferred Portfolio that will be competitive in a wide range of future landscapes.

No.	Scenario Name	Gas/Market Price	CO_2 Price	Load Forecast
1	Base	Base	Moderate-EPA	Base
2	High Load	Base	Moderate-EPA	High
3	Low Load	Base	Moderate-EPA	Low
4	High Gas	High	Moderate-EPA	Base
5	Low Gas	Low	Moderate-EPA	Base
6	High Environmental	Environmental	High	Base
7	Environmental	Mass Cap	Moderate-ICF	Base
8	Low Environmental	Base	Low	Base

Figure 4

The future impacts on IPL's resource plan continue to be uncertain amidst anticipated regulations pertaining to waste, water, air and emissions coupled with dynamic fuel cost forecasts, electricity market structural change and variable electricity price forecasts. In addition to the future landscapes, the selection of a Preferred Portfolio is dependent on a variety of input assumptions, including the customer growth rate and the cost assumptions in *Figure 5*.

Modeling Cost Inputs

1. Natural gas costs
2. Coal costs, by region
3. Energy costs, peak and off-peak
4. Capacity costs purchased on the open market
5. Demand side management costs and benefits
6. Costs of constructing or retrofitting generation
7. Costs of future environmental regulations

Figure 5

Assumptions 1 through 4 were provided to IPL by Ventyx, a consulting firm known nationwide to produce reliable forecasts. Assumption 5 was guided by Applied Energy Group ("AEG"), a consulting firm with energy efficiency and demand response expertise. Assumptions 6 through 8 were developed internally by IPL experts based on current and future regulations and market research and trends.

IPL assumed that there will be a cost associated with emitting CO_2 in seven of its eight scenarios due to the EPA's proposed Clean Power Plan rule. This cost will result in coal generation being partially replaced with natural gas fired generation resulting in higher off-peak energy prices (as coal generation normally sets the off-peak price). It may also result in additional renewable generation.

Aside from the planned retirement of Eagle Valley coal fired units 3 through 6 in 2016 and the planned refuel of Harding Street units 5 through 7[1] from coal to natural gas in 2016, the model was allowed to choose optimal unit retirement dates based on production costs.

IPL's Preferred Portfolio

From the eight scenarios, IPL used sophisticated modeling techniques to develop five resource expansion plans and their corresponding cost to customers. Plans one and two included no early retirements while plans three through five included the early retirement of Petersburg units 1 and 2. At the conclusion of modeling, the Base Case, or plan one, provided the reasonable least cost to customers over the planning period and was identified as the Preferred Portfolio.

Plan one is expected to provide the lowest reasonable cost of power to IPL's customers while meeting environmental and reliability constraints and reflecting emerging preference for, and the viability of customer self-generation. Plan one only adds new generation when an IPL unit is retired, which is reflective of the projected moderate energy growth rate for Indianapolis. As seen in *Figure 6*, IPL has sufficient resources to meet its load requirements until 2031 when Harding Street units 5 and 6 are planned to retire and be replaced with new natural gas generation.

[1]IPL's request to refuel HSS 7 is pending with the IURC in Cause No. 44540.

Plan one provides reliable electric utility service, at a reasonable cost, through a combination of existing resources, new resources and demand-side management programs. IPL will maintain adequate capacity resources to serve its customers' peak demand and required MISO reserve margin needs throughout the planning period.

The following *Figure 6* provides a long–term yearly description of the Preferred Portfolio—Plan one.

YEAR	Retirements	New Resource
2015-2030	None	None
2031	Harding Street Units 5 and 6	Combined Cycle Natural Gas 200 MW
2032	None	None
2033	Petersburg Unit 1	Combined Cycle Natural Gas 200 MW
2034	Harding Street Unit 7	Combined Cycle Natural Gas 400 MW

Figure 6

Short Term Action Plan

IPL's short-term action plan covering 2015 through 2017 identifies the initial steps toward the Company's longer-term resource strategy, as described in the Preferred Portfolio. The short term action plan focuses on managing the impacts of implementing the recommendations that resulted from the 2011 IRP. The following recommendations from the 2011 and 2014 IRP are in the process of being implemented over the 2015-2017 period:

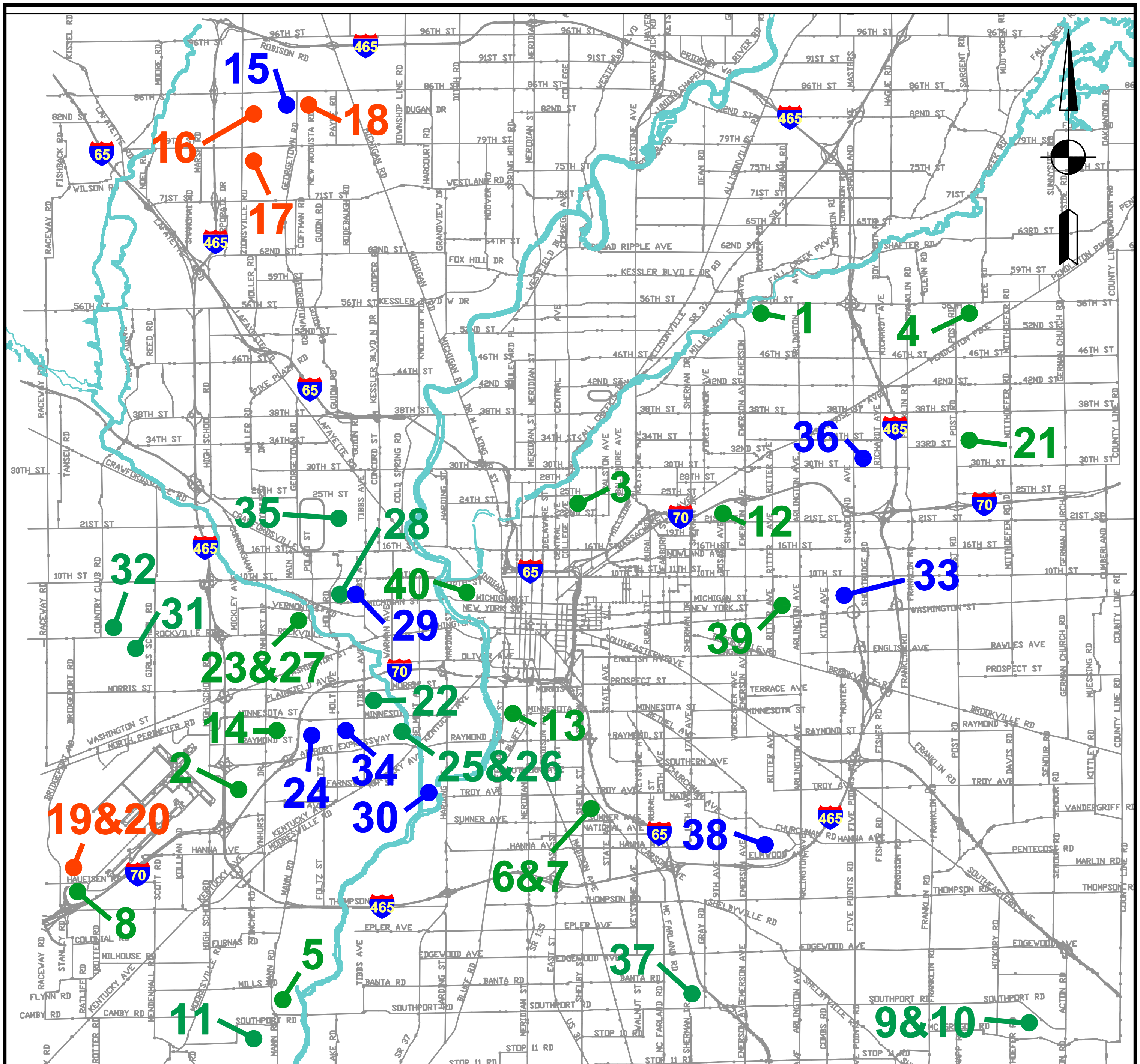
- Continue to offer Commission approved cost-effective DSM programs (See IURC Cause No. 44497)
- Retire Eagle Valley Units 3 through 6
- Construct the new 671 MW Eagle Valley CCGT (See IURC Cause No. 44339)
- Refuel Harding Street Units 5 and 6 from coal to natural gas (See IURC Cause No. 44339)
- Install environmental control equipment to comply with MATS regulations (See IURC Cause No. 44242)
- Plan for the refueling of Harding Street Unit 7 from coal to natural gas to comply with NPDES permits—pending Commission approval (See IURC Cause No. 44540)
- Complete construction of transmission facilities
- Purchase capacity for MISO planning years 2015-2016 and 2016-2017

Because Integrated Resource Planning is an iterative process, IPL will complete another IRP in 2016 incorporating updated and/or new assumptions. IPL thanks stakeholders for their involvement in the 2014 IRP. Please visit https://www.iplpower.com/irp/ to access detailed presentations and the IRP document.

FINAL RATE REP PARTICIPANTS

Count	Customer	Address	Nameplate Capacity (kW, AC)	Ground / Roof
1	Cathedral High School	5525 E. 56th St.	50	R
2	ES by JMS	5925 Stockberger Place	90	R
3	Indiana Veneers	1121 E. 24th Street	85	R
4	GSA Bean Finance Center	8899 E. 56th Street	1,800	R
5	Melloh Enterprises	6627 Mann Road	39	G
6	L&R #1 (Laurelwood Apts.)	Building #6, 3340 Teakwood Dr	30	R
7	L&R #2 (Laurelwood Apts.)	Building #16, 3340 Teakwood Dr	28	R
8	Airport I	7800 Col. H. Weir Cook Memorial Drive	9,800	G
9	Indy Solar I	10321 East Southport Road	10,000	G
10	Indy Solar II	10321 East Southport Road	10,000	G
11	Indy Solar III	5800 West Southport Road	8,640	G
12	Indy DPW	3915 E 21st Street	95	R
13	Indy DPW	1737 S. West St	95	R
14	Schaefer Technologies	4901 W. Raymond St, 46241	500	G
15	Citizens Energy (LNG North)	4650 W. 86th	1,500	G
16	Duke Realty #98	8258 Zionsville Rd, 46278	3,000	R
17	Duke Realty #87	5355 W. 76th St., Indpls., 46268	3,000	R
18	Duke Realty #129	4925 W. 86th St. Indianapolis, IN 46268	4,000	R
19	Airport Phase IIA	Intersection of Haueisen Rd& Bridgeport F	2,500	G
20	Airport Phase IIB	4250 W Perimeter Rd	7,500	G
21	Celadon Trucking Services	9503 E. 33rd Street, 46235	82	R
22	Vertellus	1500 S. Tibbs Ave, 46241	8,000	G
23	Merrell Brothers	4251 W. Vermont ST	96	R
24	Grocers' Supply Co.	4310 Stout Field Dr. North	1,000	R
25	A-Pallet Co.	1225 S. Bedford St.	48	G
26	A-Pallet Co.	1305 S. Bedford St.	96	R
27	Town of Speedway, IN	4251 W. Vermont ST	750	G
28	GenNx Properties VI, LLC (Maple Creek Apts)	3800 W. Michigan Street (Bldg 17)	20	R
29	GenNx Properties VI, LLC (Maple Creek Apts)	3800 W. Michigan Street (Bldg 1)	20	R
30	CWA Authority	2700 S. Belmont (WWTF)	3,830	G
31	Rexnord Industries	7601 Rockville Road	2,800	G
32	Equity Industrial A-Rockville LLC	7900 Rockville Road	2,725	R
33	Lifeline Data Centers	401 N. Shadeland Ave	4,000	R
34	Omnisource	2205 S. Holt	1,000	G
35	Indianapolis Motor Speedway	3702 W 21st Street	9,594	G
36	DEEM	6900 E. 30th Street	500	R
37	Indy Southside Sports Academy	4150 Kildeer Dr	200	R
38	Marine Center of Indiana	5701 Elmwood Ave	500	R
39	5855 LP	5855 E. Washington St.	78	R
40	IUPUI	801 W. Michigan Rd	48	R
		Total	98,138	

4	10/2/2014	Under Construction	17,500
27		Operating	65,816
9		In Development	14,823



1. CATHEDRAL HIGH SCHOOL
2. ES by JMS
3. INDIANA VENEERS
4. GSA BEAN FINANCE CENTER
5. MELLOH ENTERPRISES
6. L&R #1 (LAURELWOOD APTS.)
7. L&R #2 (LAURELWOOD APTS.)
8. AIRPORT I
9. INDY SOLAR I
10. INDY SOLAR II
11. INDY SOLAR III
12. INDY DPW
13. INDY DPW
14. SCHAEFER TECHNOLOGIES
15. CITIZENS ENERGY (LNG NORTH)
16. DUKE REALTY #98
17. DUKE REALTY #87
18. DUKE REALTY #129
19. AIRPORT PHASE IIA
20. AIRPORT PHASE IIB
21. CELADON TRUCKING SERVICES
22. VERTELLUS
23. MERRELL BROTHERS
24. GROCERS' SUPPLY CO.
25. A-PALLET CO.
26. A-PALLET CO.
27. TOWN OF SPEEDWAY, IN
28. GenNx PROPERTIES VI, LLC. (MAPLE CREEK APTS.)
29. GenNx PROPERTIES VI, LLC. (MAPLE CREEK APTS.)
30. CWA AUTHORITY
31. REXNORD INDUSTRIES
32. EQUITY INDUSTRIAL A-ROCKVILLE LLC.
33. LIFELINE DATA CENTERS
34. OMNISOURCE
35. INDIANAPOLIS MOTOR SPEEDWAY
36. DEEM
37. INDY SOUTHSIDE SPORTS ACADEMY
38. MARINE CENTER OF INDIANA
39. 5855 LP
40. IUPUI

LEGEND

- OPERATING

- UNDER CONSTRUCTION

- IN DEVELOPMENT

ipl an AES company

INDIANAPOLIS POWER & LIGHT CO.

SOLAR FACILITIES

DRAWN BY: RLW

10-2-14

solar-REP-GIS-map

Indianapolis Power & Light Company

Attachment 9.1 (IRP Public Advisory Process Presentations)

Meeting #1: May 16, 2014
Meeting #2: July 18, 2014
Meeting #3: October 10, 2014

IRP Public Advisory Meeting #1

Workshop with IRP Stakeholders

May 16, 2014

The Hall

202 N. Alabama St

Welcome and Introductions

Meeting Agenda and Guidelines

Presented by Marty Rozelle, PhD, Meeting Facilitator

IRP Public Advisory Meeting #1

Agenda Topics

- Introduction to IPL and Integrated Resource Planning Process
- Energy and Peak Forecasts
- Demand Side Management: Energy Efficiency and Demand Response
- Planning Reserve Margin
- Generation Overview
- Environmental Overview
- Distributed Energy Resources
- Proposed Modeling Assumptions

Meeting Objectives

- Enhance understanding of IPL's IRP process and IPL's resource portfolio
- Gather comments and feedback
- Continue relationship built on trust, respect and confidence

Meeting Guidelines

- Time for clarifying questions at end of each presentation
- Parking lot for items to be addressed later
- The phone line will be muted. During the allotted question time frames, you may press *6 to un-mute yourself.
- To inquire about confidential information please contact Teresa Nyhart with Barnes & Thornburg, LLP at teresa.nyhart@btlaw.com

Written Comments and Feedback

- The email, IPL.IRP@aes.com, will be open for a period of two weeks after this meeting, until May 30, for additional comments and feedback
- All IPL responses will be posted on the IPL IRP website on June 13

Questions?

Introduction to IPL

Presented by Herman Schkabla, Director of Resource Planning

Profile

- 470,000 customers*
- 1,400 employees*
- 528 sq. miles territory
- 144 substations

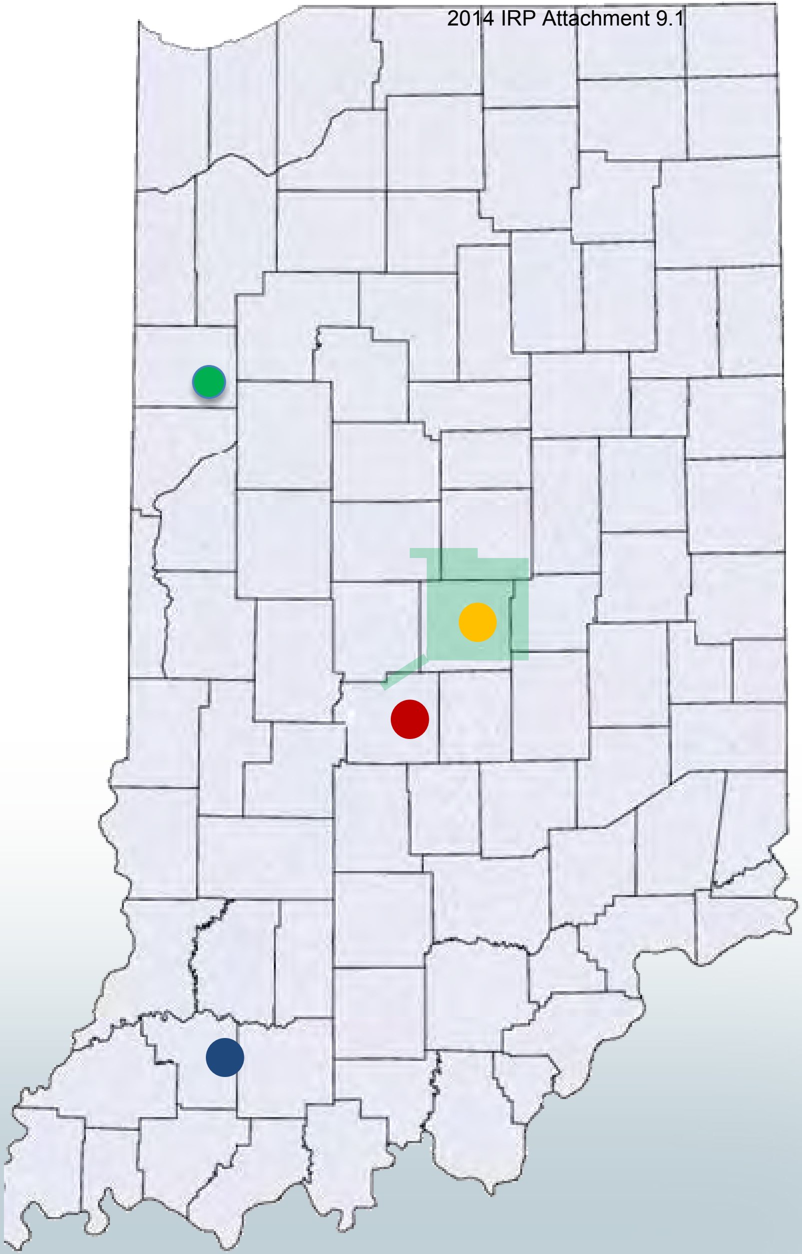
Harding Street Station, Georgetown Station, Solar REP Projects - 1,322 MW**

Eagle Valley Generating Station - 263 MW**

Petersburg Generating Station – 1,760 MW**

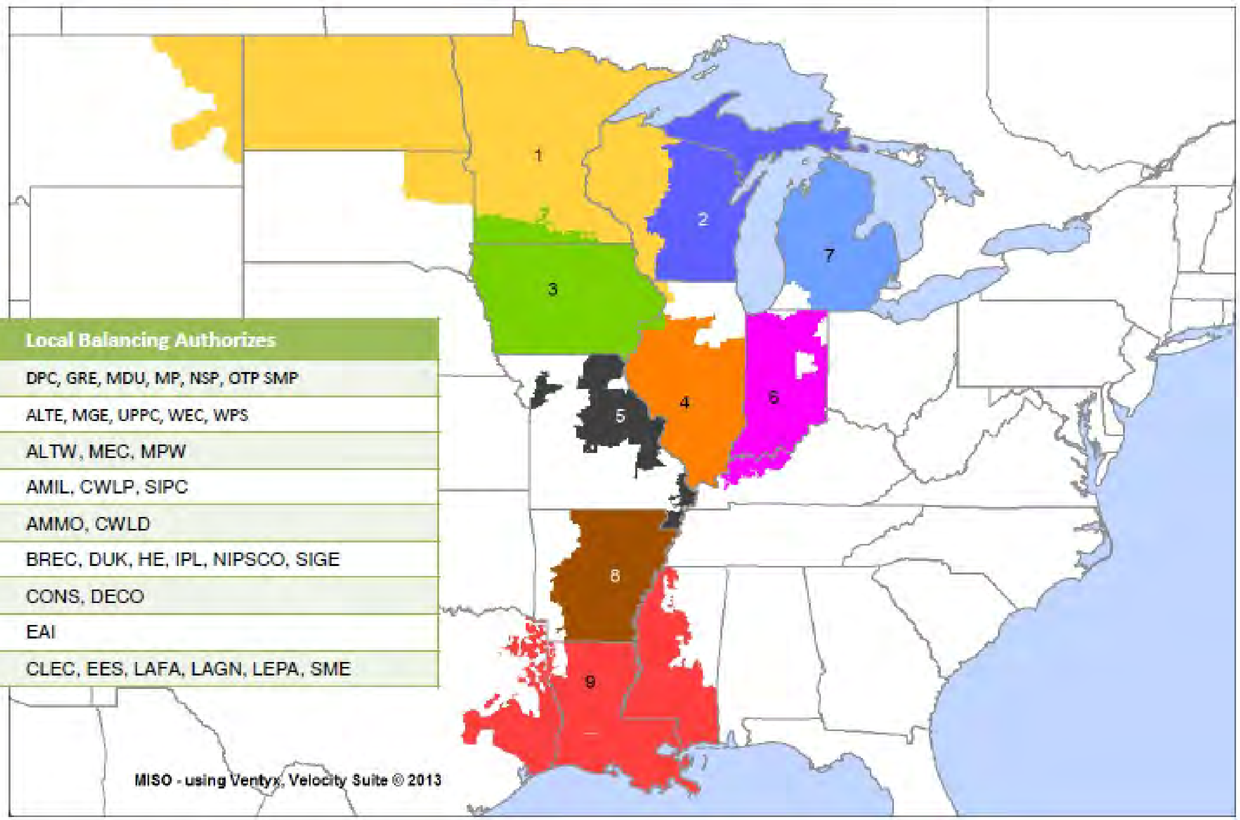
Hoosier Wind Park PPA – 100 MW**

Lakefield Wind Park PPA – 201 MW**
(In Minnesota – Not pictured)



*approximate numbers
**nameplate capacity

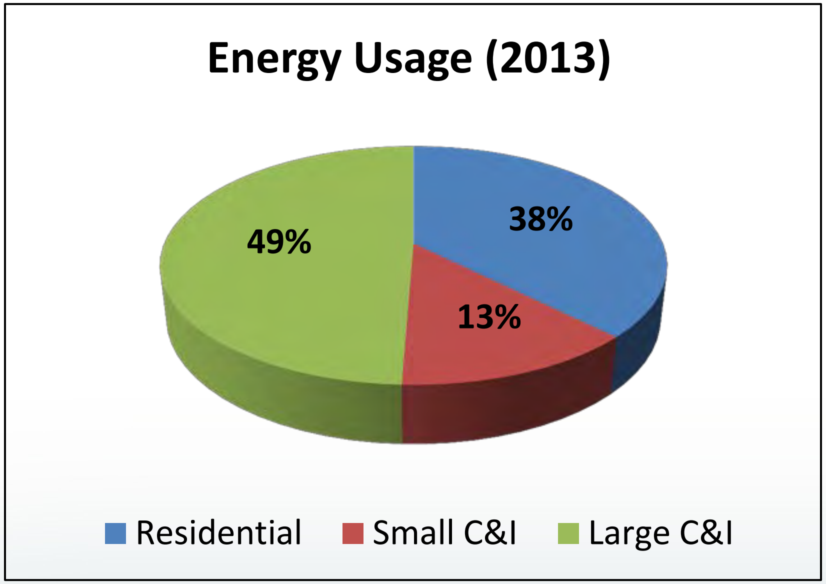
IPL Is In MISO Load Resource Zone (LRZ) 6

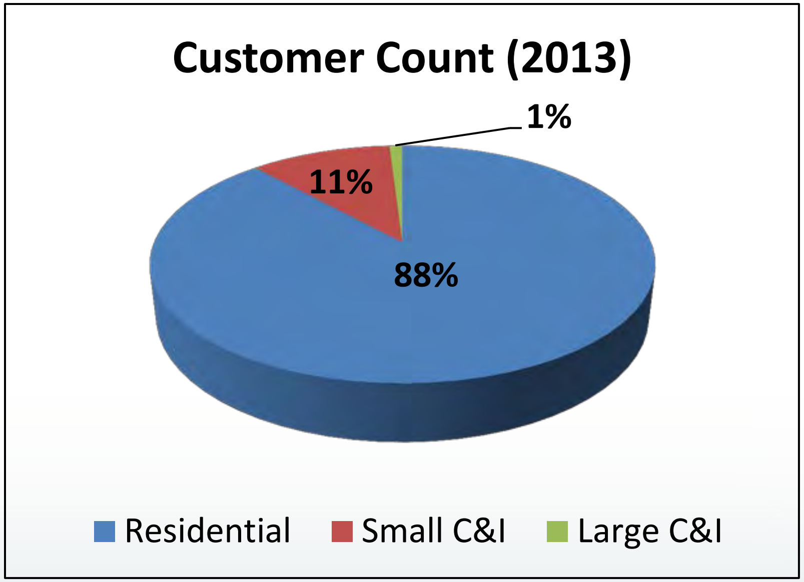


LRZ	Local Balancing Authorizes
1	DPC, GRE, MDU, MP, NSP, OTP SMP
2	ALTE, MGE, UPPC, WEC, WPS
3	ALTW, MEC, MPW
4	AMIL, CWLP, SIPC
5	AMMO, CWLD
6	BREC, DUK, HE, IPL, NIPSCO, SIGE
7	CONS, DECO
8	EAI
9	CLEC, EES, LAFA, LAGN, LEPA, SME

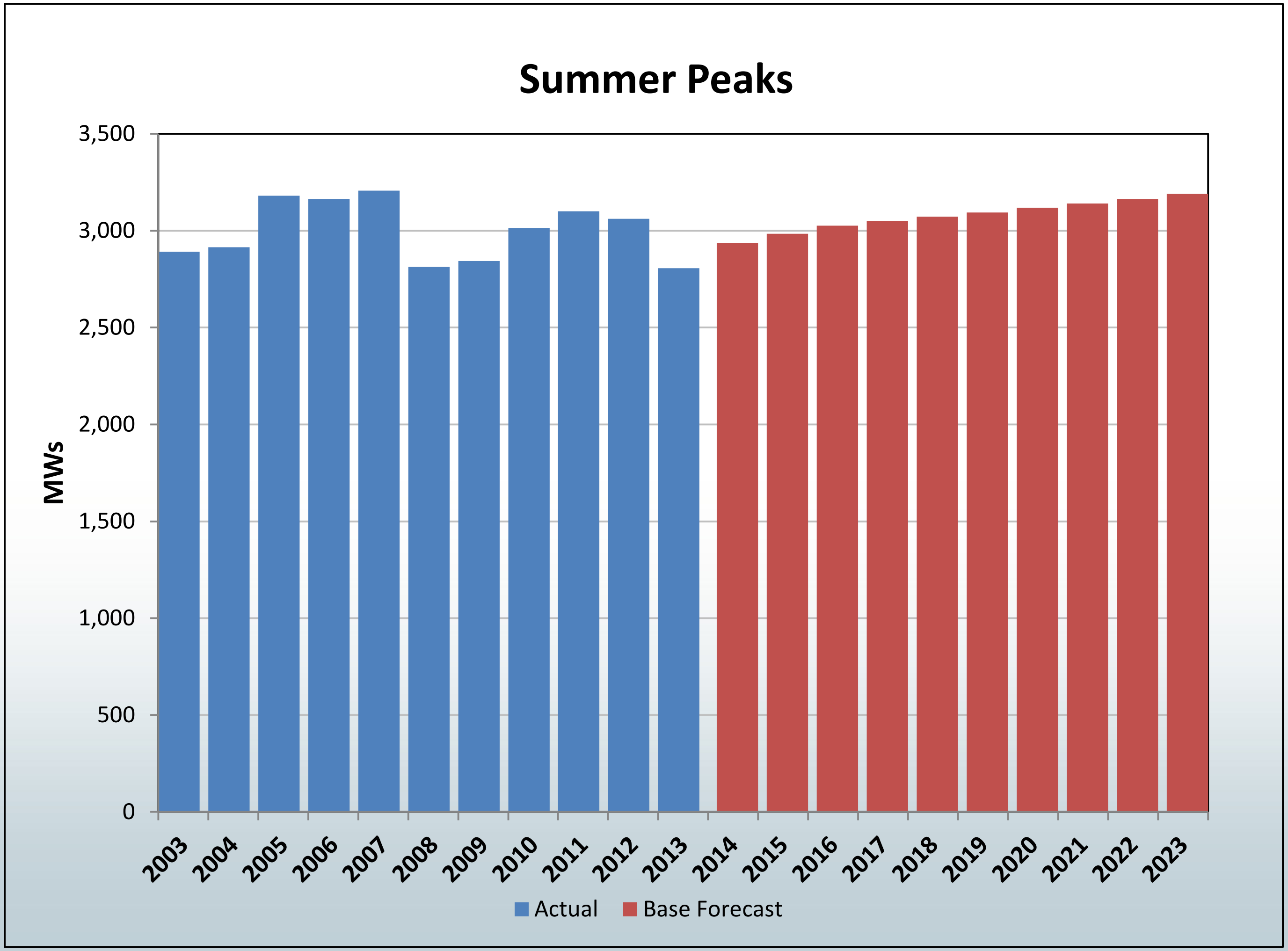
MISO – Midcontinent Independent System Operator, Inc.

Retail Energy Usage is Well Balanced between Residential and C&I Customer Classes





IPL Summer Peaks – Slow Recovery from Post-Recession Levels



Integrated Resource Planning Process

Presented by Herman Schkabla, Director of Resource Planning

IRP Process Overview

Develop IPL's **Total** Supply Resource Needs

Determine IPL's **New** Supply Resource Needs

Identify Key Risk Parameters

Identify and Screen Resource Technologies

Evaluate Resource Expansion Plans

Identify IPL's Reference and Short Term Action Plans

IPL's Total Resource Needs

Net Load Forecast and Reserve Margin Requirement

- Net Load Forecast includes:
  - Load Forecast – economic driven
  - Less the projected Demand Side Management (DSM): Energy Efficiency (EE) and Demand Response (DR) resources

- Reserve Margin Requirement – amount of generation capacity needed to meet expected demand in a planning horizon
  - Percentages set by MISO 1 year in advance
  - Impacted by IPL's generating unit availability

- These two components make up the Total Resource Needs

Net Load Forecast *times* (1 + Reserve Margin)

IPL's Total Supply Resource Needs

Demand Response Programs and Distributed Generation Projects

- Demand Response (DR) Programs and Distributed Generation (DG) Projects are subtracted from the Total Resource Needs to yield the Total Supply Resource Needs
  - DR Programs are primarily focused on reducing electric demand at peak times
  - DG Projects generate electricity from many small energy sources and are generally non-dispatchable

IPL's New Supply Resource Needs

Compare Projected Resources with Total Supply Resource Needs

- To determine if IPL needs any New Supply Resources, IPL evaluates its existing generation plan as needed based on environmental compliance
    - o Existing generation plan includes projects approved and/or pending at the IURC (e.g. Replacement Generation CPCN)
    - o IPL will also apply any portfolio mandates such as DSM/EE or RPS, if required

- Then, IPL can compare its projected resources with its forecasted Total Supply Resource Needs to see if there is a shortfall

CPCN – Certificate of Public Convenience and Necessity
RPS – Renewable Portfolio Standard

Identify Key Risk Parameters

Ventyx Screening Model Inputs

- Define key risk parameters for modeling and portfolio evaluation
- Stakeholder feedback on key risk parameters

Identify and Screen Resource Technologies

- Identify supply technologies for modeling
  - Input from Ventyx, IPL, and stakeholders
  - Subject to environmental constraints
- For defined scenarios, the Ventyx Capacity Expansion Screening Model will identify the top resource plan with the lowest Present Value Revenue Requirement (PVRR) to meet IPL's New Supply Resource Needs
- If appropriate, IPL may also select other resource alternatives that were not chosen by the Ventyx Capacity Expansion Screening Model for further evaluation

Evaluation of Resource Expansion Plans

- Resource(s) identified in the Capacity Expansion Screening Model will be used to:
  - Construct resource portfolios that will be evaluated using the more detailed Midas Gold Portfolio Simulation Production Cost model
    - ➔ Determine cost effectiveness

Identify IPL's Reference and Short Term Action Plans

- Select the plan that best meets the company's projected need for additional resources while balancing reliability, environmental responsibility, efficiency and cost.

IURC Mission

Assure that utilities and others use adequate planning and resources for the provision of safe and reliable utility services at reasonable cost.

IPL Mission

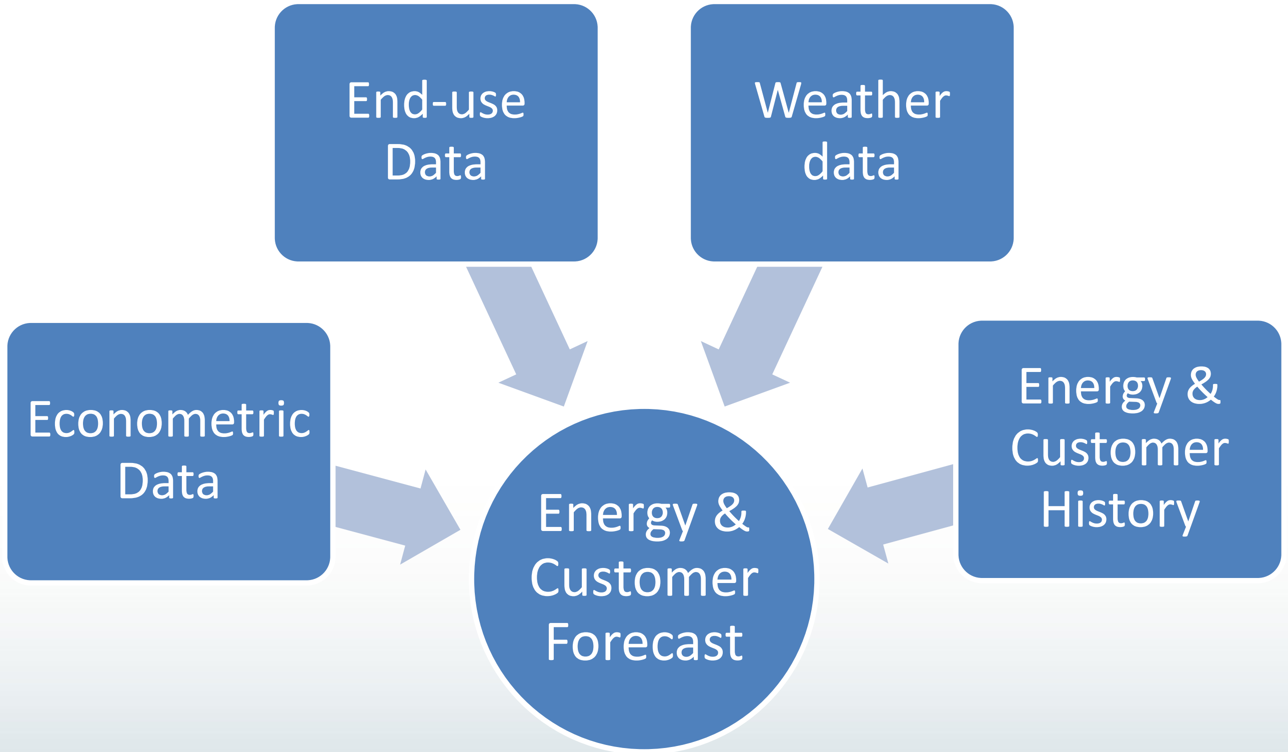
Improving lives by providing safe, reliable and affordable energy solutions in the communities we serve.

Questions?

Energy and Peak Forecasts

Presented by Swetha Sundar, Resource Planning Analyst

Energy Forecast Model

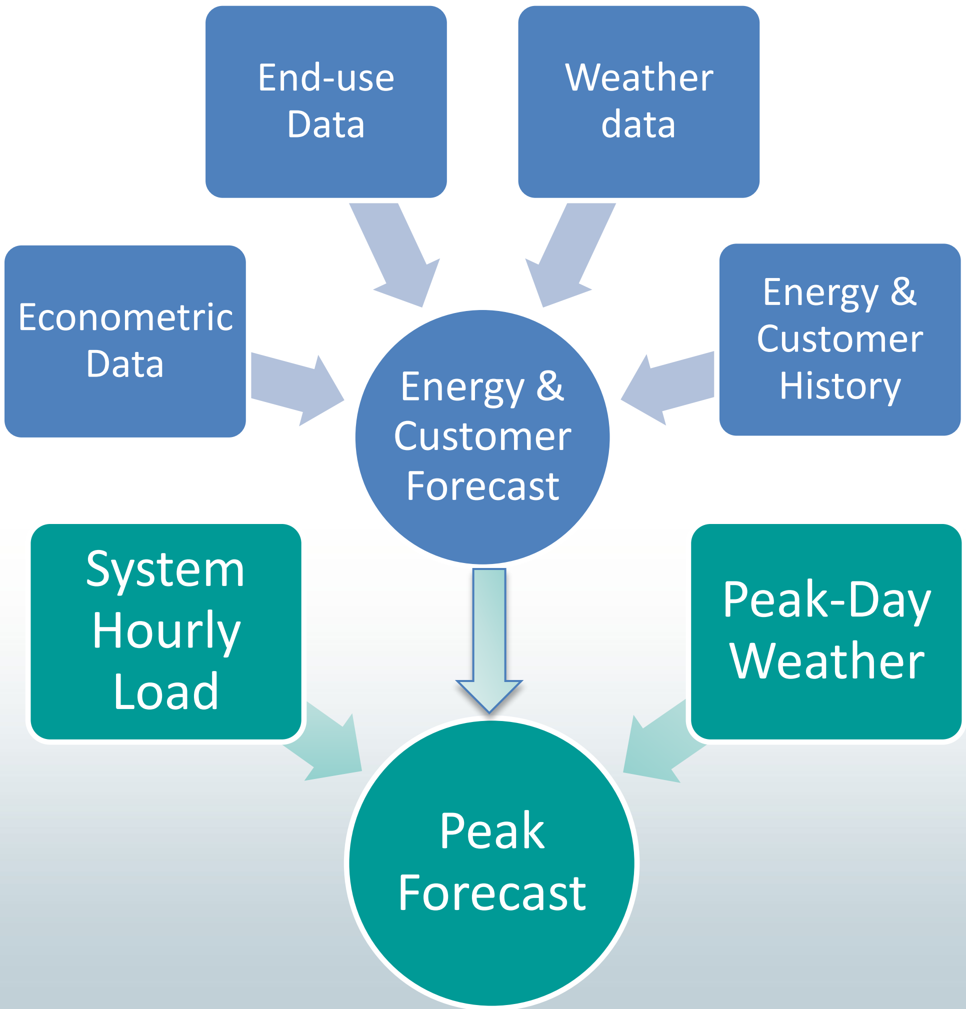


Hybrid model captures economic effects as well as energy-efficiency trends.

Energy Forecast Process

- 10-year historical data used as starting point
- 30-year average monthly degree-days used as normals
- Residential forecast:
  - o Hybrid average-use model; customer-growth trend model
  - o Average Use *times* Customer Count = Energy
- Small Commercial & Industrial forecast:
  - o Hybrid energy model
- Large Commercial & Industrial forecast:
  - o Econometric energy model

Peak Forecast Model –
Linked to Energy forecast for consistency



Peak Forecast Process

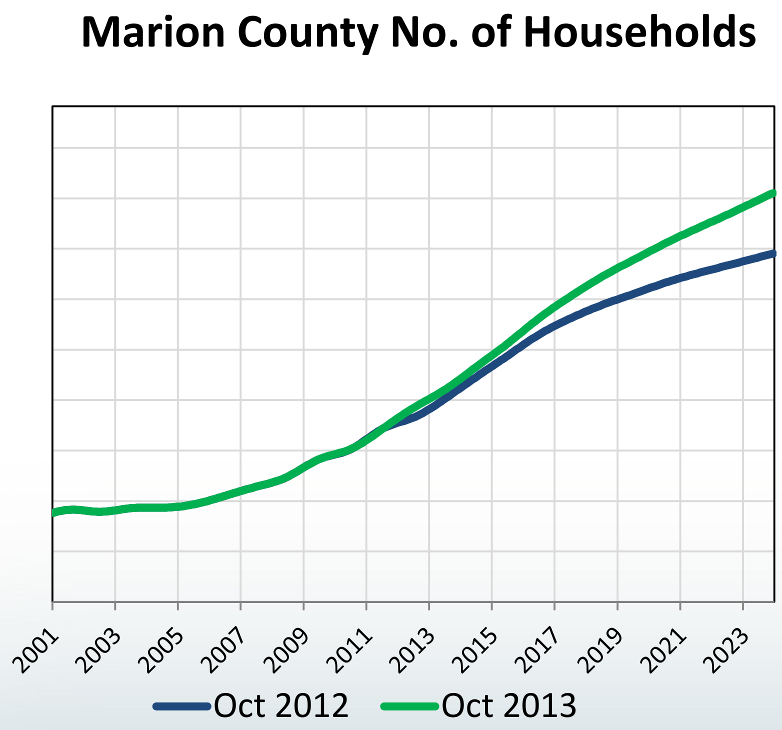
- 10-year historical actual data used as starting point
- 15-year average peak-producing degree-days used as normals
- Peak forecast:
  - Hybrid model tied to energy forecast
  - Developed based on integrated econometric and end-use variables

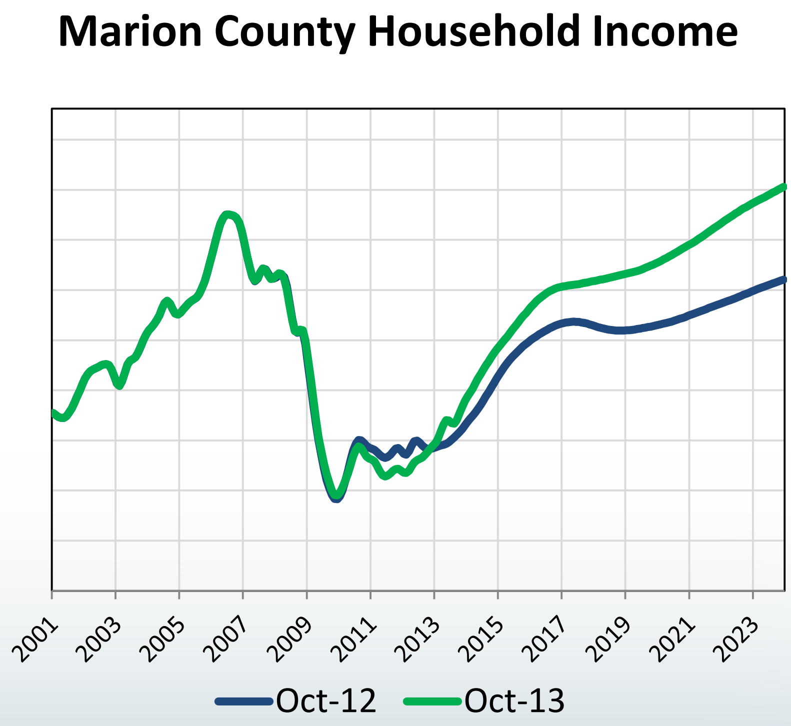
The Drivers –
Reflect economic and technological changes

Economic
(Source: Moody's)
- No. of households; Household income; Employment
- Updated quarterly

End-Use
(Source: EIA/Itron Inc.)
- EIA forecast for appliance saturation and efficiency
- Updated Annually

Residential Economic Drivers –
No. of households to grow at 1%



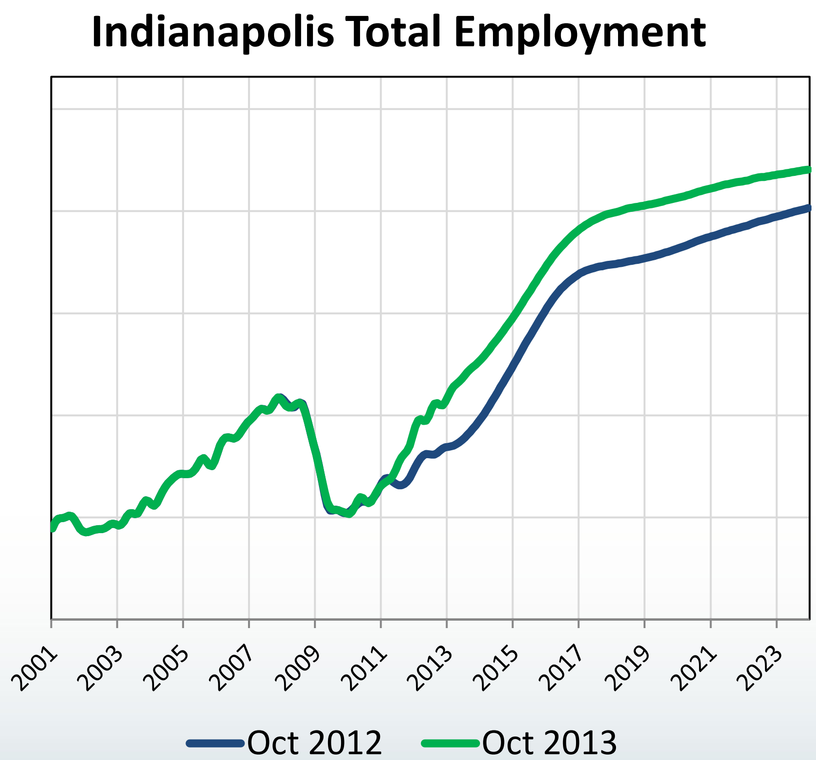


Projected Growth rates (2014 – 2023)

- # of households: 1%
- Household income: 1.2%

Source: Moody's Analytics

Commercial & Industrial Economic Drivers – Employment to grow at 1%



Projected Growth rates (2014 – 2023)

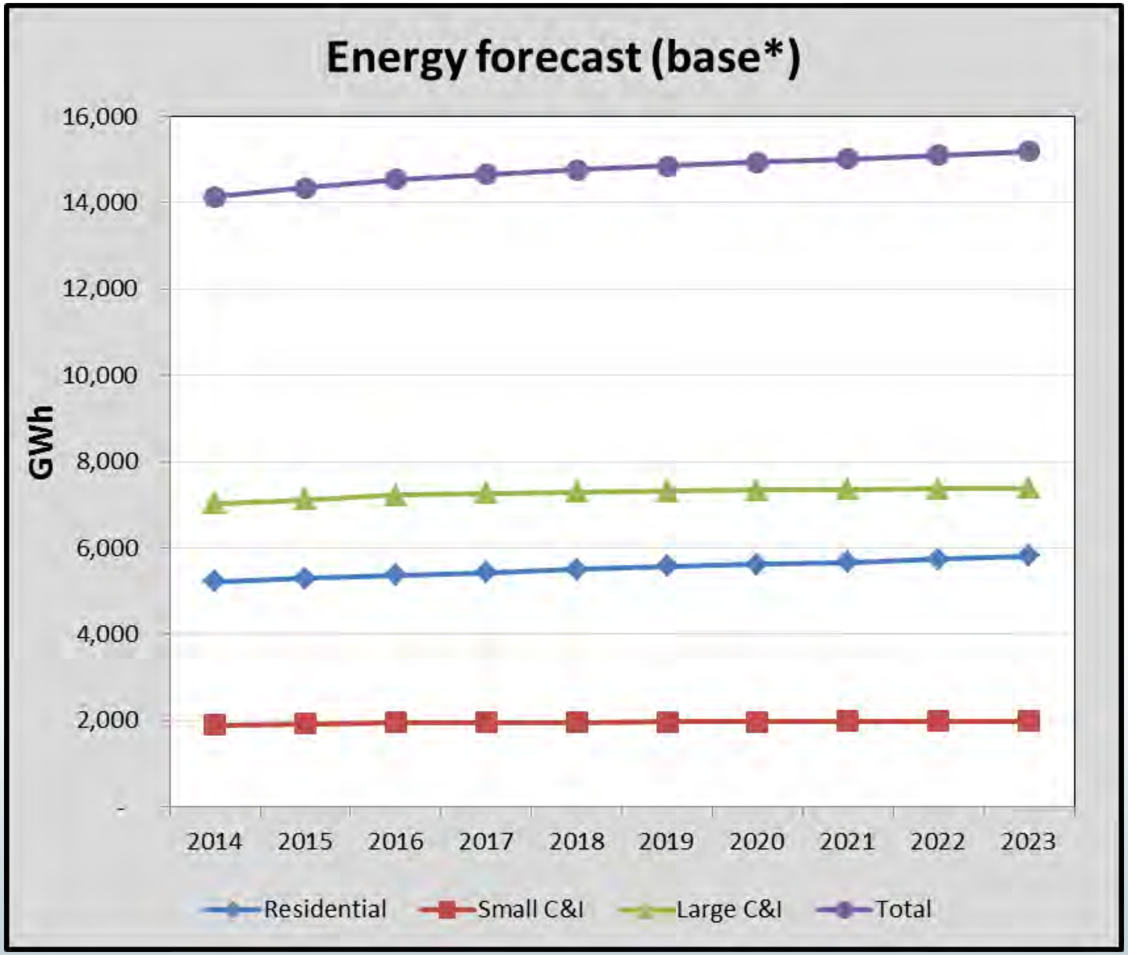
- Manufacturing employment: 0.1%
- Non-Manufacturing employment: 1.1%

Source: Moody's Analytics

Federal standards reflected in EIA data (examples)

Product	Compliance Date for Original Standard and Updates	Authorizing Legislation*
RESIDENTIAL PRODUCTS		
Clothes Washers (Water and Energy)	1988, 1994, 2004/2007, 2015/2018	NAECA 1987
Clothes Dryers	1988, 1994, 2014	NAECA 1987
Dishwashers (Water and Energy)	1988, 1994, 2010, 2013	NAECA 1987
Refrigerators and Refrigerator-Freezers	1990, 1993, 2001, 2014	NAECA 1987
Freezers	1990, 1993, 2001, 2014	NAECA 1987
Room Air Conditioners	1990, 2000, 2014	NAECA 1987
Central Air Conditioners and Heat Pumps	1992/1993, 2006, 2015	NAECA 1987
Water Heaters	1990, 2004, 2015	NAECA 1987
Furnaces	1992, 2013	NAECA 1987
Boilers	1992, 2012	NAECA 1987
Direct Heating Equipment	1990, 2013	NAECA 1987
Cooking Products	1990, 2012	NAECA 1987
Pool Heaters	1990, 2013	NAECA 1987
Ceiling Fans and Ceiling Fan Light Kits	2007	EPACT 2005
Torchieres	2006	EPACT 2005
Dehumidifiers	2007, 2012	EPACT 2005
External Power Supplies	2008	EISA 2007

The Forecast : Energy

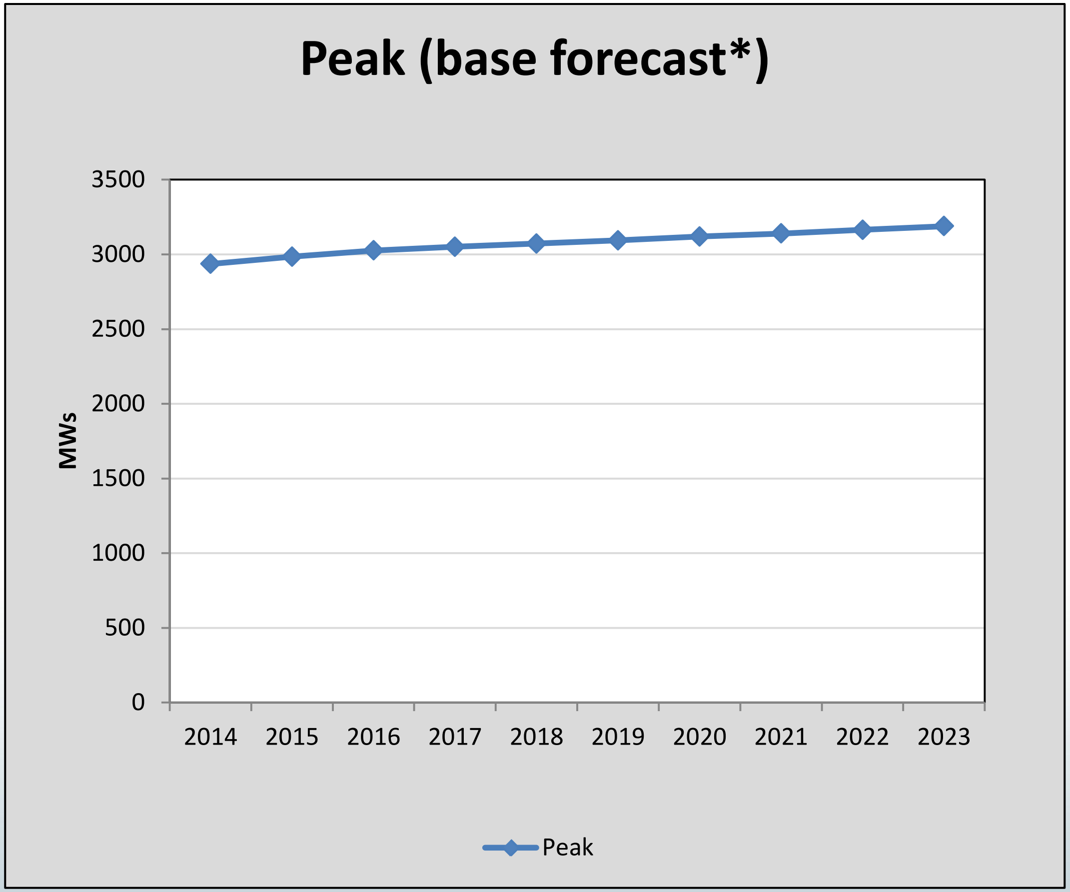


Average **Energy** growth rates (2014-23):

- Residential: 1.2%
- SCI: 0.6%
- LCI: 0.6%
- **Total: 0.8%**

* The forecast does not reflect company-sponsored DSM savings.

The Forecast : Peak



Average **Peak** growth rate (2014-23): **0.9%**

* The forecast does not reflect company-sponsored DSM savings.

IPL Forecast Is Consistent with Other Sources

- Itron, Inc. reviewed and updated models and forecasting practices
- Observed forecast-trend consistent with industry-wide expectations
- Impact of large C&I customers’ changes are monitored and reflected in forecast

Questions?

Demand Side Management: Energy Efficiency and Demand Response

Presented by Jake Allen, DSM Program Development Manager

What is Demand Side Management (DSM)?

- Per Indiana Administrative Code (170 IAC 4-7-1 (g)):
  - "Demand-side management" or "DSM" means the planning, implementation, and monitoring of a utility activity designed to Influence customer use of electricity that produces a desired change in a utility's load. DSM includes only an activity that involves deliberate intervention by a utility to alter load.
- Includes conservation, energy efficiency and demand response

DSM Rules and Requirements

- Historically, utilities have followed the Integrated Resource Planning rules (170 IAC 4-7) requiring that:
  - The utility shall consider alternative methods of meeting future demand for electric service
  - Include consideration of demand-side resources as a source of new supply in meeting future electric service requirements
  - For DSM programs, a cost-benefit analysis is performed using the four standard cost-benefit tests

Evolving DSM Rules and Requirements

- In December 2009, the Indiana Utility Regulatory Commission (IURC) established DSM targets for all Indiana jurisdictional electric utilities (Cause No. 42693-S1)
  - Targets increased in annual increments from 0.3% in 2010 to 2.0% in 2019
  - Established a set of “Core” DSM programs to be administered by a statewide 3rd party administrator
  - Utilities supplemented the Core Programs with Additional Core Plus programs

- In March 2014, the Indiana General Assembly passed legislation which modified DSM requirements in Indiana
  - Removes requirement to deliver statewide “Core” DSM programs and to meet the savings targets after 2014
  - Allows for opt-out by large customers (if greater than 1 MW demand)

Program Savings Are Verified Annually

- Both demand response programs and DSM programs are subject to cost-effectiveness testing as outlined by the Indiana Administrative Code
  - Used to gauge the costs versus benefits of each program
- All DSM programs are evaluated annually to verify the energy saving impacts
  - Programs are evaluated by an independent statewide evaluator: TecMarket Works

Current Demand Response Programs

- IPL's Demand Response programs are primarily focused on reducing electric demand at peak times
  - o Load Displacement and Interruptible Contracts: contracts with large commercial and industrial customers that are willing to reduce electrical consumption at peak times
    - IPL has approximately 44 MW of Load Displacement and Interruptible Contracts
  - o Cool Cents: a voluntary energy management program for residential and commercial customers that cycles cooling equipment during periods of peak electricity demand
    - IPL has approximately 40,000 participants
    - Cool Cents program participants can earn bill credits up to $20 per cooling system over June through September
    - Approximately 30 MW of peak load reduction

Current DSM Programs

Core Programs
(Energizing Indiana)

ENERGIZING INDIANA
Together we'll do powerful things.

- Residential Lighting
- Home Energy Assessment
- Income Qualified Weatherization
- School Education & Assessment
- Commercial & Industrial Prescriptive

Core Plus Programs
(By IPL)

POWER TOOLS

Residential
- Appliance Recycling
- Multi-Family Direct Install
- Residential New Construction
- Peer Comparison Report
- Air Conditioning Load Management
- Online Energy Assessment w Kit
- Renewables

Commercial & Industrial
- Business Energy Assessment
  - Prescriptive
  - Custom
- Air Conditioning Load Management
- Renewables

Recent DSM Achievement

2015 to 2017 DSM Action Plan Is Being Finalized

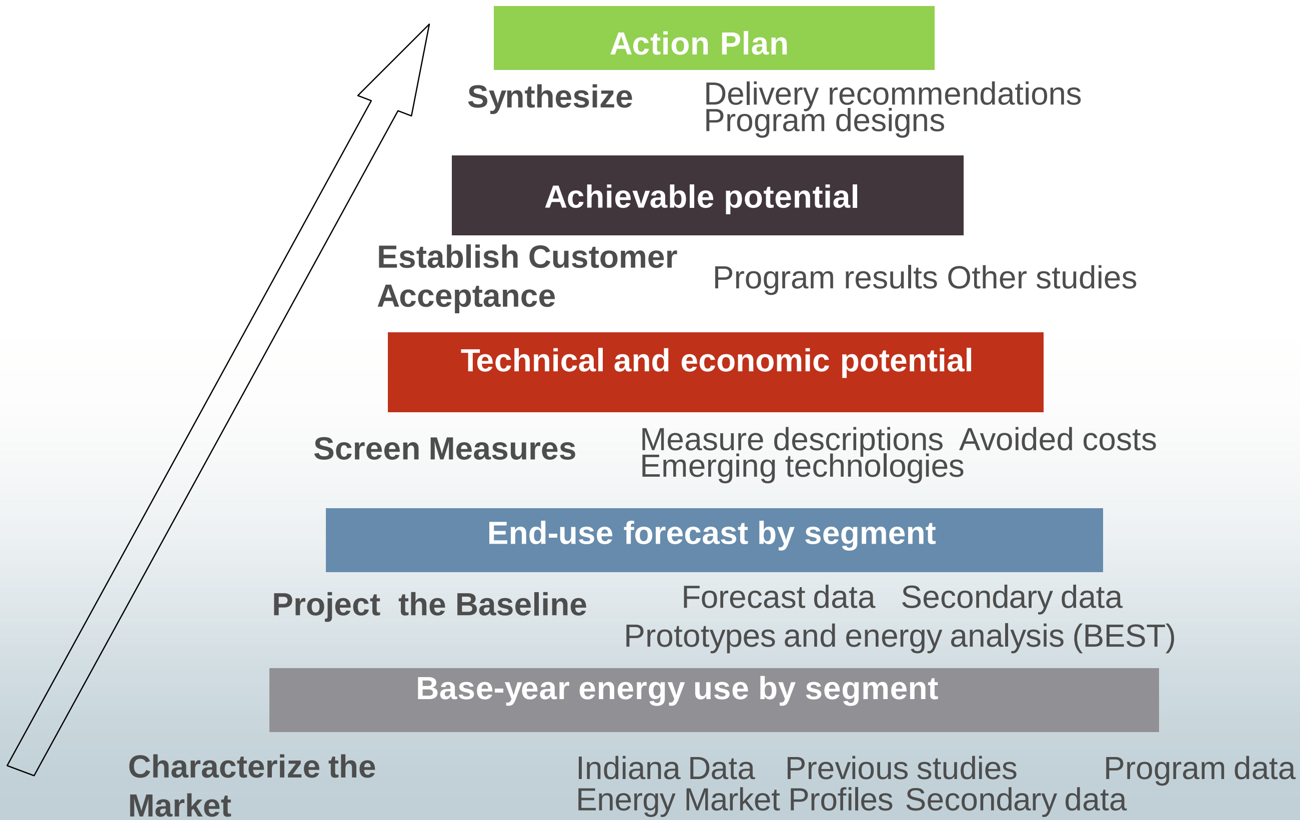
- In 2012, IPL completed a DSM Market Potential Study (MPS) in cooperation with the DSM Oversight Board to identify the potential savings from energy efficiency programs
  - The Oversight Board is comprised of IPL, the OUCC, and the CAC
  - IPL contracted with EnerNOC to perform the MPS
  - The EnerNOC MPS ultimately provided a low and high Achievable Potential for DSM program savings as well as an Action Plan

- IPL is in the process of working with EnerNOC to update this Action Plan
  - Factor in changes that have occurred since 2012, including the opt-out opportunity for the large Commercial and Industrial customers and the completion of the Indiana Technical Resource Manual

Updated Action Plan = key evidence in IPL's anticipated
May 30, 2014 filing for approval of future DSM programs

2018 to 2034 DSM Forecast Will Be Created

- Next step after the update of the Action Plan ➔ Have EnerNOC provide a forecast of IPL DSM for the period 2018 through 2034



Key Assumptions for the 2014 IRP

- IPL will continue to offer cost-effective DSM to assist customers in managing their energy bills and meet future energy requirements

- The load forecast also includes an ongoing level of energy efficiency related to codes and standards embedded in the load forecast projections
    - Natural occurring savings includes the impacts of new appliance efficiencies, changes in Federal standards regarding appliance efficiency, new building codes

- Demand Response impacts are an important part of resource planning but are generally customer driven

DSM Integration into IPL's Planning and Portfolio

- IPL has offered DSM programs on essentially a continuous basis since 1993
- IPL expects to continue to provide cost effective DSM programs to help our customers reduce their energy use and better manage their energy bills
- IPL considers an ongoing level of DSM in preparation of our base case load forecast, which helps mitigate the need for future generation

IPL WILL CONTINUE TO OFFER A BROAD PORTFOLIO OF DSM PROGRAMS

Questions?

Planning Reserve Margin

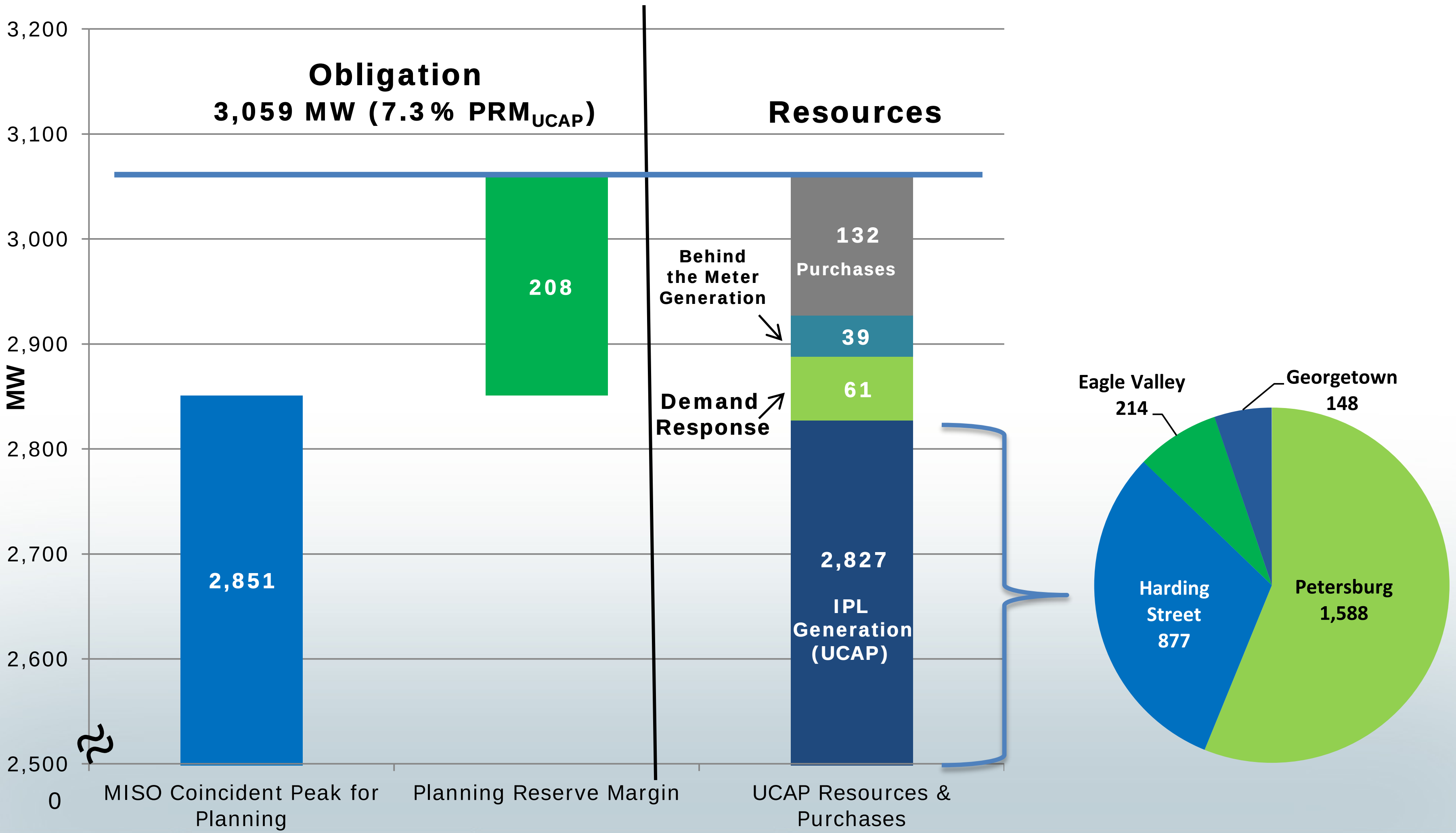
Presented by Herman Schkabla, Director of Resource Planning

MISO Capacity Construct - Installed Capacity vs. Unforced Capacity

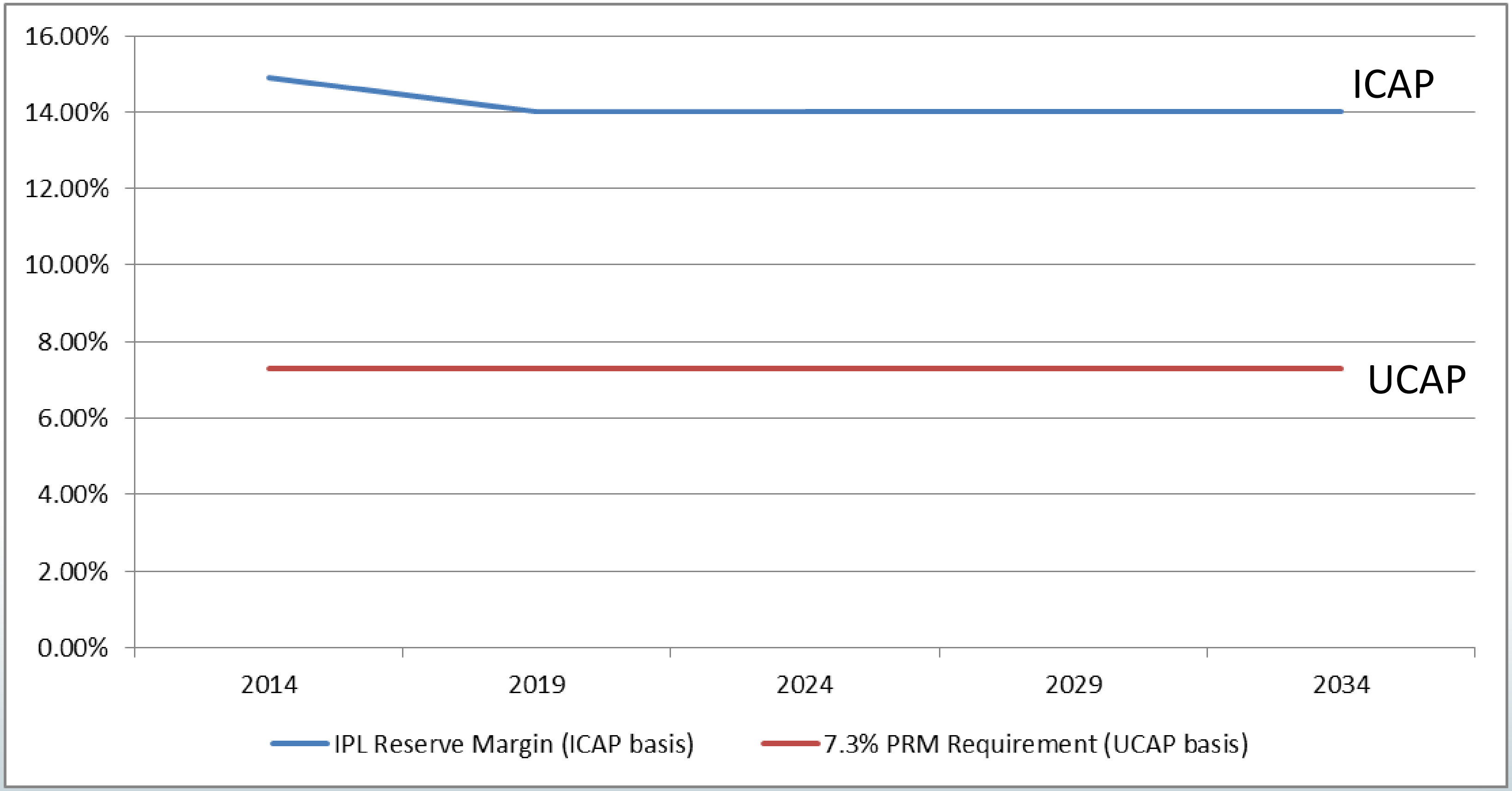
- The Unforced or "UCAP" capacity is what can be counted at the time of the annual peak load
- For thermal generating units, it reflects Installed Capacity rating adjusted for past three year average availability performance
- For wind and solar, IPL currently does not receive UCAP credit from MISO
  - Wind Purchase Power Agreement's do not have NRIS
  - Criteria for behind the meter solar credit yet to be established by MISO, IPL assumes 30% of nameplate as credit for IRP planning

NRIS - Network Resource Integration Service

IPL MISO Obligation vs. Capacity Resources Summer 2014



IPL Planning Reserve Margin (PRM)



Questions?

Generation Overview

Presented by Herman Schkabla, Director of Resource Planning

Petersburg

Hoosier and Lakefield Wind Parks

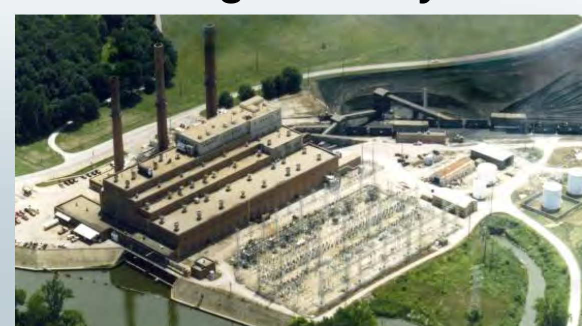
Georgetown

Generation

Harding Street

Solar Projects

Eagle Valley



IPL Generating Stations - Coal Fired Units

	Unit #	Fuel	Commercial Date	Age	MW
Petersburg	1	Coal	Jun-67	46	232
	2	Coal	Dec-69	44	435
	3	Coal	Nov-77	36	540
	4	Coal	Apr-86	28	545
Harding Street	5	Coal	Jun-58	55	106
	6	Coal	May-61	53	106
	7	Coal	Jul-73	40	427
Eagle Valley	3	Coal	Dec-51	62	43
	4	Coal	Jan-53	61	56
	5	Coal	Dec-53	60	62
	6	Coal	Oct-56	57	99

IPL Generating Stations – Oil and Gas Units

	Unit #	Fuel	Commercial Date	Age	MW
Petersburg	DG	Diesel	Aug-67	46	8
Harding Street	CT-1	Oil	May-73	40	20
	CT-2	Oil	May-73	40	20
	CT-4	Oil/Gas	Apr-94	20	82
	CT-5	Oil/Gas	Jan-95	19	82
	CT-6	Gas	May-02	12	158
	DG	Diesel	Apr-67	47	3
Eagle Valley	DG	Diesel	Apr-67	47	3
Georgetown	GT-1	Gas	May-00	14	79
	GT-4	Gas	Feb-02	12	79

IPL Generating Stations—Wind and Solar

	Fuel	Commercial Date	Age	MW
Hoosier Wind Park PPA	Wind	Nov-09	4	100
Lakefield Wind Park PPA	Wind	Sep-11	2	201
Rate REP Solar Projects	Solar	Oct -14	N/A	98*

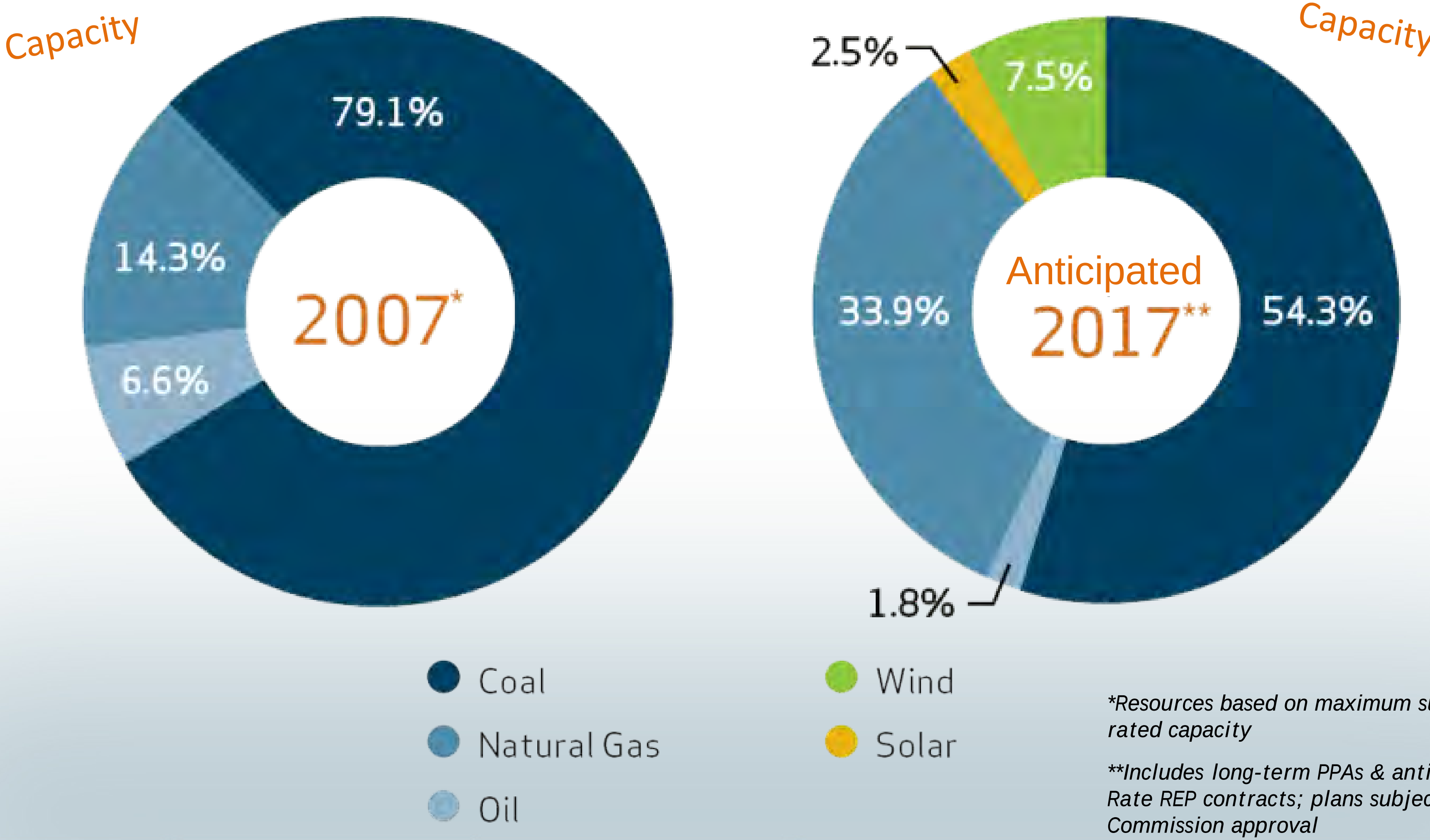
*As of 5/16/2014, approximately 53 MW are in service

Planning for the Future | Generation

- Diversifying portfolio by retiring or refueling less efficient coal & oil units and replacing with CCGT
- Investment in wind and solar resources

IPL's Proposed Eagle Valley CCGT

Adapting our Generation Portfolio to Respond to EPA Rules and Market Dynamics



*Resources based on maximum summer rated capacity

**Includes long-term PPAs & anticipated Rate REP contracts; plans subject to Commission approval

Questions?

Environmental Overview

Presented by Angelique Oliger, Director of Environmental Policy

Current Environmental Controls

Unit	In Service Date	Generating Capacity	SO_2 Control	NO_x Control	PM Control
Eagle Valley 3	1951	43 MW			ESP (1975)
Eagle Valley 4	1953	56 MW		LNB, SOFA (2004)	ESP (1973)
Eagle Valley 5	1953	62 MW		LNB, SOFA (2004)	ESP (1972)
Eagle Valley 6	1956	99 MW		LNB, COFA (1996), NN (2002)	ESP (1971)
Harding Street 5	1958	106 MW		LNB (1993), NN, SNCR (2004)	ESP (1968)
Harding Street 6	1961	106 MW		LNB (1996), NN, SNCR (2004)	ESP (1975)
Harding Street 7	1973	427 MW	Scrubber (2007)	LNB (1978), NN (2001), SCR (2005)	ESP (1978)
Petersburg 1	1967	232	Scrubber (1996)	LNB (1995)	ESP (1967)
Petersburg 2	1969	435	Scrubber (1996)	LNB (1994), SCR (2004)	ESP (1977)
Petersburg 3	1977	540	Scrubber (1977)	SCR (2004)	ESP (1986)
Petersburg 4	1986	545	Scrubber (1986)	LNB (2001)	ESP (1986)

SO_2 = Sulfur dioxide
NO_x = Nitrogen oxides
MW = Mega Watts

ESP = Electricstatic Precipitator
SCR = Selective catalytic reduction
LNB = Low NO_x Burners

SOFA = Separated Overfire Air
COFA = Closed Coupled Overfire Air
SNCR = Selective Noncatalytic Reduction

Environmental Regulations

- Current Environmental Regulations/Environmental Projects
  - Mercury and Air Toxics Standard (MATS)
  - NPDES Water Discharge Permits
- Future Environmental Regulations
  - Coal Combustion Residuals (CCR)
  - 316(b) – Cooling water intake structures
  - Greenhouse Gas (GHG) New Source Performance Standards (NSPS)
  - National Ambient Air Quality Standards (NAAQS)
  - Clean Air Interstate Rule (CAIR) Replacement Rule

NPDES= National Pollutant Discharge Elimination System

Mercury and Air Toxics Standard (MATS)

- Regulates mercury and other air toxics from utilities
- Status
  - o Compliance Date of April 16, 2015
  - o One-year extensions obtained
  - o Potential Agreed Order with EPA for one additional year
- Impact
  - o $511 million in controls approved by IURC in 2013
  - o Retire or repower older, smaller coal-fired units
  - o 80% reduction in Mercury emissions

Mercury and Air Toxics Standard (MATS)

<table>
<tr><th>Plant</th><th>Unit</th><th colspan="2">Mercury (Hg)</th><th>Metal HAPs (PM)</th><th>Acid Gas (HCl)</th><th>Monitoring</th><th>Complete Installation</th></tr>
<tr><td rowspan="4">Petersburg</td><td>1</td><td rowspan="4">ACI
SI</td><td>NA</td><td rowspan="4">ESP Enhancements</td><td rowspan="2">Scrubber Upgrade</td><td rowspan="4">PM CEMs
HCl CEMs
Hg CEMs</td><td>Spring 2015</td></tr>
<tr><td>2</td><td>Full – size Baghouse</td><td>Summer 2015</td></tr>
<tr><td>3</td><td>Polishing Baghouse</td><td rowspan="2">No Additional Controls</td><td>Spring 2016</td></tr>
<tr><td>4</td><td>NA</td><td>Spring 2016</td></tr>
<tr><td rowspan="3">Harding Street</td><td>5</td><td colspan="5" rowspan="2">Convert to Natural Gas*</td><td rowspan="2">Spring 2016</td></tr>
<tr><td>6</td></tr>
<tr><td>7</td><td colspan="2">ACI
SI System Upgrade</td><td>ESP Upgrade</td><td>Scrubber Upgrade</td><td>HCl CEMs
Hg CEMs</td><td>Spring 2016</td></tr>
<tr><td rowspan="4">Eagle Valley</td><td>3</td><td colspan="5">Retire</td><td>Spring 2016</td></tr>
<tr><td>4</td><td colspan="5">Retire</td><td>Spring 2016</td></tr>
<tr><td>5</td><td colspan="5">Retire</td><td>Spring 2016</td></tr>
<tr><td>6</td><td colspan="5">Retire</td><td>Spring 2016</td></tr>
</table>

* Pending IURC Approval

ESP = Electrostatic Precipitator
ACI = Activated Carbon Injection
SI = Sorbent Injection
PM = Particulate Matter

CEMs = Continuous Emissions Monitors
Hg = Mercury
HCl = Hydrchloric Acid
CCGT = Combined Cycle Gas Turbine

NPDES Water Discharge Permits

- NPDES compliance date: September 2017
  - new metal limits for Harding Street and Petersburg
- IPL is now in the final stages of evaluating compliance options
- Costs are still under development but expected to be material

Future Environmental Regulations – Coal Combustion Residuals Rule

- Currently a majority of fly-ash and scrubber product is beneficially used in encapsulated concrete and synthetic gypsum applications
- Ash is currently treated in on-site ponds
- New regulations proposed in May 2010
  - Hazardous (Subtitle C) vs. solid waste (Subtitle D)
  - Timing for Final Rule: December 2014
  - Beneficial use (encapsulated uses) allowed in both Subtitle C and D proposals
  - Timing and costs of existing pond closures unknown.

Future Environmental Regulations – Cooling Water Intake Structures Rule

- 316(b) of the Clean Water Act regulates environmental impact from cooling water intake structures (CWIS) associated with impingement and entrainment of fish at the intake structure.
- Based on the proposed rule closed cycle cooling systems may be required.
- Three of IPL's five Units are already equipped with this technology.
- Timing
  - Final Rule: May 16, 2014
  - Compliance required in 2020 or later depending on final rule

Future Environmental Regulations – Greenhouse Gas Regulations

- Greenhouse Gas Rulemakings driven by Administration's Climate Action Plan

- New Source Performance Standards for **new sources** (CAA Section 111(b))
  - Comments due on May 9, 2014
  - Emission standards for coal-fired and natural gas combined cycle units
  - Emission standard for new coal-fired units would require at least partial carbon capture and sequestration (CCS)

CAA = Clean Air Act
EPA = Environmental Protection Agency
GHG = Green House Gas

Future Environmental Regulations – Greenhouse Gas Regulations (cont'd.)

- New Source Performance Standards for **existing sources** (CAA Section 111(d))
  - o EPA to issue emission guidelines for states to implement through State Implementation Plans
    - Proposed June 2014: Finalized June 2015
    - State Implementation Plans due June 2016
  - o Standard based on emission limit achievable by best system of emission reduction adequately demonstrated
    - taking into consideration costs, environmental impacts, energy requirements, remaining useful life of unit
  - o Based on IPL's current plans, GHG emissions reduced by 20% in 2017 over 2005

Future Environmental Regulations – NAAQS and CAIR Replacement Rule

- National Ambient Air Quality Standards (NAAQS)
  - o SO2
    - Compliance required in 2017
    - Unscrubbed units would likely be unable to comply
  - o PM2.5
    - Compliance required by 2020
    - EPA believes most areas will be in attainment by 2020 due to other requirements
  - o Ozone
    - Lowered standard expected to be proposed in 2014 with compliance required as early as 2019
    - Could require SCR installation
- Clean Air Interstate Rule Replacement
  - o Cross State Air Pollution Rule vacatur overturned by Supreme Court
  - o Impact under evaluation

NAAQS = National Ambient Air Quality Standards
CAIR = Clean Air Interstate Rule
$PM_{2.5}$ = Particulate Matter less than 2.5 microns in diameter

SO_2 = Sulfur Dioxide
SCR = Selective catalytic reduction
EPA = Environmental Protection Agency

Model Assumptions and Inputs

Potential Impacts of Pending Environmental Regulations

Regulation	Expected Implementation Year	Cost Range Estimate* ($MM)
Coal Combustion Residuals	2019	50-80
Cooling Water Intake Structure	2020	10-160
Effluent Limitations Guidelines	2018	50-80
National Ambient Air Quality Standards	2019	0-150

Pending Regulations Requirements are Being Monitored

* Subject to change as data is updated.

Questions?

Distributed Generating Resources

Presented by John Haselden, Principal Engineer, Regulatory Affairs

Examples of Distributed Generating Resources

- Customer-Sited Emergency Generators
- Combined Heat and Power
- Wind
- Biomass
- Solar
- Other Distributed Energy Resources

IUPUI

Characteristics of the Technologies

- Size
- Location
- Fuel
- Cost
- Operating characteristics
- Contribution to capacity

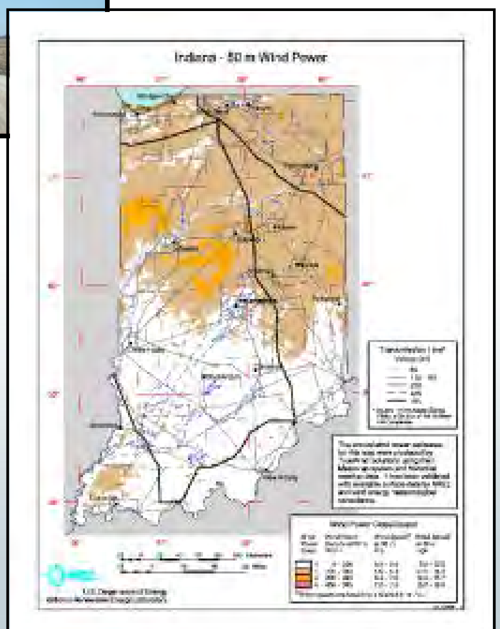
Characteristics – Customer-Sited Emergency Generation

- Typically diesel generators
- Usually not synchronous with IPL
- New EPA regulations restrict availability to run during non-emergencies
    - 2014: 31.7 MW
    - 2010: 40.1 MW
- Size: 0.1 MW – 16 MW
- Quick start, high variable cost

Combined Heat and Power (CHP)

- Combined Heat and Power
  - o Usually customer sited and owned
  - o Heat requirements
- Technology options
  - o Conventional
    - Natural gas reciprocating engines
    - Natural gas turbines
  - o Advanced
    - Fuel cell
    - Microturbine
    - Micro-CHP

Characteristics - Wind



- Poor wind resources in IPL's service territory – low energy output
- Height is important for production
- Siting/zoning issues
- Noise
- Low coincidence with system peak, intermittent production
- Consequently few installations in the IPL territory despite available incentives

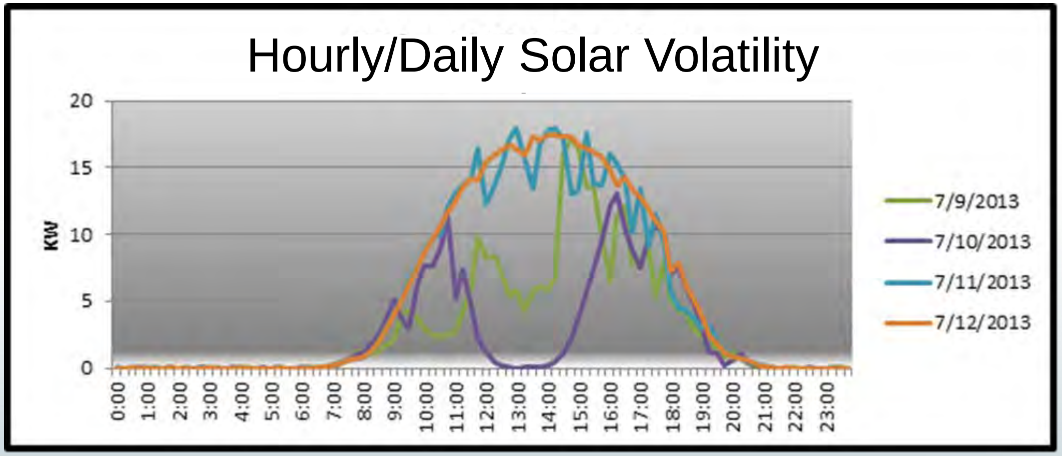
Characteristics - Biomass

- Includes anaerobic digesters and combustion of organic products
- Siting and zoning issues
- Usually base load generation
- Customer choice to install
- Consequently no installations in the IPL territory despite available incentives

Characteristics - Solar Photovoltaic

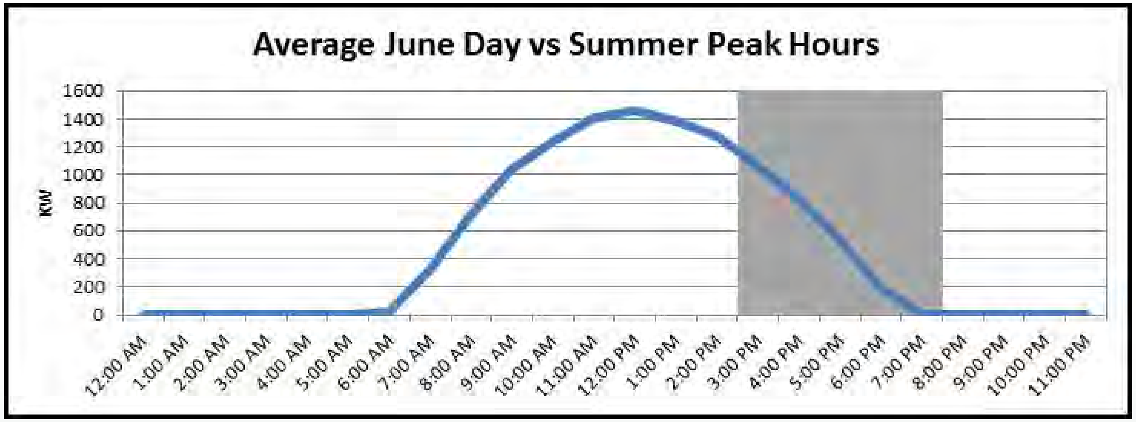
- Permitting and construction are usually quick and not complicated
- Location determined by others
- Requires large space
- Low capacity factor – 15%. Intermittent production

Johnson Melloh



Characteristics - Solar Photovoltaic (continued)

- Some coincidence with system peak



- High relative costs and subsidization

IPL Experience with Solar PV

- Net metering
  - Small projects – Total capacity 0.45 MW
- Solar Rate REP (Feed-In Tariff)
  - 53 MW operating
  - 98 MW total
  - 1.8% estimated rate increase as a result of Rate REP
  - Approx. 25 MW contribution to capacity
  - Not the least cost resource

Indianapolis Airport

Maywood Solar Farm

Other Distributed Energy Resources

- IPL recognizes technology innovation is impacting the industry
- "Distributed Energy Resources" go beyond "Distributed Generation" and will be considered as they mature
    - Microgrids
    - Energy storage
    - Voltage controls
    - Electric vehicles

Summary

- Distributed generation can be difficult to implement on a large scale
- Solar has the best opportunity for growth but is currently challenging as a least cost resource
- Actively monitoring trends in Distributed Generation and Distributed Energy Resources

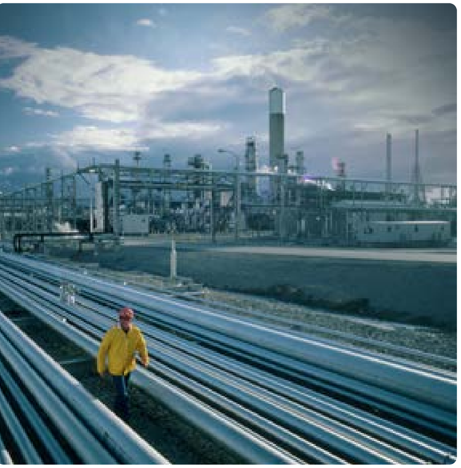
Questions?

VENTYX™
AN ABB COMPANY

Indianapolis Power & Light

2014 Integrated Resource Plan (IRP) Proposed Modeling Assumptions

Presented by Diane Crockett, Ventyx Lead Consultant



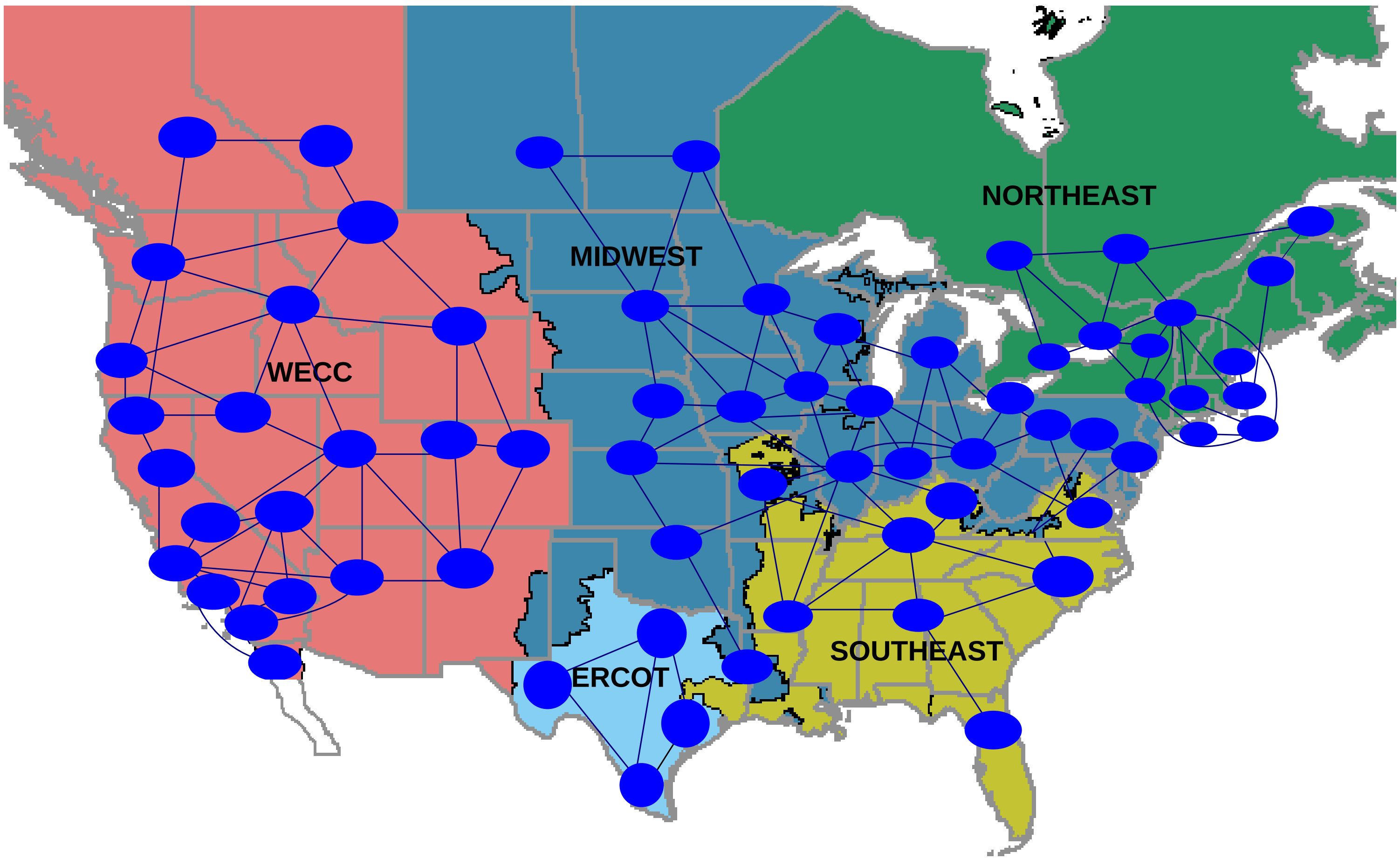

Agenda

- Introduction to North American Power Reference Case
  - Load and Resources
  - Natural Gas
  - Coal Forecast
  - Emissions Market
  - Renewables
  - Scenarios
- Proposed IPL Modeling Assumptions
  - Natural Gas Prices
  - Market Power Prices
  - Carbon Policy
  - Modeling

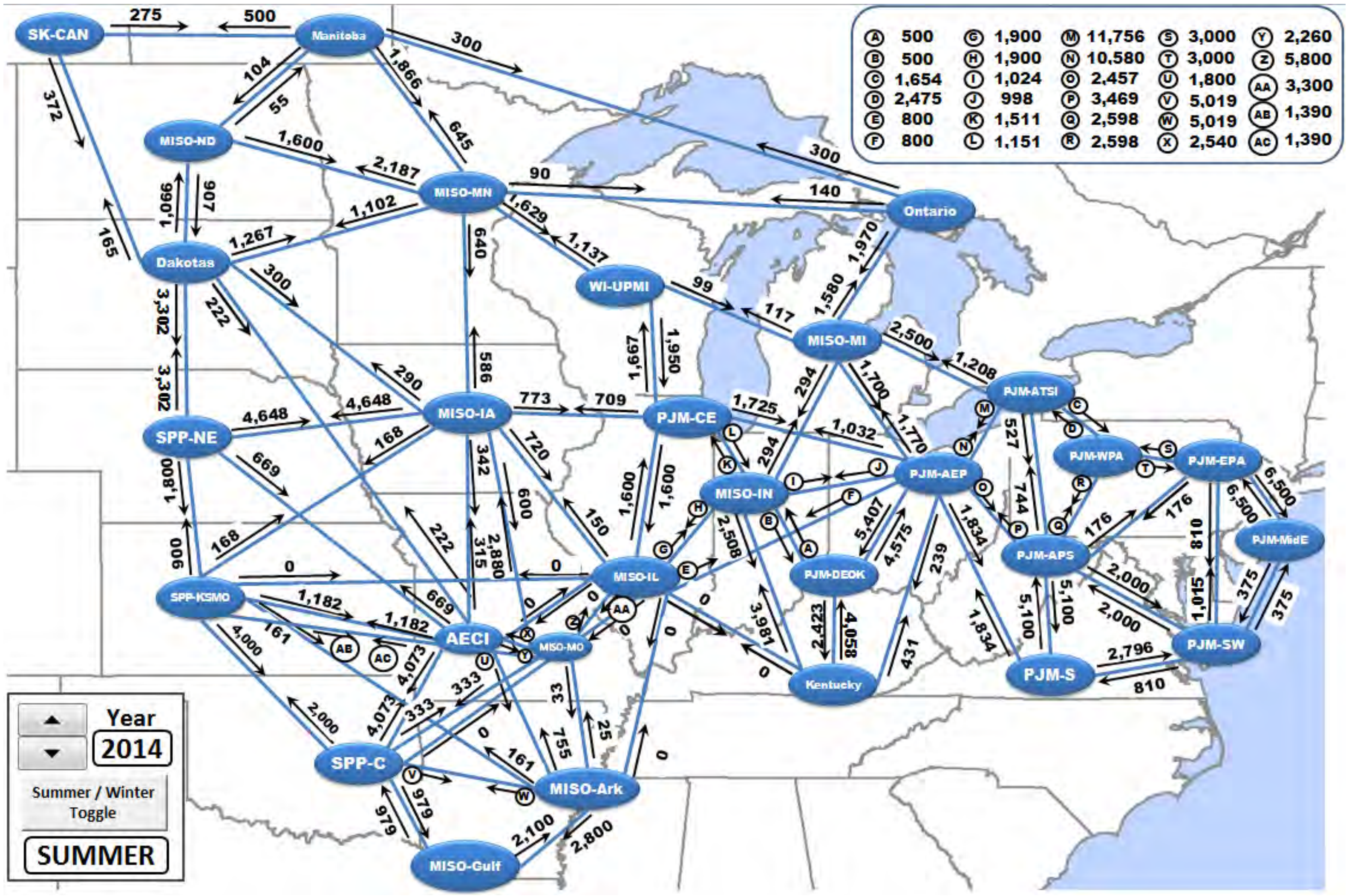
What is the Ventyx North American Power Reference Case?

- Assessment of conditions and trends in North American and regional markets: power, fuels, and environmental
- Forecast of future conditions in these markets
  - Based on fundamentals of demand and supply in these markets
  - Independent and un-conflicted – used by all types of market participants to make decisions
  - Utilizes Ventyx's market-leading software and intelligence products
- Created twice a year – Spring case and Fall case
  - IPL will be using the most recent case – Fall 2013

Region and Market Area Definitions



Midwest Transaction Groups

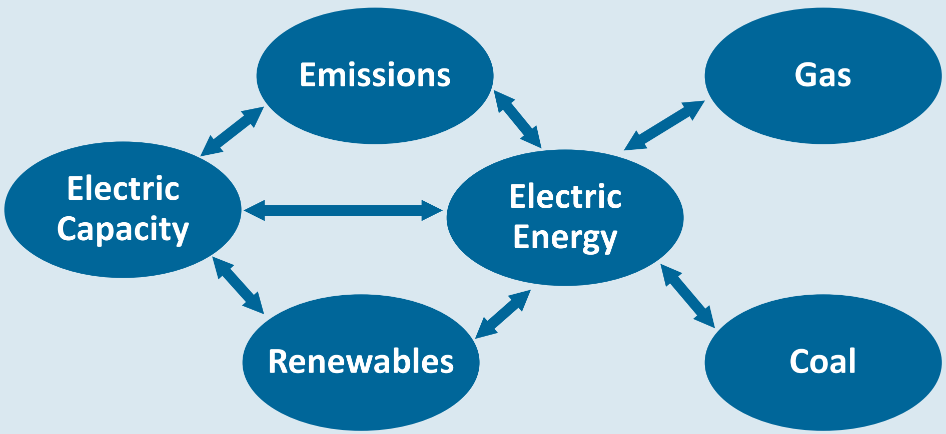


Methodology Overview

Data

- Loads
- Generating unit characteristics
- Gas/coal supply and non-power demand curves
- Non-gas/coal fuel prices
- Transmission topology
- Non-power emission reduction supply curves
- Power market, emission, and renewables rules

Horizons Interactive



Capacity

- Additions
- Retirements
- Retrofits

Prices

- Electric capacity
- Fuel
- Emissions
- RECs

PROMOD

- Final electric energy prices

Compound Annual Energy Growth (%)

	2014 - 2019	2019 - 2024	2024 - 2038
ERCOT	2.0	0.9	0.7
NWPP	2.1	1.2	1.0
California	0.7	1.0	0.8
DSW+RMPA	1.4	1.4	1.2
NYISO	0.5	0.5	0.4
ISONE	0.4	0.1	0.3
NPCC Canada	0.3	0.6	0.5
SERC	1.2	1.1	0.9
FRCC	1.5	1.1	0.9
MISO/MRO	1.0	0.9	0.8
PJM	1.5	1.1	0.8
SPP	0.5	0.7	0.7
Total	1.2	1.0	0.8

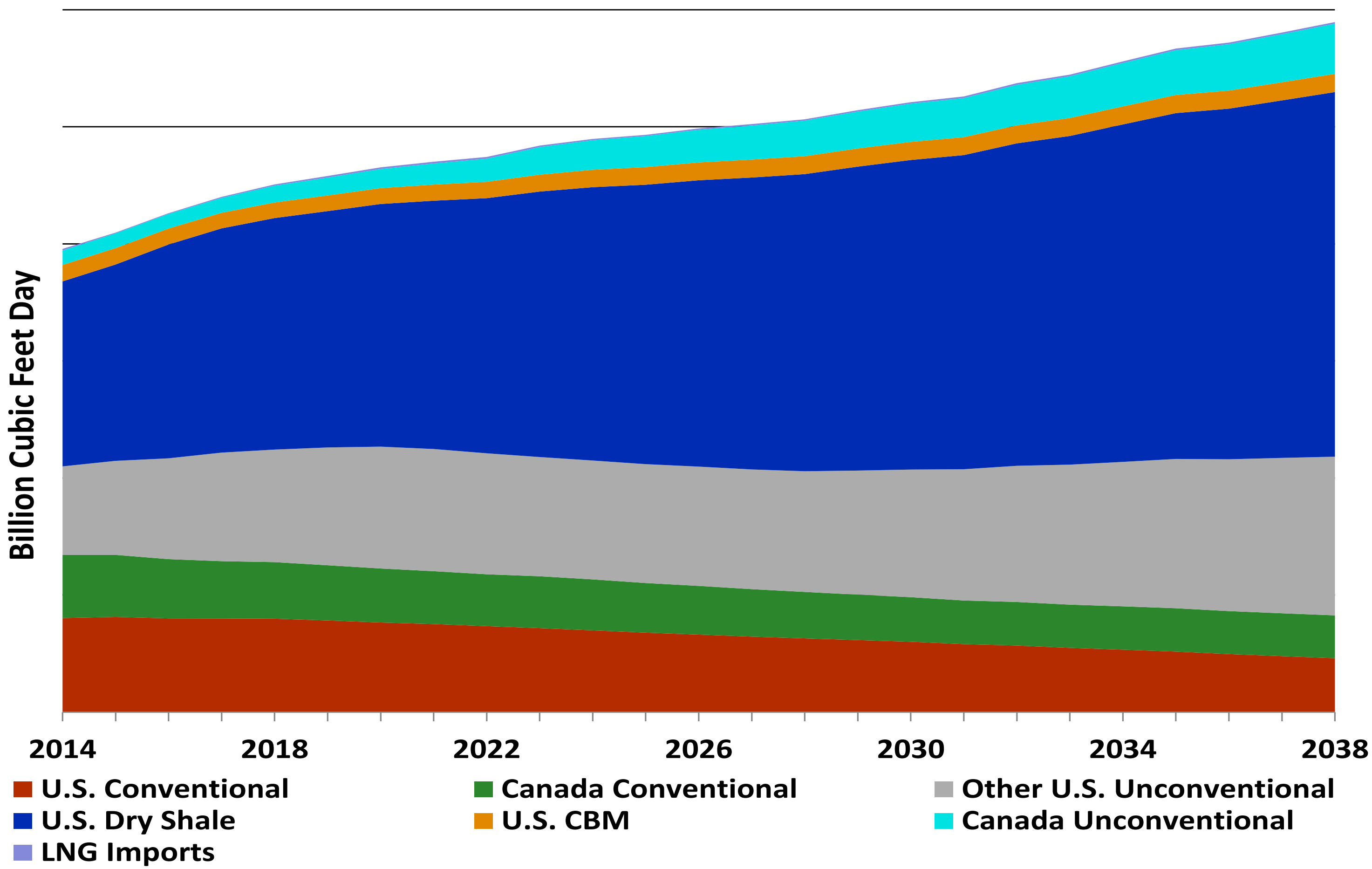
Please note the forecast does not reflect company-sponsored DSM savings.

Reference Case Supply Side Technology Options

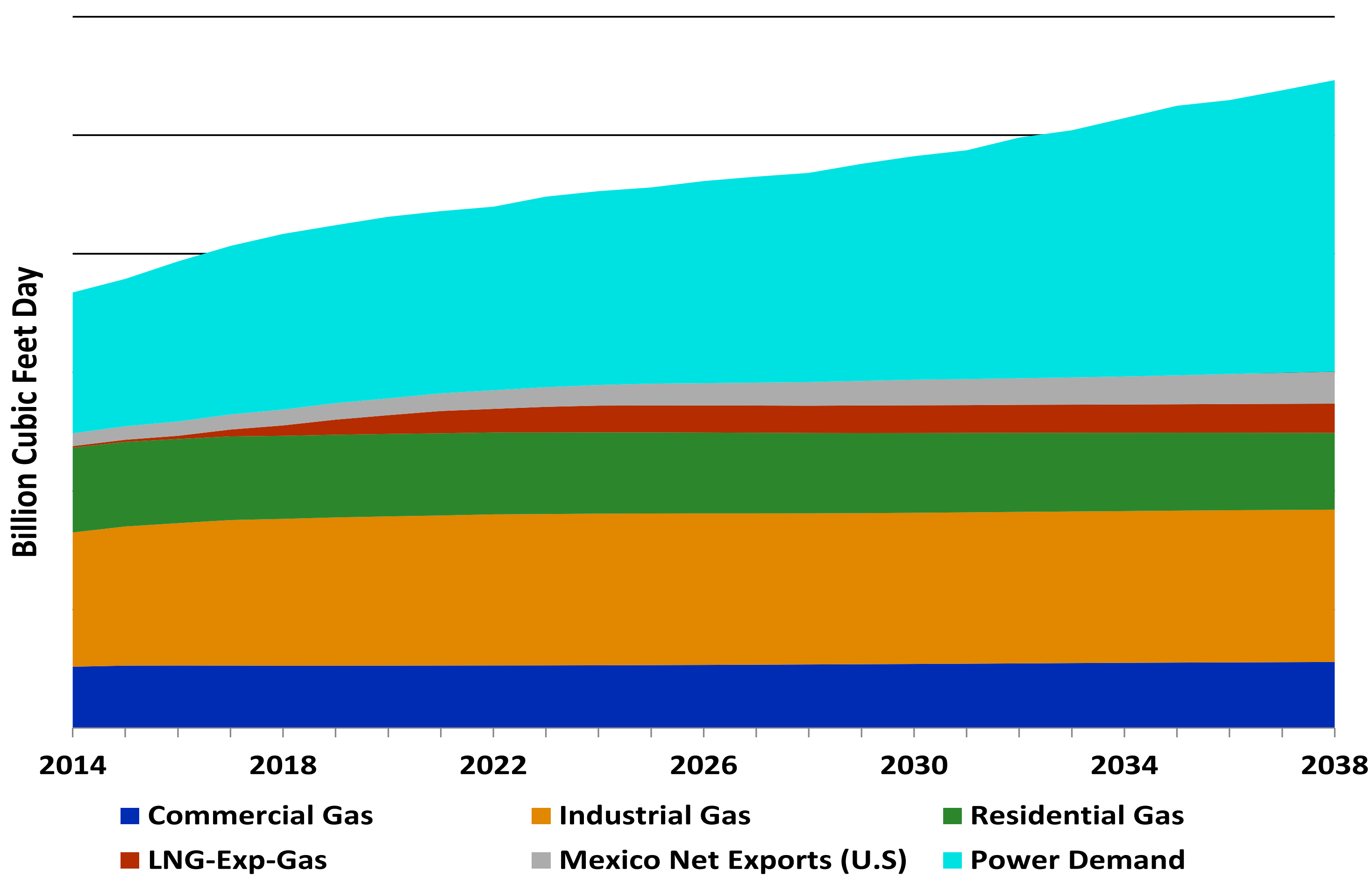
	Summer Capacity (MW)	On-Line Year
Nuclear	1,000	2018
Combined Cycle F-Class	450	2014
Combined Cycle G-Class	350	2014
Combined Cycle H-Class	400	2020
Combustion Turbine	160	2014
Geothermal Steam Turbine	10	2014
Landfill Gas	10	2014
Biomass	10	2014
Photovoltaic	10	2014
Wind Turbine	10	2014

North America Gas Supply Forecast (Bcfd)

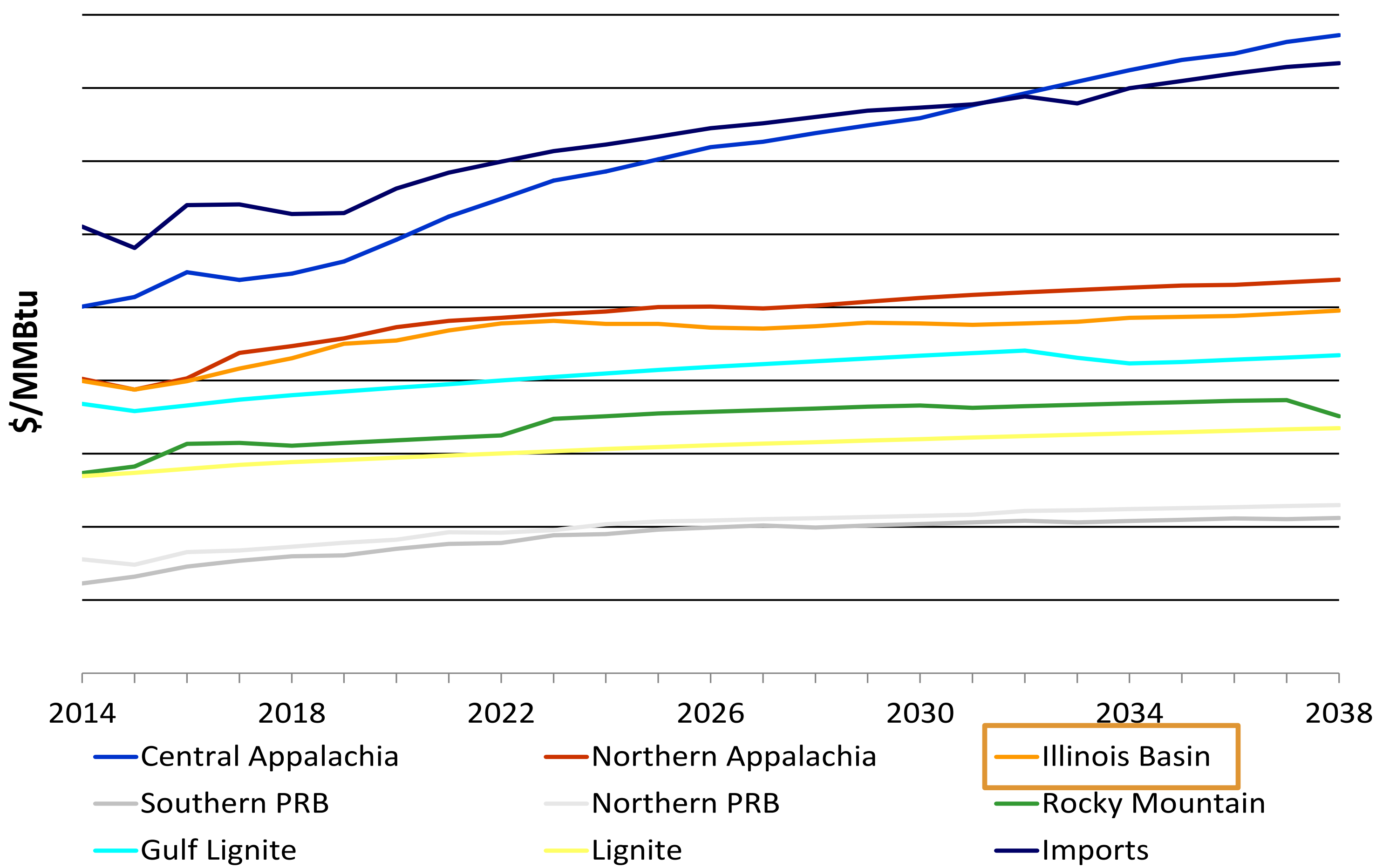
2014 IRP Attachment 9.1



North America Gas Demand Forecast (Bcfd)



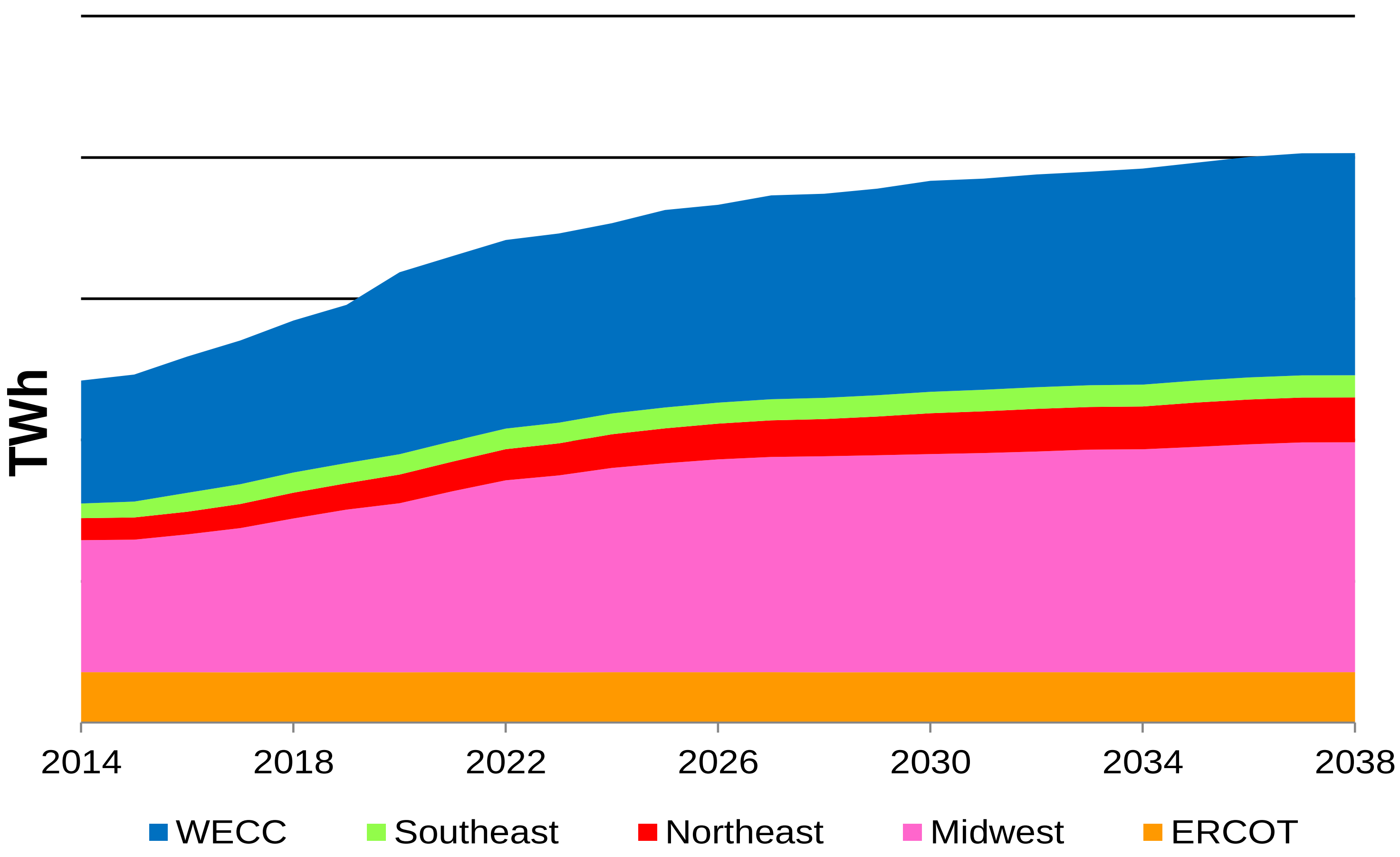
FOB Mine Coal Price Forecast (2013 $/MMBtu)



Emissions Markets

- Included in Fall 2013 Reference Case
  - Clean Air Act (CAIR) for NO_x and SO_2
  - MATS related coal retirements
  - California AB32 starting in 2013
  - CO_2 taxes in British Columbia and Alberta Only
  - RGGI in Northeastern State (excl. NJ)

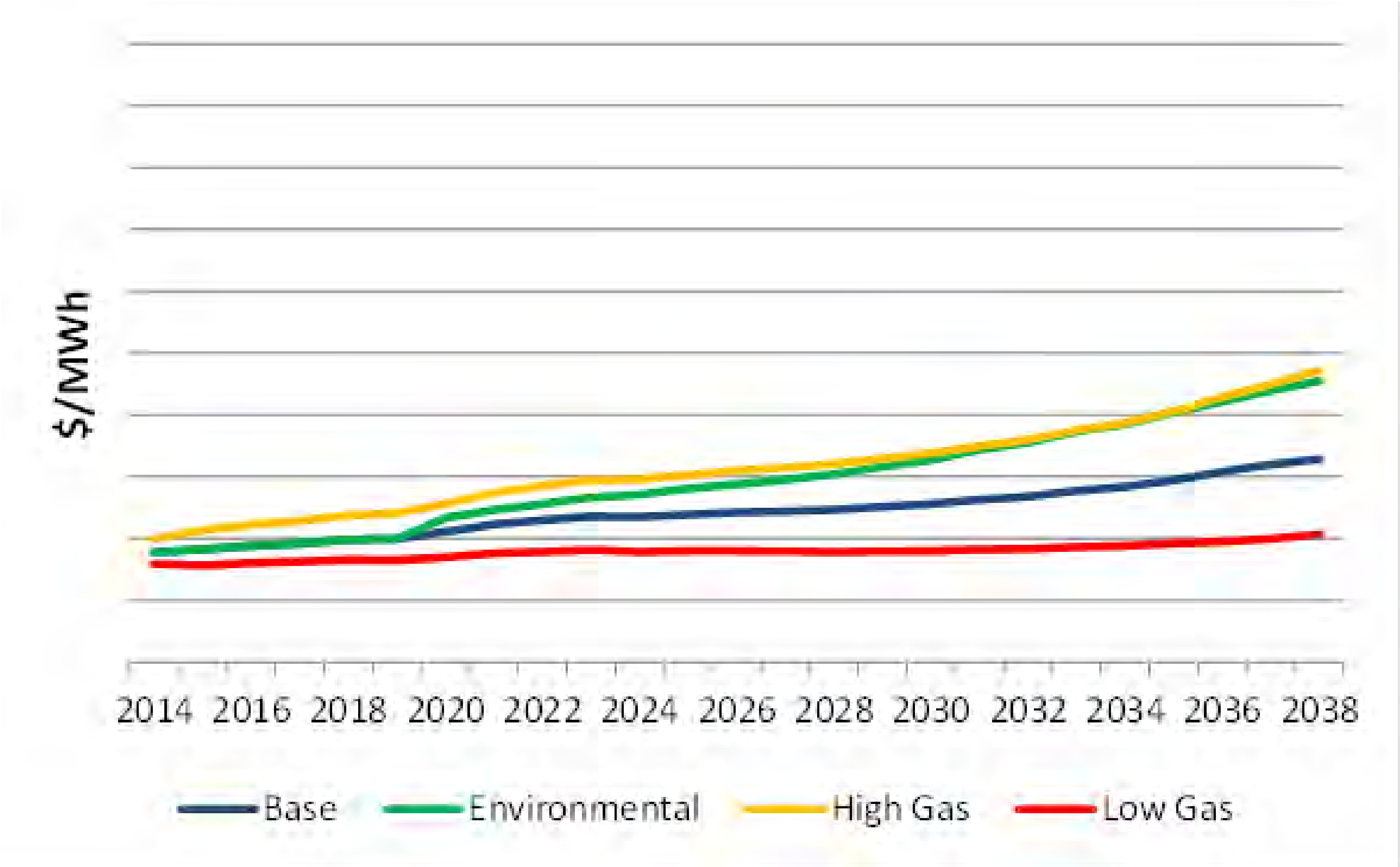
U.S. Renewable Energy Generation Forecast (TWh)



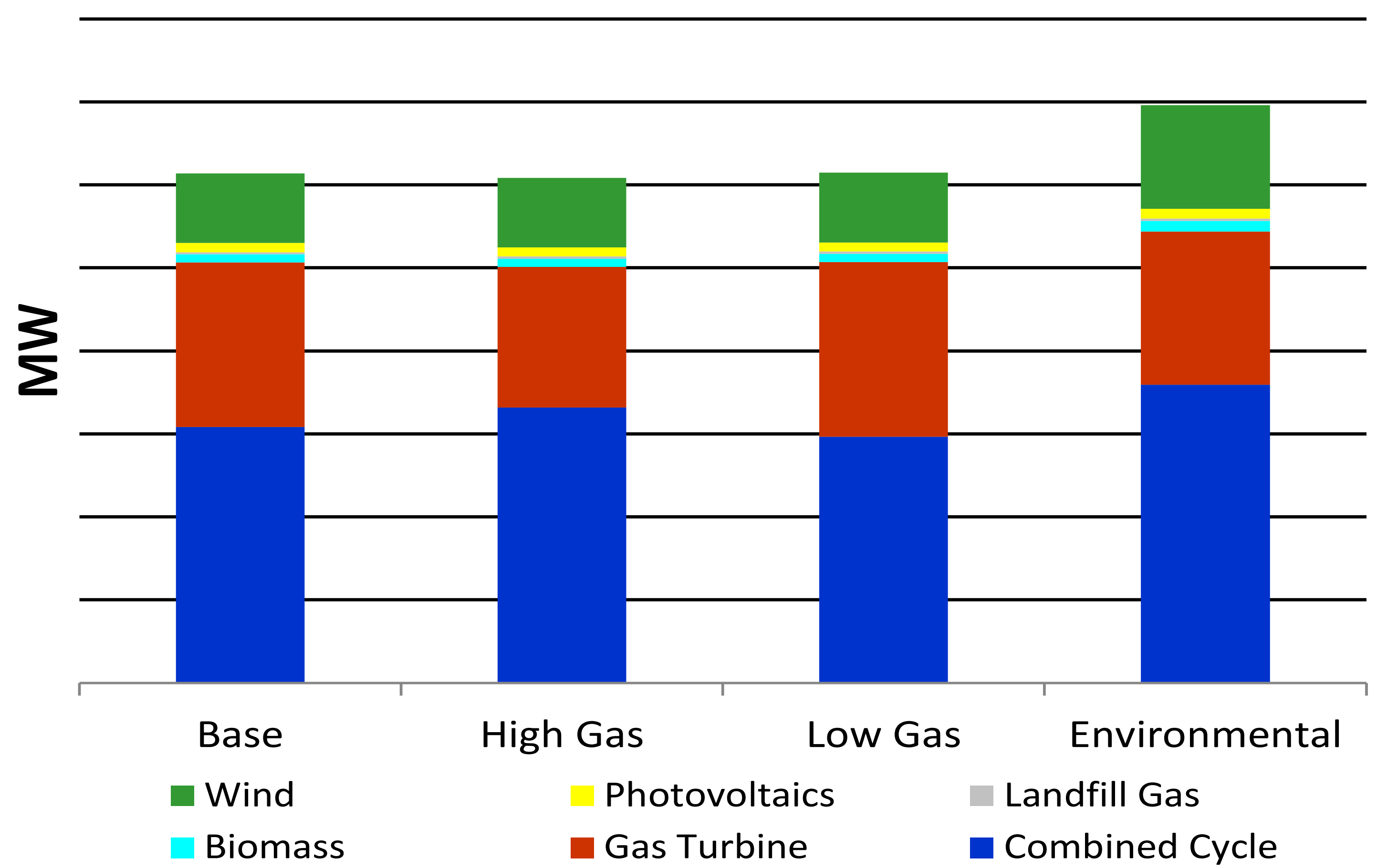
Reference Case Scenario Descriptions

- Base Gas Price
  - Base Reference Case assumptions
  - NoCO2 emissions cap
- Low gas price
  - Ventyx subjective view of 10th percentile of probability distribution
  - Corresponds to production costs for best shale plays
- High gas price
  - Ventyx subjective view of 90th percentile of probability distribution
  - Corresponds to limited shale supply scenario
- Federal environmental legislation
  - CO2 emissions cap 2020 start, 80% below 2005 levels by 2050
  - RPS begins in 2020 and later target is 12% of retail sales by utilities with load greater than 4 Terawatt hours (TWh)

National Scenario Price Comparison (7x24)(Fall 2013 Reference Case $/MWh)



Midwest Reference Case Scenario 2034 Resource Mix Comparison

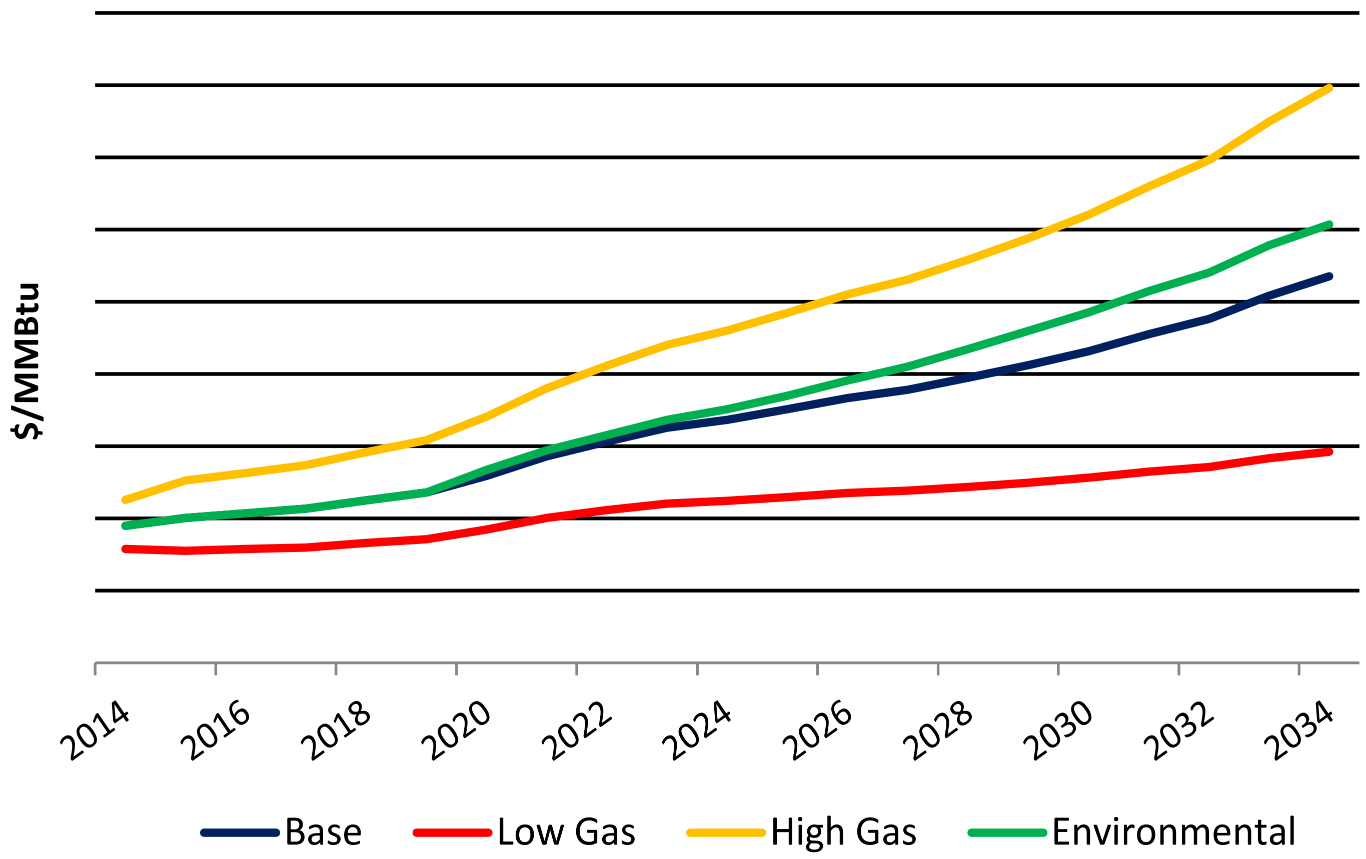


Proposed IPL Modeling Assumptions

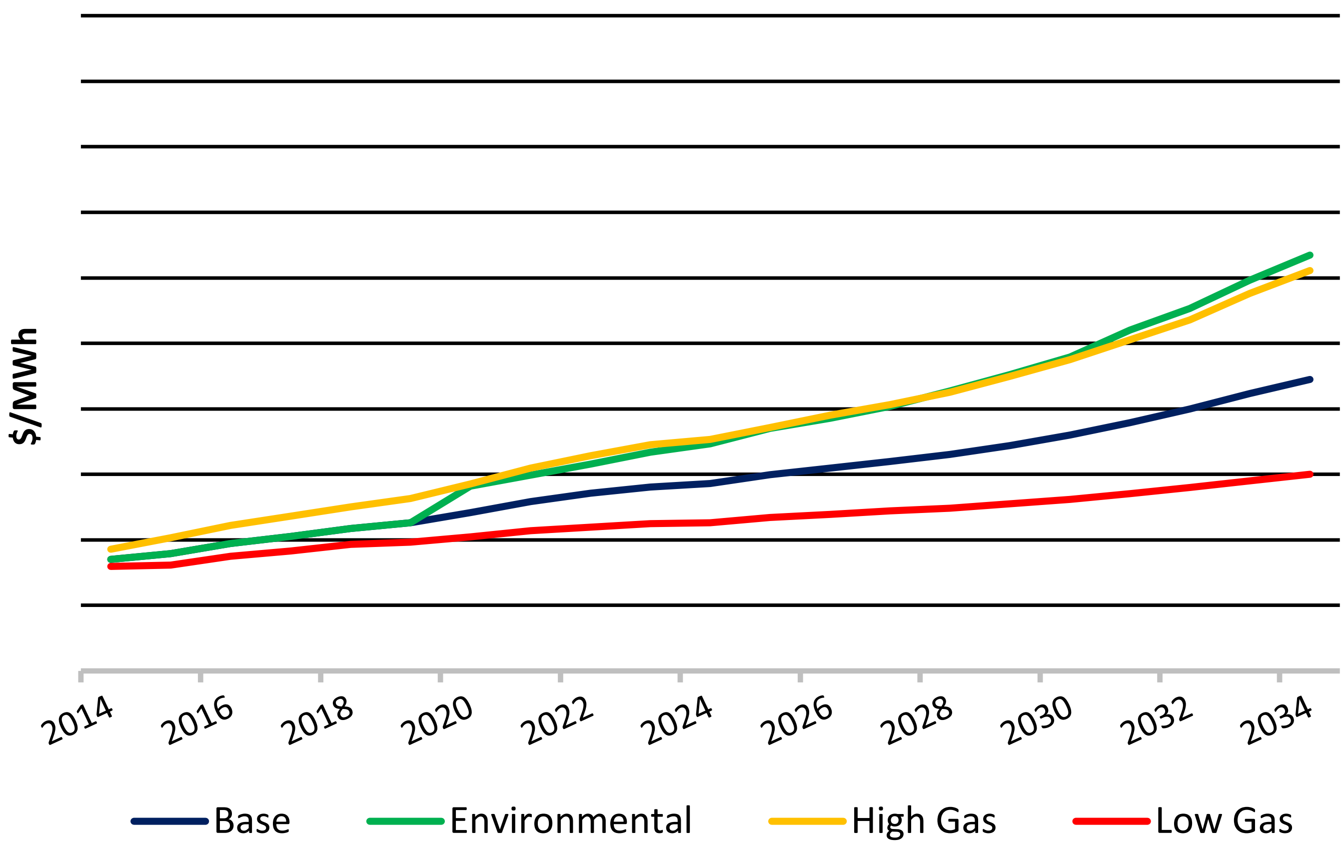
Strategic Planning *powered by Midas Gold®*

- Strategic Planning includes multiple modules for an enterprise wide strategic solution. The following modules will be used for IPL's IRP:
  - Capacity Expansion (Optimization Screening Model)
  - Portfolio Simulation
  - Financial (Incremental only)

Henry Hub Proposed Annual Gas Price Forecast (Fall 2013 Reference Case $/MMBtu)



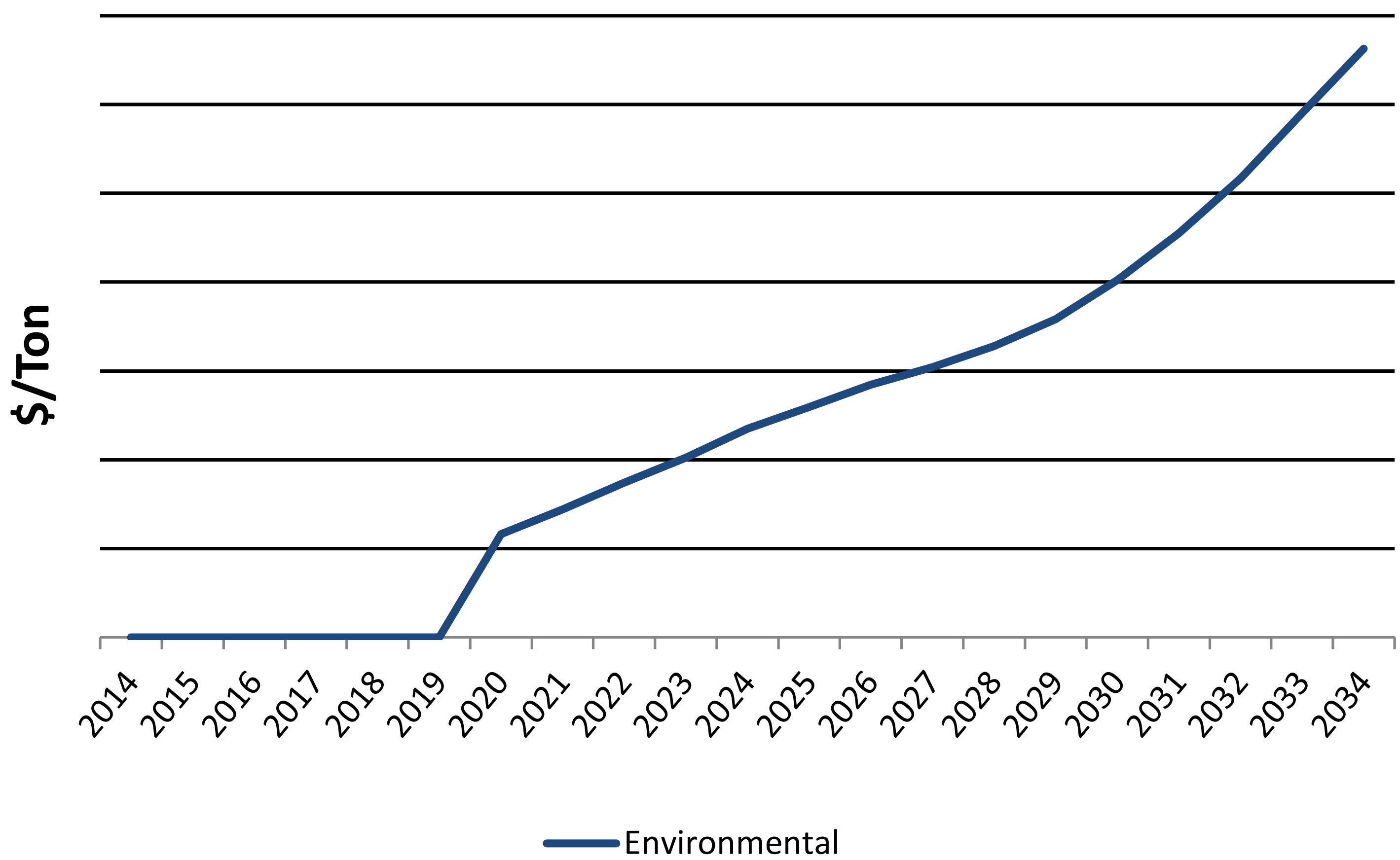
Proposed Annual MISO-Indiana Market Prices (7x24)(Fall 2013 Reference Case $/MWh)



IPL's Proposed Carbon Policy Assumptions

- **Base Case**
  - No Carbon Tax
- **Future CO_2**
  - Ventyx Environmental Scenario with Carbon Tax beginning in 2020
  - IPL also evaluating other 3rd party CO_2 policy scenarios

Proposed Carbon Prices ($/Ton)



Modeling Considerations

- Critical Key Risk Parameters to be included:
  - Fuel and market prices
  - Load growth/DSM/EE
  - Carbon policy
  - Others based on evaluation of stakeholder feedback

- Alternate Resource Plans
  - Include any portfolio mandates such as DSM/EE or RPS, if required
  - Various utility/stakeholder specified plans – may also select other resource alternatives that were not chosen by the Ventyx Capacity Expansion Screening Model for further evaluation

Questions?

Additional Feedback and Comments

Facilitated by Marty Rozelle, PhD, Meeting Facilitator

Next Steps

Presented by Marty Rozelle, PhD, Meeting Facilitator

Next Steps

Schedule for the Rest of 2014

May 23, 2014	IRP Public Advisory Meeting #1 Notes Posted to IPL Website
May 30, 2014	Deadline to Submit Comments/Questions to IPL.IRP@aes.com
June 13, 2014	IPL's Response to Comments/Questions Will be Posted to IPL Website
July 18, 2014	IRP Public Advisory Meeting #2
September 23, 2014	IRP Public Advisory Meeting #3
October 31, 2014	Submit IRP Document to the IURC

Give us your feedback. IPL is here to listen to you.

Thank You!

IRP Public Advisory Meeting #2

Workshop with IRP Stakeholders

July 18, 2014

Barnes & Thornburg

11 South Meridian St.

Welcome and Introductions

Meeting Agenda and Guidelines

Presented by Marty Rozelle, PhD, Meeting Facilitator

Meeting Objectives

- Continue conversation on the Integrated Resource Plan, including providing new information and incorporating stakeholder feedback
- Gather comments and feedback – specifically on the four Ventyx Scenario results presented
- Continue relationship built on trust and respect

IRP Public Advisory Meeting #2

Agenda Topics

- Summary of IRP Public Advisory Meeting #1
- Demand Side Management Update
- Environmental Update
- Overview of Stakeholder Comments and Questions
- Incorporating Stakeholder Input
- Presentation of Ventyx Scenario Results
- Stakeholder Feedback and Comments

Meeting Guidelines

- Time for clarifying questions at end of each presentation
- Parking lot for items to be addressed later
- The phone line will be muted. During the allotted question time frames, you may press *6 to un-mute yourself or type a question through the web-chat function.
- To inquire about confidential information please contact Teresa Nyhart with Barnes & Thornburg, LLP at teresa.nyhart@btlaw.com

Written Comments and Feedback

- Please email comments and questions to IPL.IRP@aes.com

- All comments and questions received by August 1 will have responses posted on the IPL IRP website by August 15

Questions?

Summary of IRP Public Advisory Meeting #1

Presented by Herman Schkabla, Director of Resource Planning

IRP Public Advisory Meeting #1

May 16, 2014 --- Agenda Topics

- Introduction to IPL and Integrated Resource Planning Process
- Energy and Peak Forecasts
- Demand Side Management: Energy Efficiency and Demand Response
- Planning Reserve Margin
- Generation Overview
- Environmental Overview
- Distributed Energy Resources
- Proposed Modeling Assumptions

Company Profile

- 470,000 customers*
- 1,400 employees*
- 528 sq. miles territory
- 144 substations

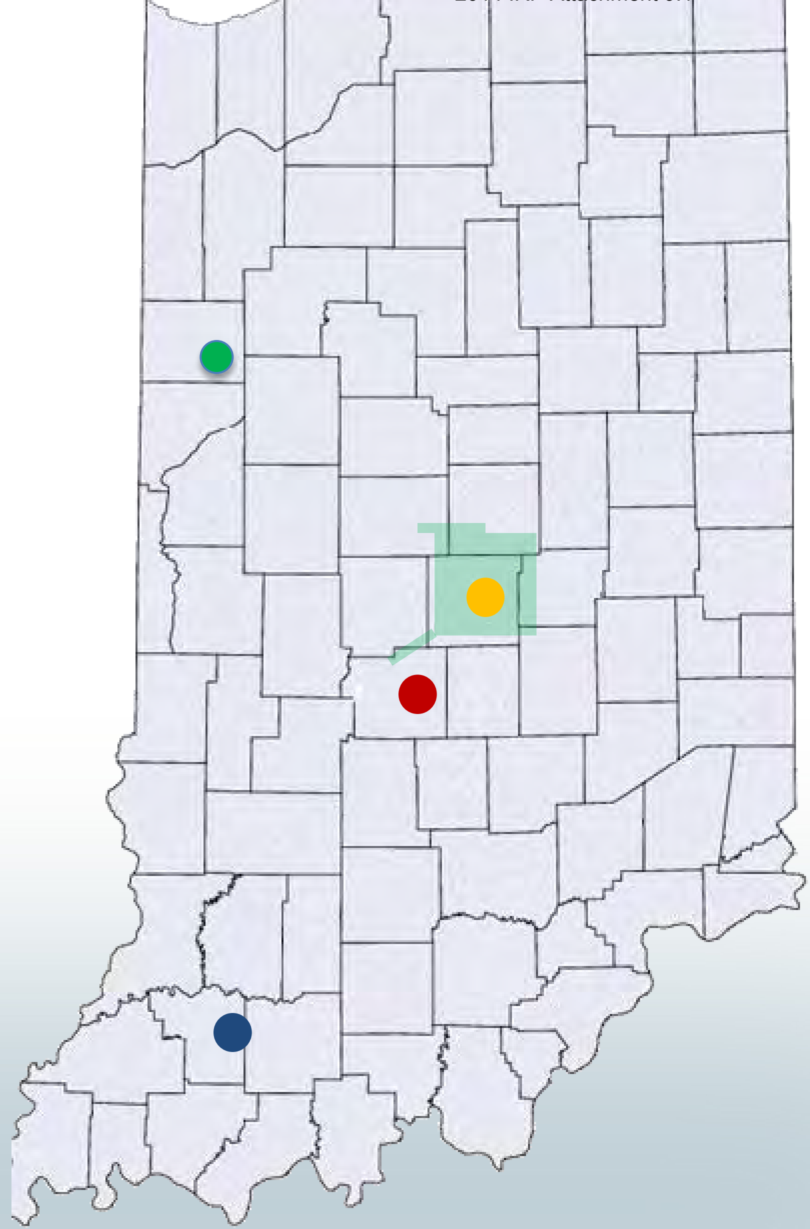
Harding Street Station, Georgetown Station, Solar REP Projects - 1,322 MW**

Eagle Valley Generating Station - 263 MW**

Petersburg Generating Station – 1,760 MW**

Hoosier Wind Park PPA – 100 MW**

Lakefield Wind Park PPA – 201 MW**
(In Minnesota – Not pictured)

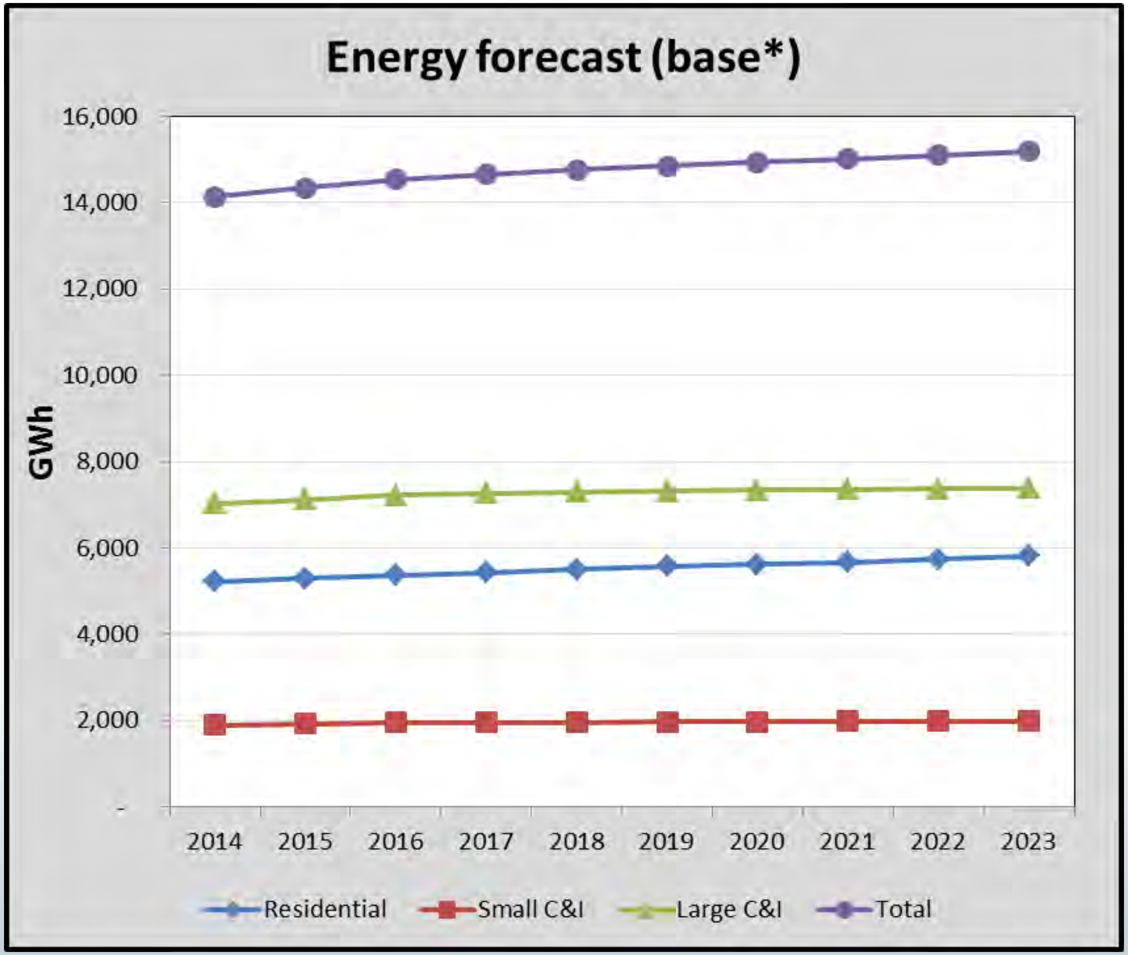


*approximate numbers
**nameplate capacity

IRP Process Overview

1. Develop IPL's **Total** Supply Resource Needs
2. Determine IPL's **New** Supply Resource Needs
3. Identify Key Risk Parameters
4. Identify and Screen Resource Technologies
5. Evaluate Resource Expansion Plans
6. Identify IPL's Reference and Short Term Action Plans

The Forecast : Energy

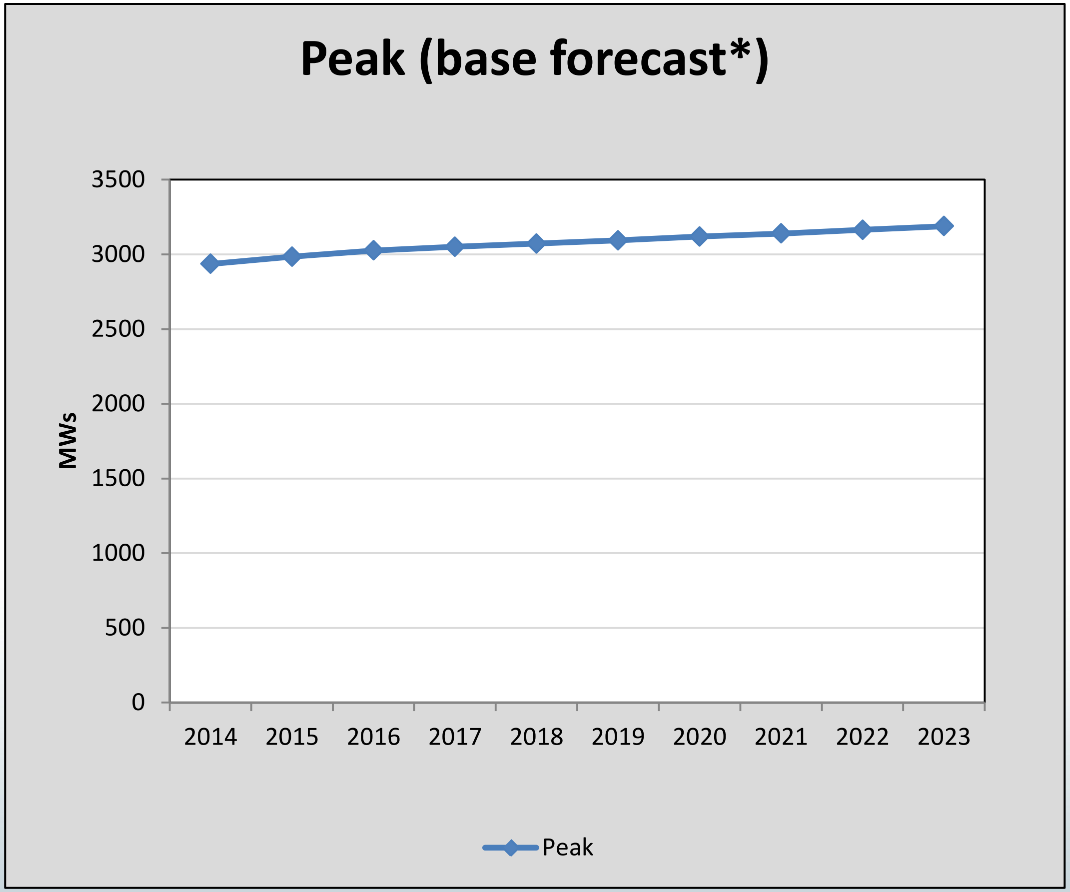


Average **Energy** growth rates (2014-23):

- Residential: 1.2%
- SCI: 0.6%
- LCI: 0.6%
- **Total: 0.8%**

* The forecast does not reflect company-sponsored DSM savings.

The Forecast : Peak



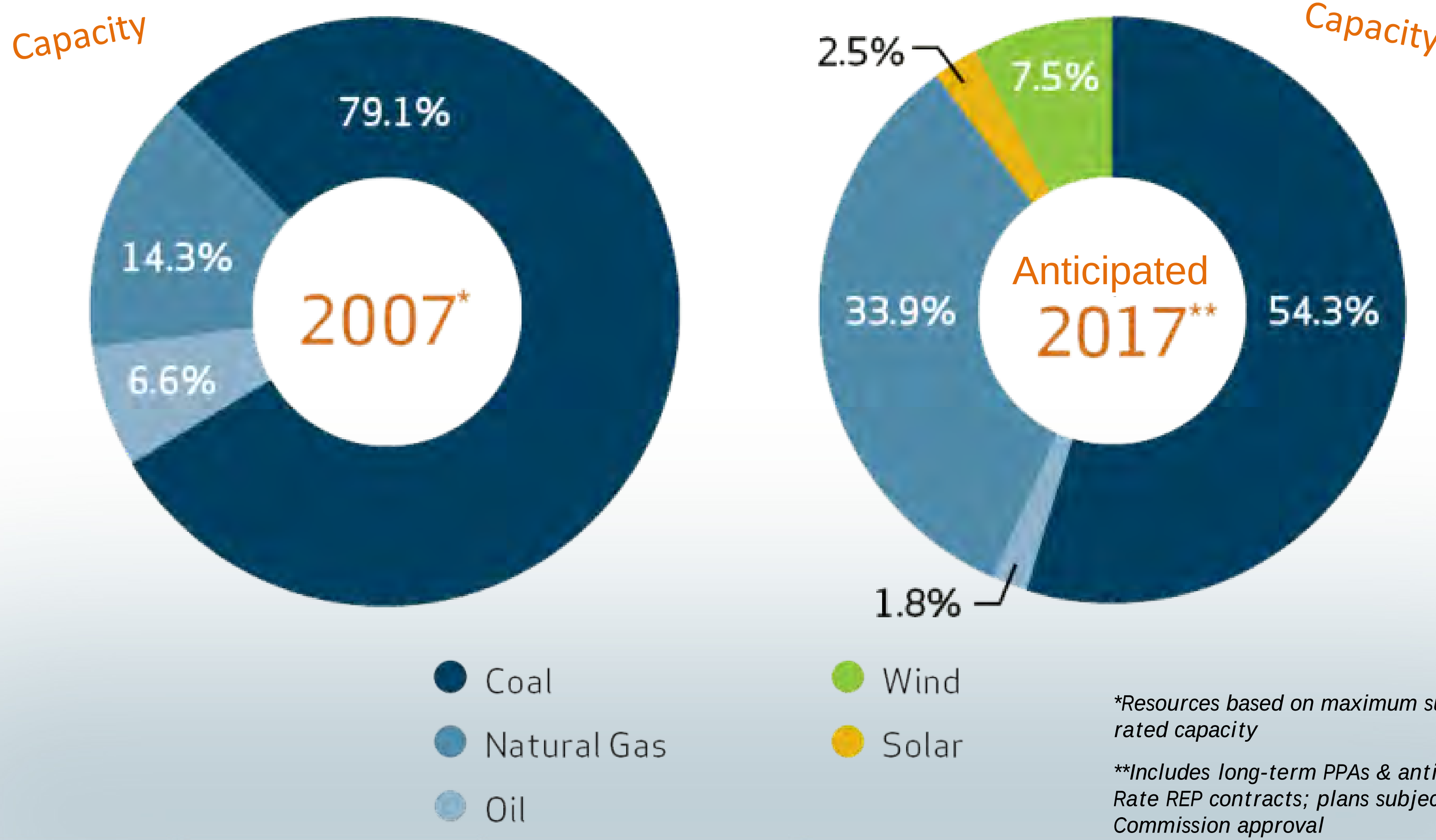
Average **Peak** growth rate (2014-23): **0.9%**

* The forecast does not reflect company-sponsored DSM savings.

DSM Integration into IPL's Planning and Portfolio

- IPL has offered DSM programs on essentially a continuous basis since 1993
- IPL expects to continue to provide cost effective DSM programs to help our customers reduce their energy use and better manage their energy bills
- IPL reflects an ongoing level of end-use Energy Efficiency (ex. home appliance improvements) in preparation of our base case load forecast
- The 2015-2017 DSM Action Plan is being finalized
- The 2018 and beyond DSM forecast will be developed with the support of EnerNOC

Adapting our Generation Portfolio to Respond to EPA Rules and Market Dynamics



*Resources based on maximum summer rated capacity

**Includes long-term PPAs & anticipated Rate REP contracts; plans subject to Commission approval

Environmental Regulations

- Current Environmental Regulations/Environmental Projects
  - Mercury and Air Toxics Standard (MATS)
  - NPDES Water Discharge Permits

- Future Environmental Regulations
  - Coal Combustion Residuals (CCR)
  - 316(b) – Cooling water intake structures
  - Greenhouse Gas (GHG) New Source Performance Standards (NSPS)
  - National Ambient Air Quality Standards (NAAQS)
  - Clean Air Interstate Rule (CAIR) Replacement Rule

NPDES= National Pollutant Discharge Elimination System

Distributed Generation

- Distributed generation can be difficult to implement on a large scale
- Solar has the best opportunity for growth in the IPL service territory but is currently challenging as a least cost resource
- Actively monitoring trends in Distributed Generation and Distributed Energy Resources

Ventyx's Agenda

- Introduction to North American Power Reference Case
  - Load and Resources
  - Natural Gas
  - Coal Forecast
  - Emissions Market
  - Renewables
  - Scenarios
- Proposed IPL Modeling Assumptions
  - Natural Gas Prices
  - Market Power Prices
  - Carbon Policy
  - Modeling

Reference Case Scenario Descriptions – Modeling results were not presented at the May 16, 2014 meeting

- Base Gas Price
  - Base Reference Case assumptions
  - No CO_2 emissions cap
- Low gas price
  - Ventyx subjective view of 10th percentile of probability distribution
  - Corresponds to production costs for best shale plays
- High gas price
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  - RPS begins in 2020 and later target is 12% of retail sales by utilities with load greater than 4 Terawatt hours (TWh)

Questions?

Demand Side Management Update

Presented by Jake Allen, DSM Program Development Manager

Recent Developments

- IPL has made a filing for approval of a DSM Plan for 2015/2016 in Cause No. 44497
- Testimony filed in Cause No. 44441 regarding large customer's ability to opt-out of DSM
    - First window for opt-out (July 1, 2014) has closed
- Numerous comments on the IURC General Administrative Order have been made, providing recommendations for future DSM in Indiana

2015-2016 DSM Plan Filed - Cause No. 44497

- Cause No. 44497 seeks Commission approval of a 2 Year Plan (2015-2016); however, a 3 Year Action Plan (2015-2017) was included in the prepared filing
- Petition filed on May 30, 2014
- Plan includes 13 DSM Programs (9 Residential; 4 Business)
- Target EE Savings approx. 1.2% of sales (total sales before large customer opt-out)
- Expect to continue collaboration with Citizens Gas

IPL's Proposed DSM Programs - Cause No. 44497

Segment	2015/2016 Proposed Programs	Program Description
RES	Lighting	Prescriptive lighting buy down
RES	Income Qualified Weatherization	Audit with direct install measures including air sealing and insulation
RES	Home Energy Assessment	Walk through assessment with direct install measures and energy efficient recommendations
RES	School Education – Kits	Energy efficient kits and education to eligible students
RES	Multifamily	Direct install measures delivered in multifamily housing units
RES	Online Energy Assessment	Online assessment with kit delivery as fulfillment
RES	Appliance Recycling	Recycling of inefficient refrigerators, freezers, and window AC units
RES	Peer Comparison	Home energy reports
RES	Air Conditioning Load Management	Direct load control
BUS	Prescriptive Rebates	Prescriptive rebates for qualifying measures
BUS	Custom Rebates	Custom rebates for qualifying measures
BUS	Small Business Direct Install	Walk through assessment with direct install measures and energy efficient recommendations
BUS	Air Conditioning Load Management	Direct Load Control

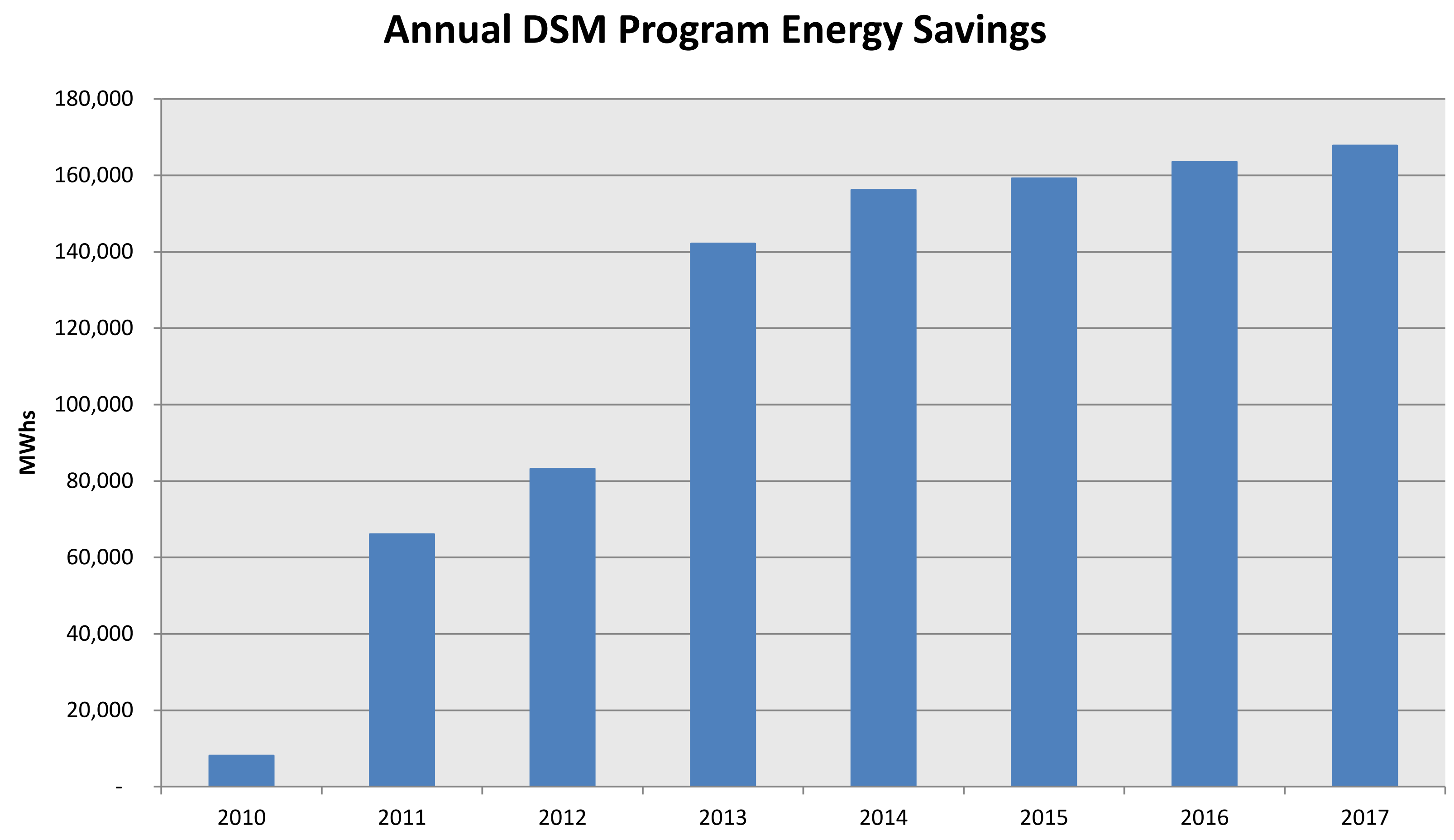
Proposal for Current Offerings - RESIDENTIAL

Current Residential Programs	2015/2016 Proposal
Home Energy Assessment (was Energizing Indiana Program)	IPL will begin to administer
Income Qualified Weatherization (was EI Program)	IPL will begin to administer
Residential Lighting (was EI Program)	IPL will begin to administer
Energy Efficient Schools – Education (was EI Program)	IPL will begin to administer
Residential New Construction	Program not continued
Online Energy Assessment w/ Kit	IPL will continue to administer
Multifamily Direct Install	IPL will continue to administer
Appliance Recycling	IPL will continue to administer
Peer Comparison Report	IPL will continue to administer
CoolCents® Residential ACLM	IPL will continue to administer
Residential Renewables	Program not continued

Proposal for Current Offerings - BUSINESS

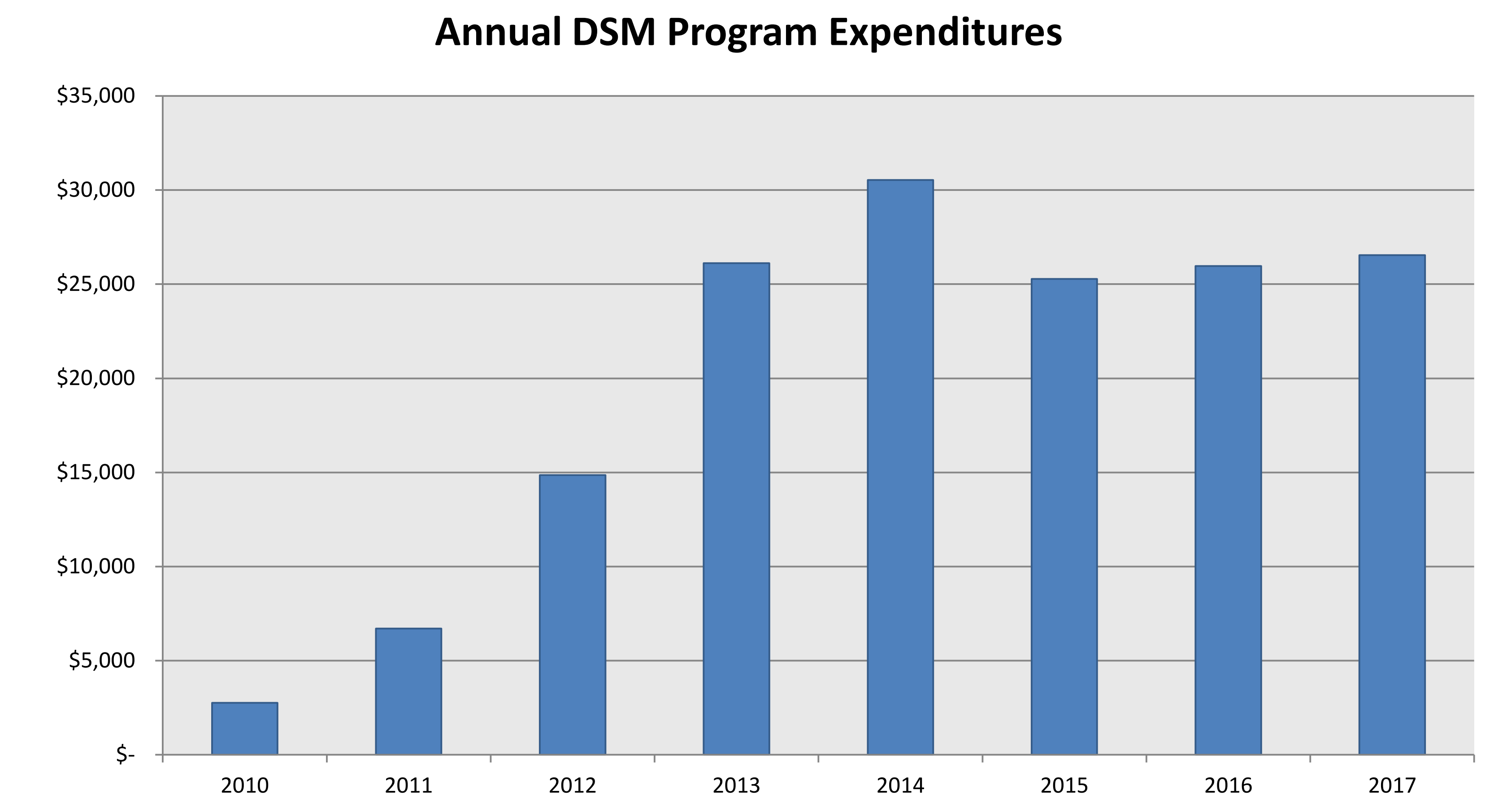
Current Business Programs	2015/2016 Proposal
Energy Efficient Schools - Audit & DI (was EI Program)	Program discontinued; Schools will continue to have EE opportunities
C&I Prescriptive – Core (was EI Program)	IPL will administer moving forward; measures merged with IPL Business Energy Incentives
C&I Renewables	Program not continued
CoolCents® C&I ACLM	IPL will continue to administer
C&I Renewables Multifamily Direct Install	IPL will continue to administer
Business Energy Incentive Program – Prescriptive/Custom	IPL will continue to administer. Combined with Prescriptive Measures from EI Core

DSM Energy Savings



Note: 2014 is forecasted. 2015-2017 is as filed in Cause No. 44497.

DSM Spending



Note: 2014 is forecasted. 2015-2017 is as filed in Cause No. 44497.

Other DSM Considerations

- Update on Large Commercial & Industrial Customer opt-out of participation in IPL DSM Programs
  - First opt-out opportunity was July 1, 2014
  - Next opt-out opportunity is January 1, 2015
  - 41 IPL customers opted out
  - These 41 customers had 231 services
  - Annual sales to these customers are about 1,800 GWH or about 13% of total IPL sales

- Working with Applied Energy Group (formerly known as EnerNOC) on 2018-2034 DSM potential

- EPA Clean Power Plan
  - Proposed rule issued June 2, 2014

Other DSM Considerations

- Commission Report to Legislature
  - Recommendations on future DSM
  - Due not later than August 15, 2014 – pursuant to SEA 340
  - Review of recent DSM efforts in Indiana
- Procurement of Energy Service Providers
  - For Program Delivery (2015-2016)
  - Collaboration with Citizens Gas and Oversight Board

IPL Remains Committed to Providing Cost Effective DSM to Our Customers

- In Cause No. 44497, IPL is requesting approval to spend about the same amount as the current level for DSM, while achieving…
- …About the same amount of annual savings in 2015/2016 as the current level for DSM
- IPL is retaining most of the existing programs and adding a new program – Small Business Direct Install

Questions?

Environmental Update

Presented by Angelique Oliger, Director of Environmental Policy

Environmental Updates

- 316(b)
  - Final Rule Released May 19, 2014
  - Consistent with Proposed Rule

- Clean Power Plan
  - Proposed Rule Released June 2, 2014

Clean Power Plan

- EPA's Clean Power Plan would reduce Carbon emissions from the power sector nationwide by 30% by 2030 from 2005 levels

- State-specific rate-based (lbs CO_2/MWhr) goals for carbon intensity
  - 1,607 lb/MWh – 2020-2029 average
  - 1,531 lb/MWh – 2030+

- Best System of Emission Reductions
  - cost
  - technical feasibility
  - other factors

- States must develop plans to achieve these reductions

- State Plan or Multi-state Plan

Timing

- 120 day comment period begins after publication in Federal Register
- Four public hearings will be held
- Final Rule expected June 1, 2015
- State Plans due June 30, 2016 with potential for 1-2 year extension
- Compliance with “interim goal” on average over the ten-year period from 2020-2029
- Compliance with “final goal” in 2030 and thereafter

EPA's Building Blocks

- EPA based required reductions on "building blocks" which States may incorporate into State Plans

  - Heat Rate improvements at EGUs;
  - Substituting generation from coal-fired EGUs with generation from existing NGCCs;
  - Substituting generation from coal-fired EGUs with generation from renewables;
  - Demand Side Energy Efficiency; and/or

- <u>State may elect to use some or all of these measure to varying degrees in their State regulations or they may use other measures</u>

EGU-Electric Generating Unit
NGCC- Natural Gas Combined Cycle

Potential Impacts

- Impacts will be heavily dependent upon State Plans and remain largely uncertain at this time, but may include:
  - Required heat rate improvements
  - Decreased dispatch of coal-fired units
  - Increased dispatch of renewables and existing NGCCs
  - Additional demand side EE measures

- Eagle Valley CCGT is not subject to the Rule because construction will commence after January 2014

Questions?

Overview of Stakeholder Comments and Questions

Facilitated by Marty Rozelle, PhD
Explanations by IPL Team

IPL's Feedback Response Table

- IPL responded to 112 stakeholder comments and questions
- All questions and responses were posted in IPL's Feedback Response Table on the IPL IRP webpage on June 20
- Today, IPL will briefly review selected questions and responses

Energy and Demand Forecast

- 10 year forecast but 20 year plan?
- DSM assumptions in the forecast?
- Forecast consistent with industry-wide forecasts?

Please see the Feedback Response Table on IPL's IRP webpage for all questions and answers.

Demand Side Management

- How will IPL meet future DSM goals?
- Status of Applied Energy Group's 2018 and beyond DSM forecast?

Please see the Feedback Response Table on IPL's IRP webpage for all questions and answers.

Renewables/ Environmental

- Keep Renewable Energy Certificates (“REC”) in Indiana?

- Combined heat and power opportunities?

- Many questions addressed the proposed EPA rule on CO_2. An update will be provided today.

Please see the Feedback Response Table on IPL’s IRP webpage for all questions and answers.

IPL's Modeling

- Define base case and reference case?
- Regional model vs. company specific model?
- Does IPL's model compare the cost of running generating units to the cost of purchasing or selling energy on the market?

Please see the Feedback Response Table on IPL's IRP webpage for all questions and answers.

IPL's Modeling (cont.)

- How are off system sales treated within the model?
- Retirement dates of all IPL plants?
- What would motivate an earlier retirement?
- Harding St 7 upgrades cost vs. Harding St 7 replacement generation costs?

Please see the Feedback Response Table on IPL's IRP webpage for all questions and answers.

Modeling Assumptions/ Inputs

- Many of the questions asked how DSM and CO2 will be treated in the model. An update on both will be provided today.
- There were also detailed modeling questions that can be addressed as we cover the initial modeling results today

Please see the Feedback Response Table on IPL's IRP webpage for all questions and answers.

Questions?

Incorporating Stakeholder Input

Presented by Herman Schkabla, Director of Resource Planning

Results from Public Advisory Meeting #1

Key Risk Factor	Number of Responses
Amount and cost of energy generated by natural gas	4
Amount and cost of energy generated by coal	6
Amount and cost of energy generated by wind turbines	7
Amount and cost of energy generated by solar facilities	5
Amount and cost of energy generated by other renewable sources (biomass, landfill gas, geothermal, etc.)	7
Amount and cost of consumer-initiated energy generation (“rooftop solar” / net metering)	10
Level of federal “carbon tax” imposed on power plant emissions	11
Level of government environmental regulations for air and water quality	10
Level of consumer energy conservation through voluntary programs (energy efficiency, etc.)	8
Load forecast	2
Cost of electricity delivered to the consumer ($ / megawatt hour)	5

Other Key Risk Factors Identified: **(1)** Level of energy conservation through mandatory programs, **(2)** Cost of climate change resulting in weather calamities, **(3)** Effects of water scarcity, **(4)** Health effects of emissions, **(5)** Industrial customers dropping load through constructing own generation or co-generation

Addressing Top Stakeholder Risk Factors

- Cost assumptions for wind turbines
  - Reduced the Ventyx reference case cost assumption for new wind resources by $200/KW to reflect declining costs for wind generation

- Carbon/GHG Assumptions
  - Included in the Ventyx environmental scenario
  - Will incorporate the "EPA Clean Power Plan" into the IPL base case scenario

Addressing Top Stakeholder Risk Factors

- DSM/EE
  - Will incorporate updated projections from Applied Energy Group analysis
  - Provide transparency on cost/benefit analysis evaluated on a consistent basis with supply-side options
  - Ventyx Model is not the best tool for DSM cost/benefit analysis
- Distributed Generation Impact
  - Will reduce energy forecast to reflect increasing level of customer dis gen (e.g. 2% by 2020, 4% by 2030)

Retirement Timing of Remaining Coal Units

- IPL is conducting a detailed parallel assessment of continued operation of its big 5 coal units
  - Part of upcoming IURC regulatory filing to develop a compliance plan for waste water rules (NPDES)
  - Unable to provide results at this time
- The NPDES compliance plan and supporting analysis will be integrated into the final 2014 IRP

NPDES – National Pollutant Discharge Elimination System

Questions?

Presentation of Ventyx Scenario Results

Presented by Diane Crockett, Ventyx and
Herman Schkabla, Director of Resource Planning

Reference Case Scenario Descriptions

- **Base Gas Price**
  - Base Reference Case assumptions
  - No CO_2 emissions cap
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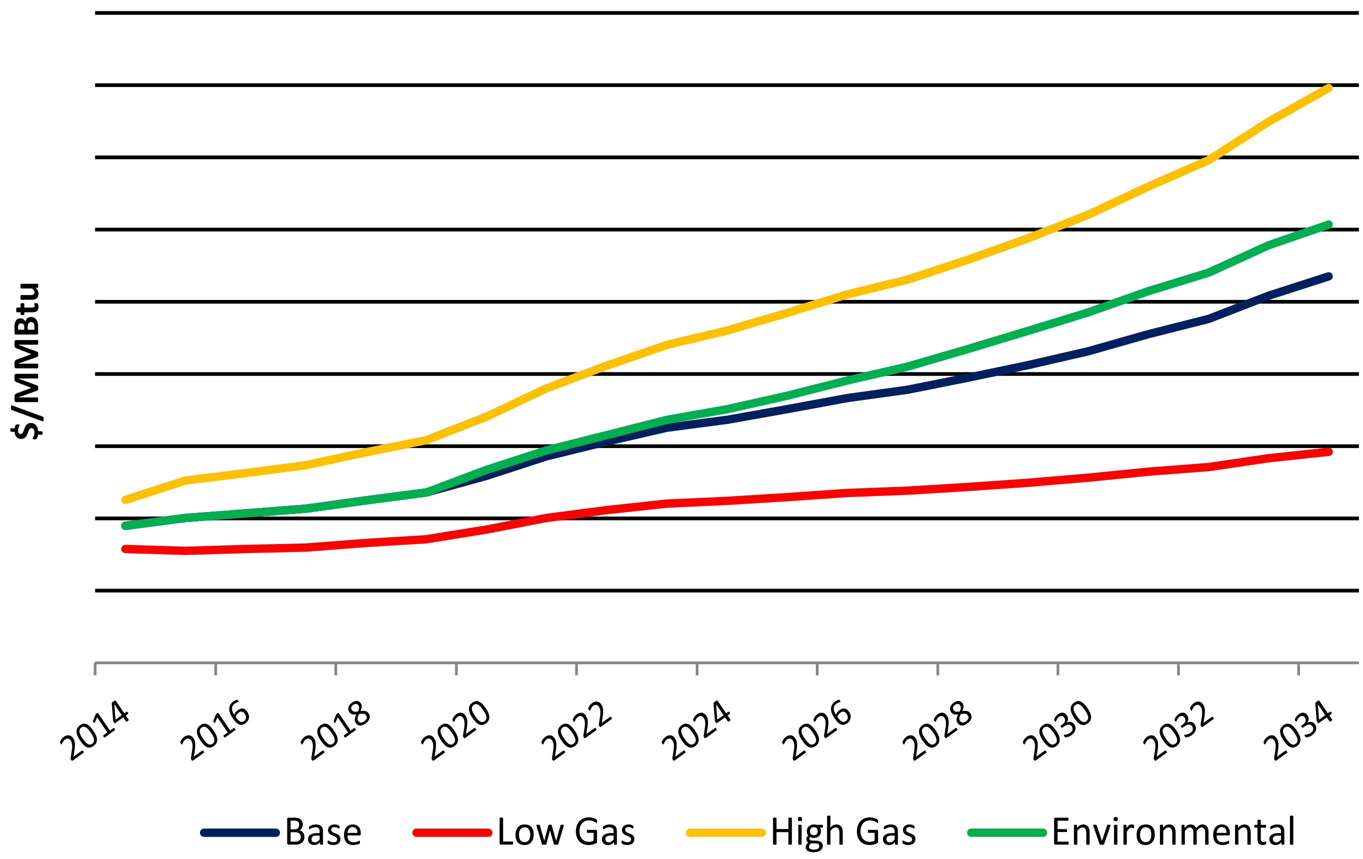
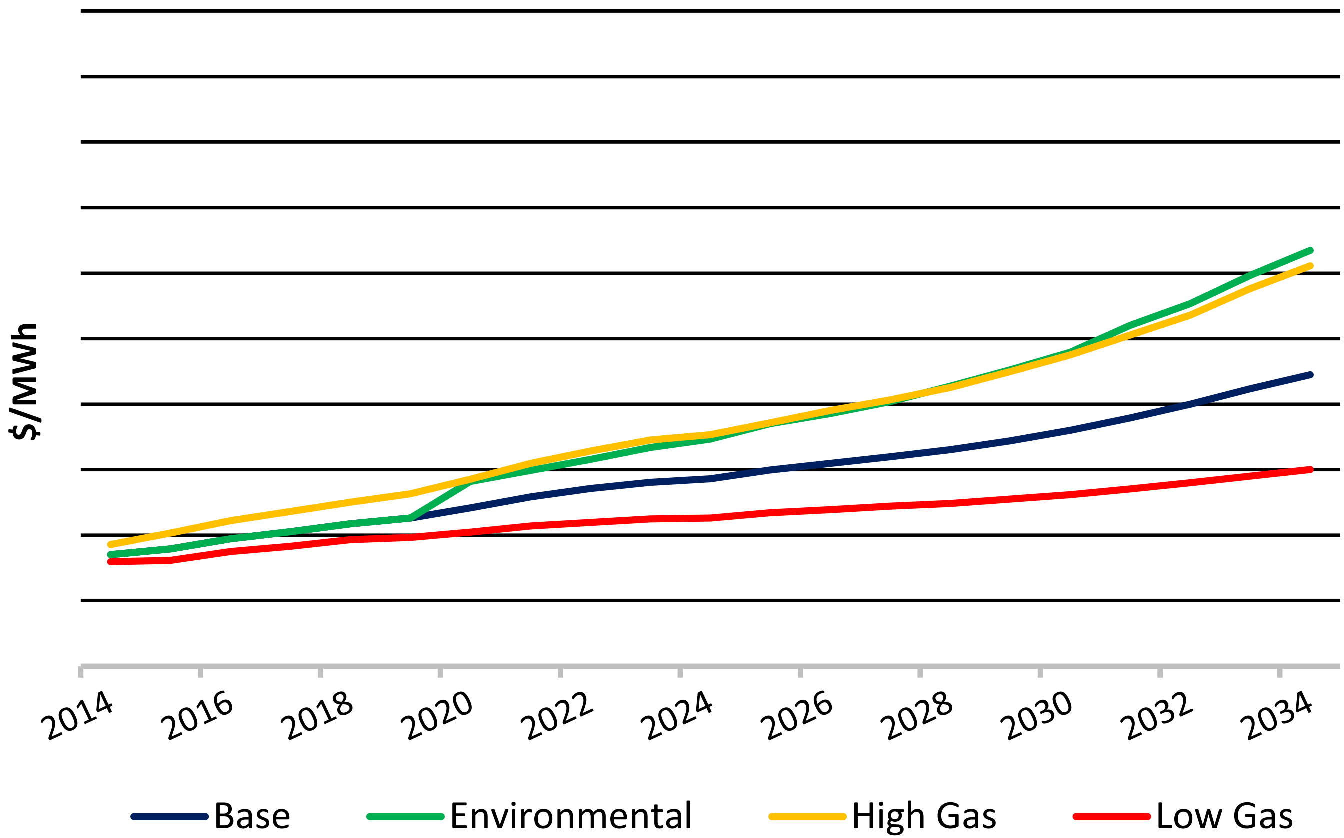
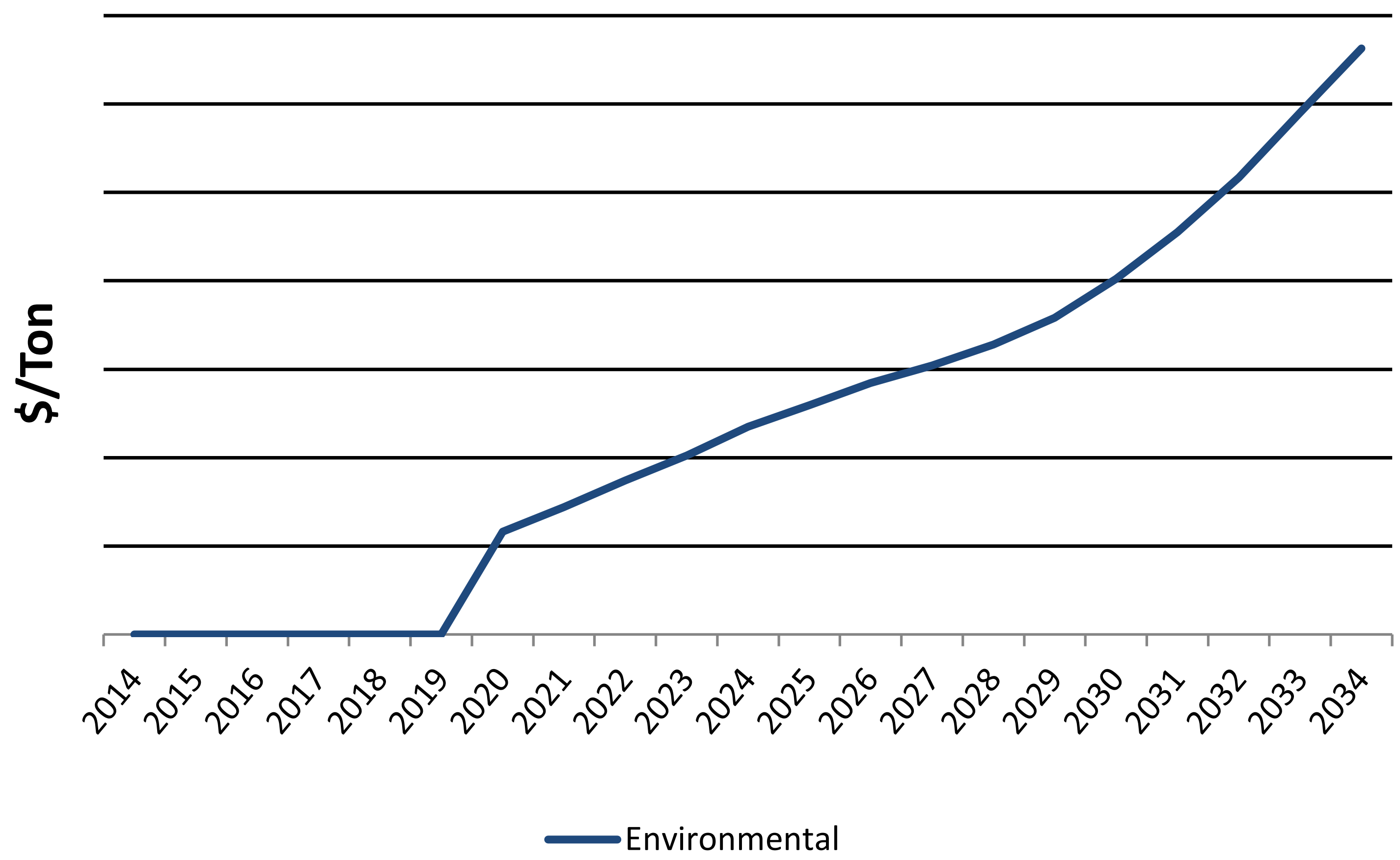


Proposed Annual MISO-Indiana Market Prices (7x24)(Fall 2013 Reference Case $/MWh)



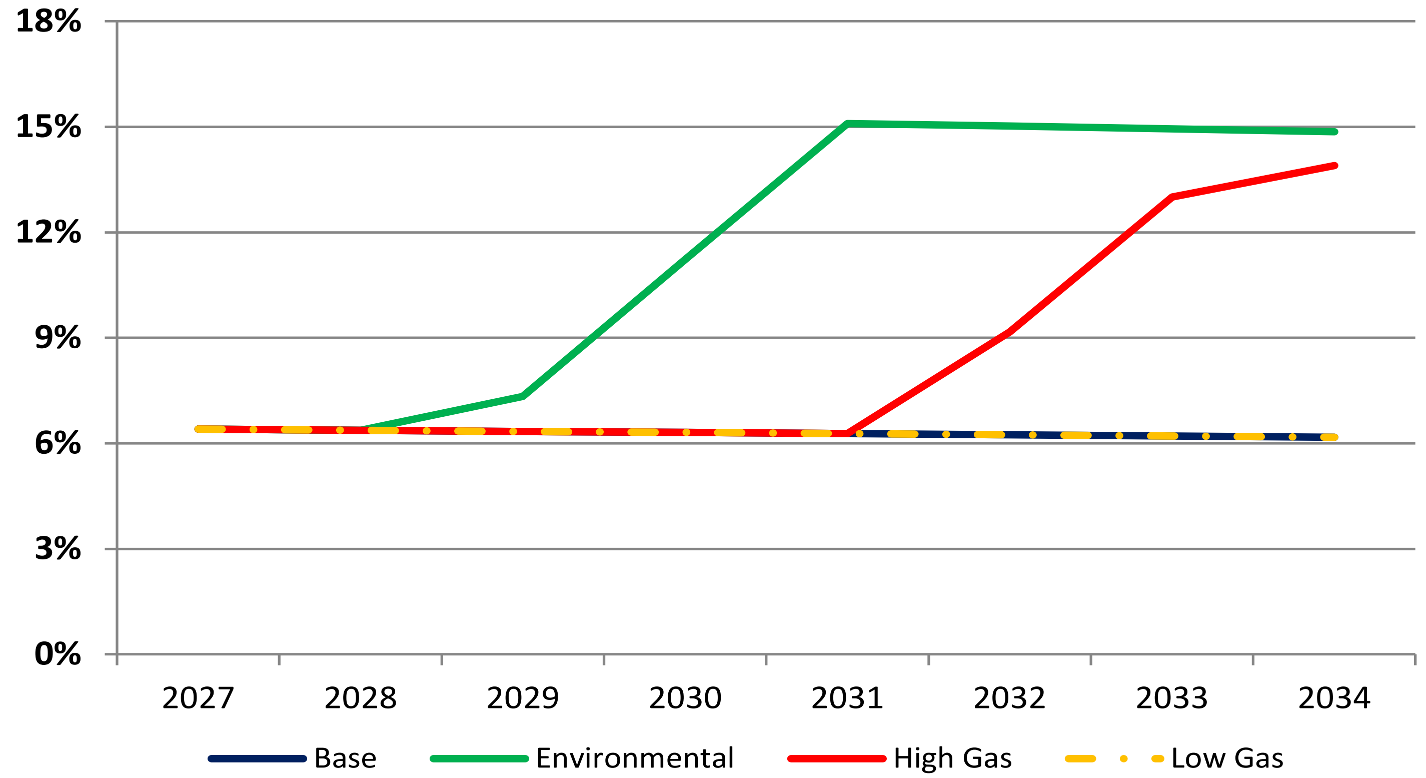
Proposed Carbon Prices ($/Ton)



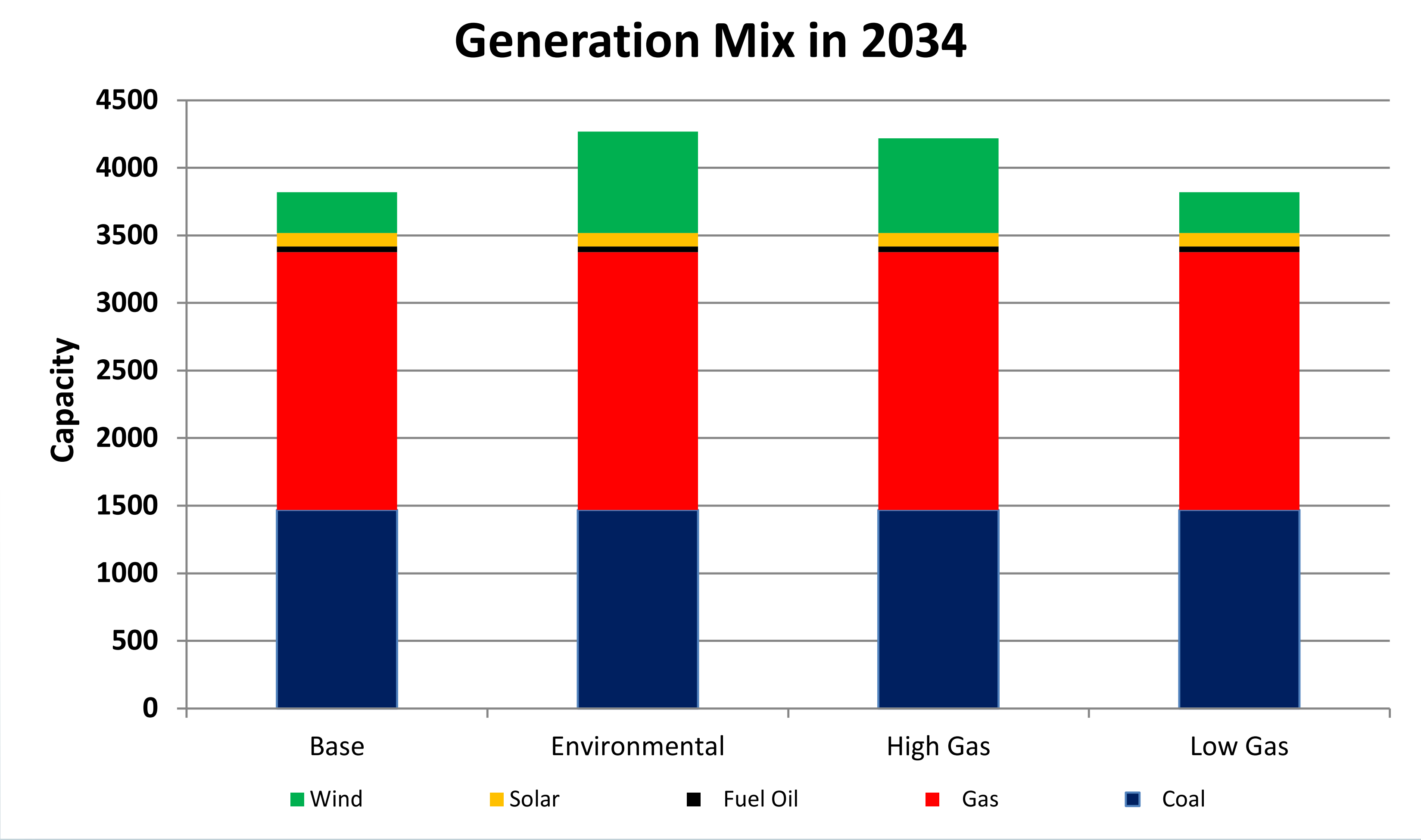
Results - Expansion Plans

YEAR	Base	Environmental	High Gas	Low Gas	Unit Retirements
2015	Market 150 MW	Market 150 MW	Market 150 MW	Market 150 MW	
2016	Market 450 MW	Market 450 MW	Market 450 MW	Market 450 MW	
2017	EV CCGT 644 MW	EV CCGT 644 MW	EV CCGT 644 MW	EV CCGT 644 MW	
2018 - 2028					
2029		Wind 50 MW			
2030	Market 50 MW	Wind 200 MW	Market 50 MW	Market 50 MW	
2031	CC 200 MW Market 50 MW	CC 200 MW Wind 200 MW	CC 200 MW Market 50 MW	CC 200 MW Market 50 MW	HS ST5 100 MW HS ST6 100 MW
2032	Market 100 MW	Market 50 MW	Wind 150MW Market 50 MW	Market 100 MW	
2033	CC 200 MW Market 150 MW	CC 400 MW	Wind 200 MW CC 200 MW Market 100 MW	CC 400 MW	Pete1 220 MW
2034	CC 400 MW Market 150 MW	CC 200 MW Market 100 MW	Wind 50 MW CC 400 MW Market 100 MW	CC 200 MW Market 150 MW	HS7 405 MW

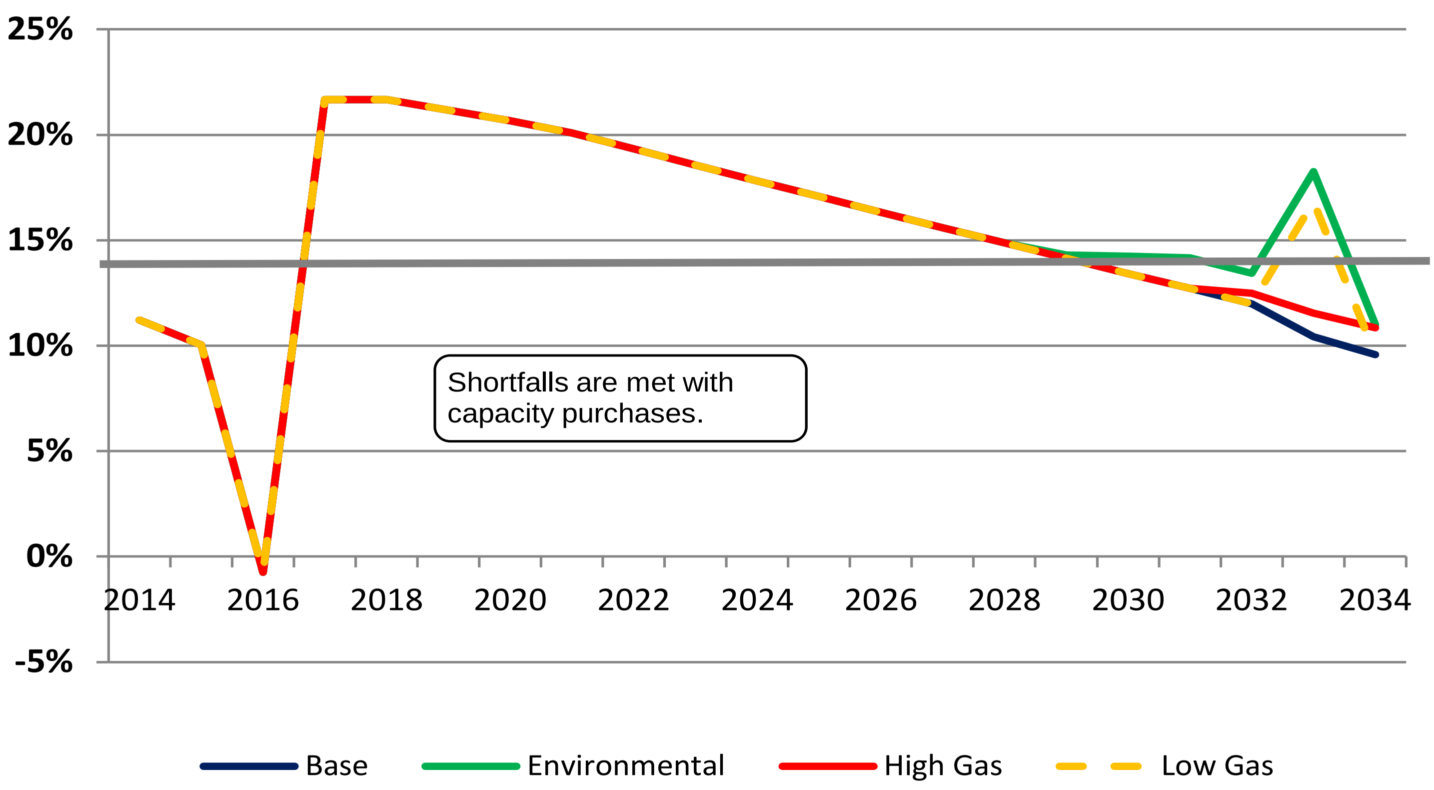
Wind/Solar Generation as Percent of Load



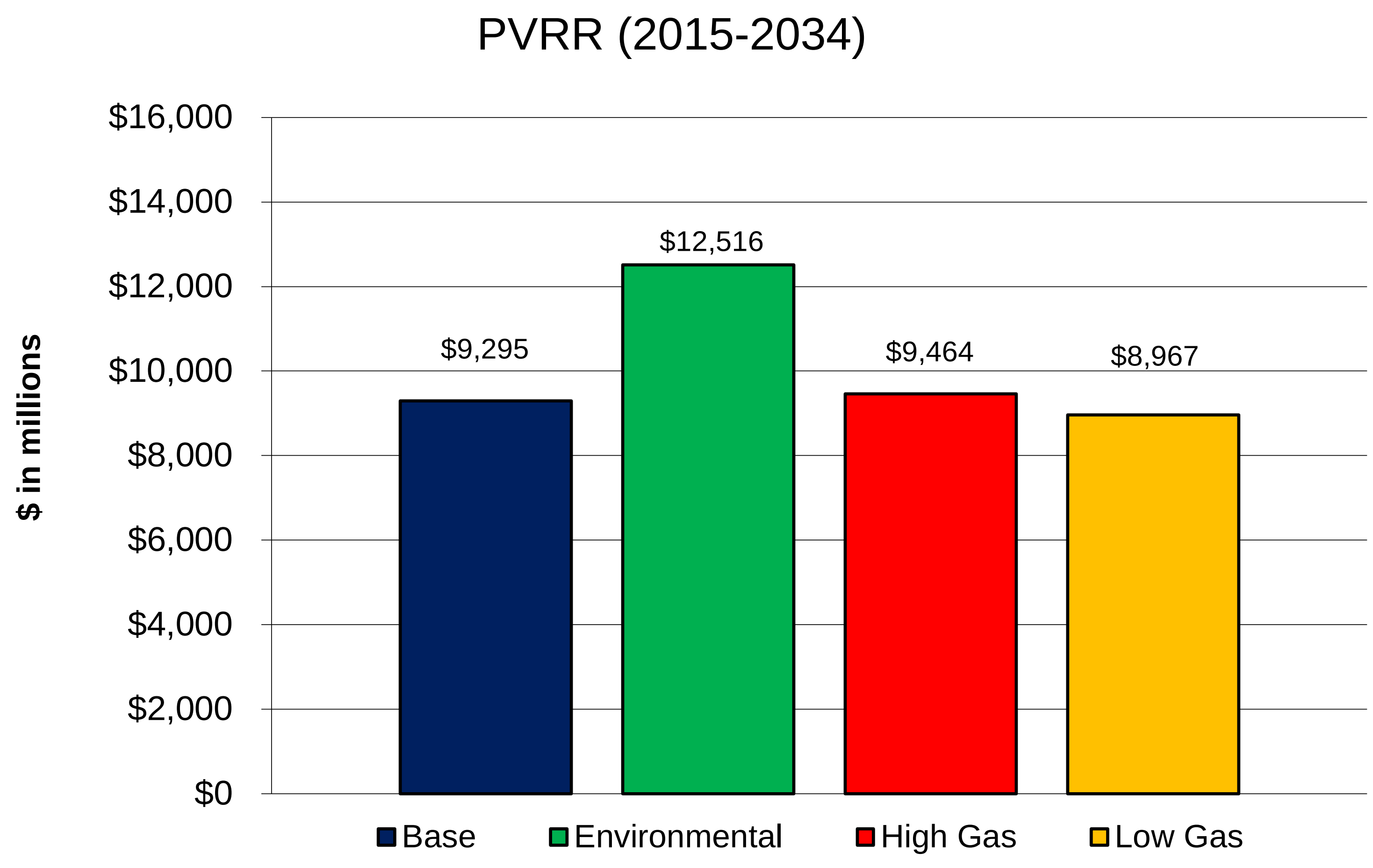
Generation Mix in 2034



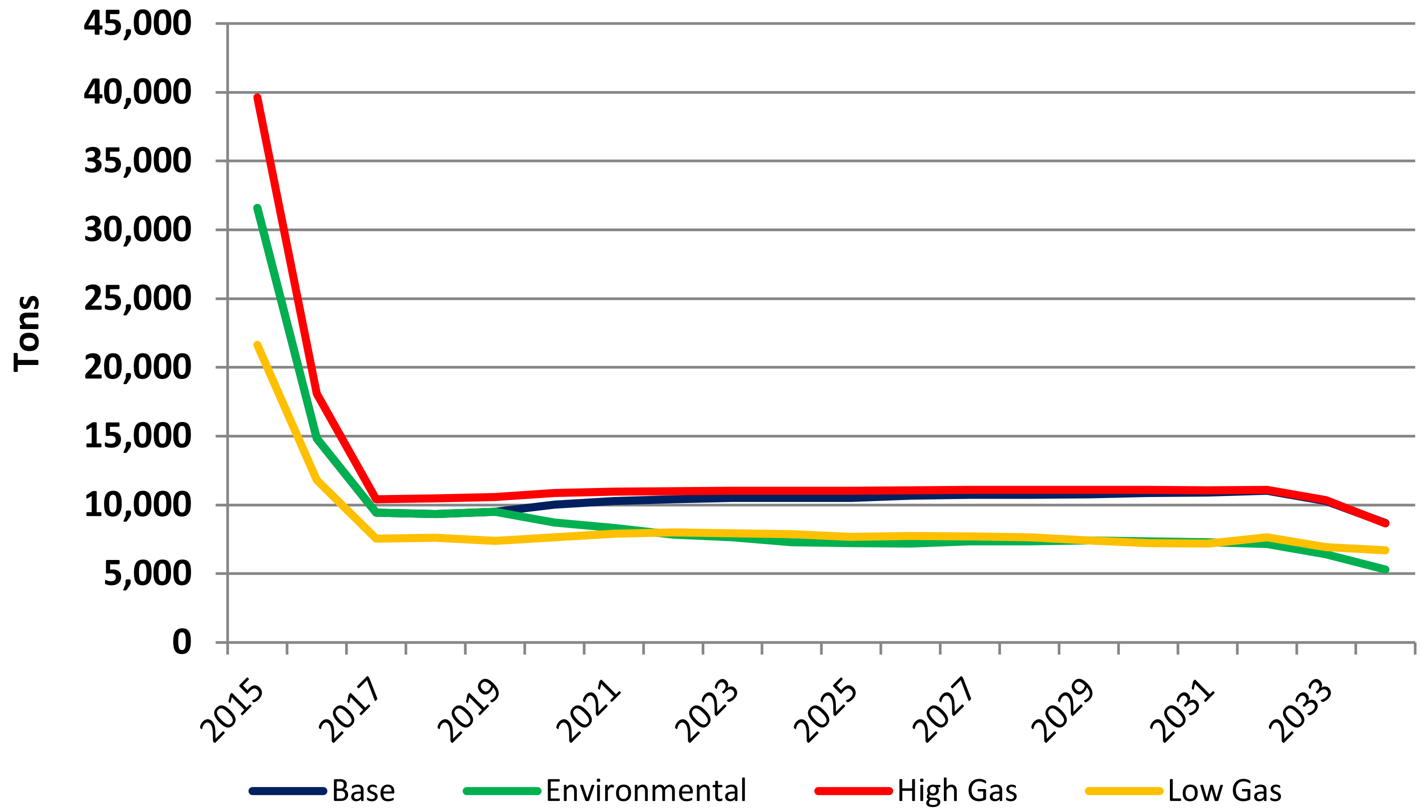
Reserve Margins



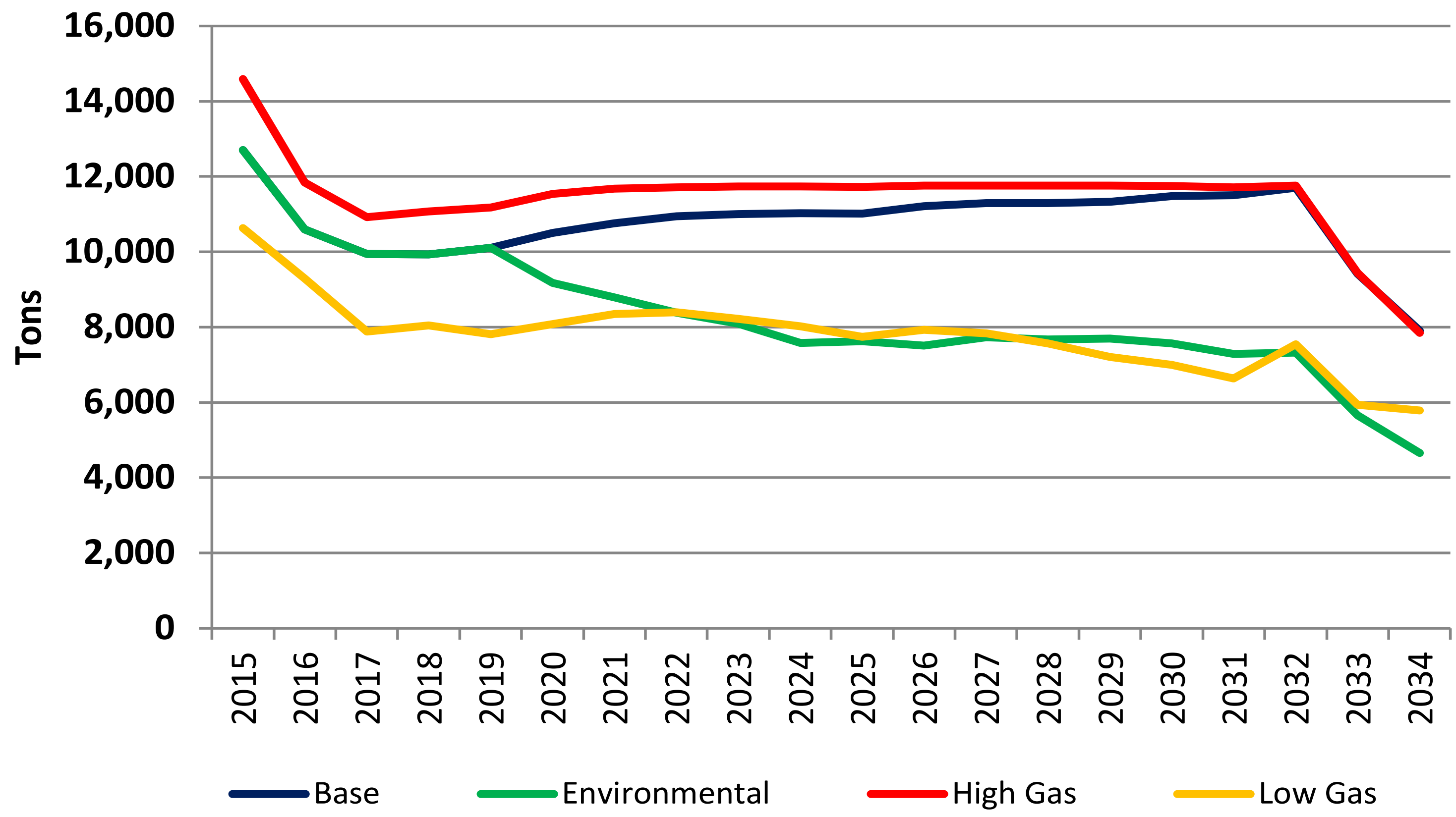
Present Value of Revenue Requirements



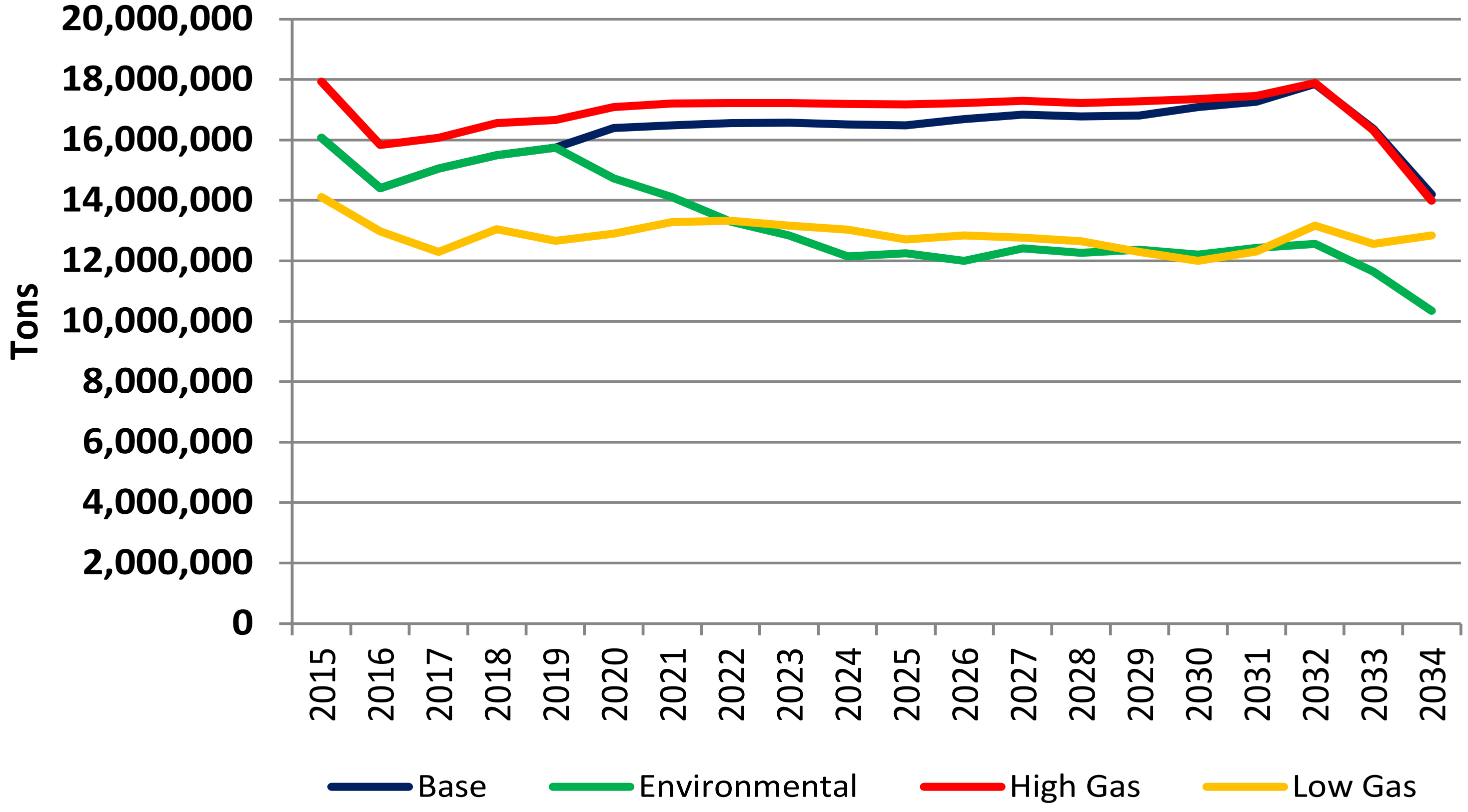
SO_2 Emissions



NO_x Emissions



CO_2 Emissions



Conclusions from IPL's Initial Modeling

- IPL does not have a need for new capacity resources for the next 15 years
  - o Eagle Valley CCGT in 2017
  - o Low load growth + DSM/EE
  - o Subject to change if NPDES evaluation indicates earlier retirement of big 5 coal units
- Combined cycle is a preferred capacity resource addition in all scenarios
- Wind is added in the environmental and high gas scenarios

Questions?

Stakeholder Feedback and Comments

Facilitated by Marty Rozelle, PhD

Next Steps

Presented by Marty Rozelle, PhD

Next Steps

Schedule for the Rest of 2014	
July 25, 2014	IRP Public Advisory Meeting #2 Notes Posted to IPL Website
August 1, 2014	Deadline to Submit Comments/Questions to IPL.IRP@aes.com
August 15, 2014	IPL's Response to Comments/Questions Will be Posted to IPL Website
September 23, 2014	IRP Public Advisory Meeting #3 – Final modeling results presented
October 31, 2014	Submit IRP Document to the IURC

Give us your feedback. IPL is here to listen to you.

Thank You!

ipl an AES company

IRP Public Advisory Meeting #3

Workshop with IRP Stakeholders

October 10, 2014

Barnes & Thornburg

11 South Meridian St.

Welcome and Introductions

Meeting Agenda and Guidelines

Presented by Marty Rozelle, PhD, Meeting Facilitator

Meeting Guidelines

- Time for clarifying questions at end of each presentation
- Parking lot for items to be addressed later
- The phone line will be muted. During the allotted question time frames, you may press *6 to un-mute yourself or type a question through the web-chat function.
- To inquire about confidential information please contact Teresa Nyhart with Barnes & Thornburg, LLP at teresa.nyhart@btlaw.com

Meeting Objectives

- Provide the NPDES analysis results driving the conversion of Harding Street Unit 7 to natural gas
- Provide updated IRP modeling assumptions and inputs
- Explain the resource modeling scenarios and preferred resource portfolio
- Present the Short Term Action Plan

NPDES – National Pollutant Discharge Elimination System

IRP Public Advisory Meeting #3

Agenda Topics

- Summary of IRP Public Advisory Meeting #1 and #2
- NPDES Analysis
- Updated Modeling Assumptions and Inputs
- Presentation of Scenario Results
- Short Term Action Plan
- Next Steps

Questions?

Summary of IRP Public Advisory Meetings #1 and #2

Presented by Joan Soller, Director of Resource Planning

IRP Public Advisory Meeting #1

May 16, 2014 --- Agenda Topics

- Introduction to IPL and Integrated Resource Planning Process
- Energy and Peak Forecasts
- Demand Side Management: Energy Efficiency and Demand Response
- Planning Reserve Margin
- Generation Overview
- Environmental Overview
- Distributed Generation
- Proposed Modeling Assumptions

Company Profile

- 470,000 customers*
- 1,400 employees*
- 528 sq. miles territory
- 144 substations

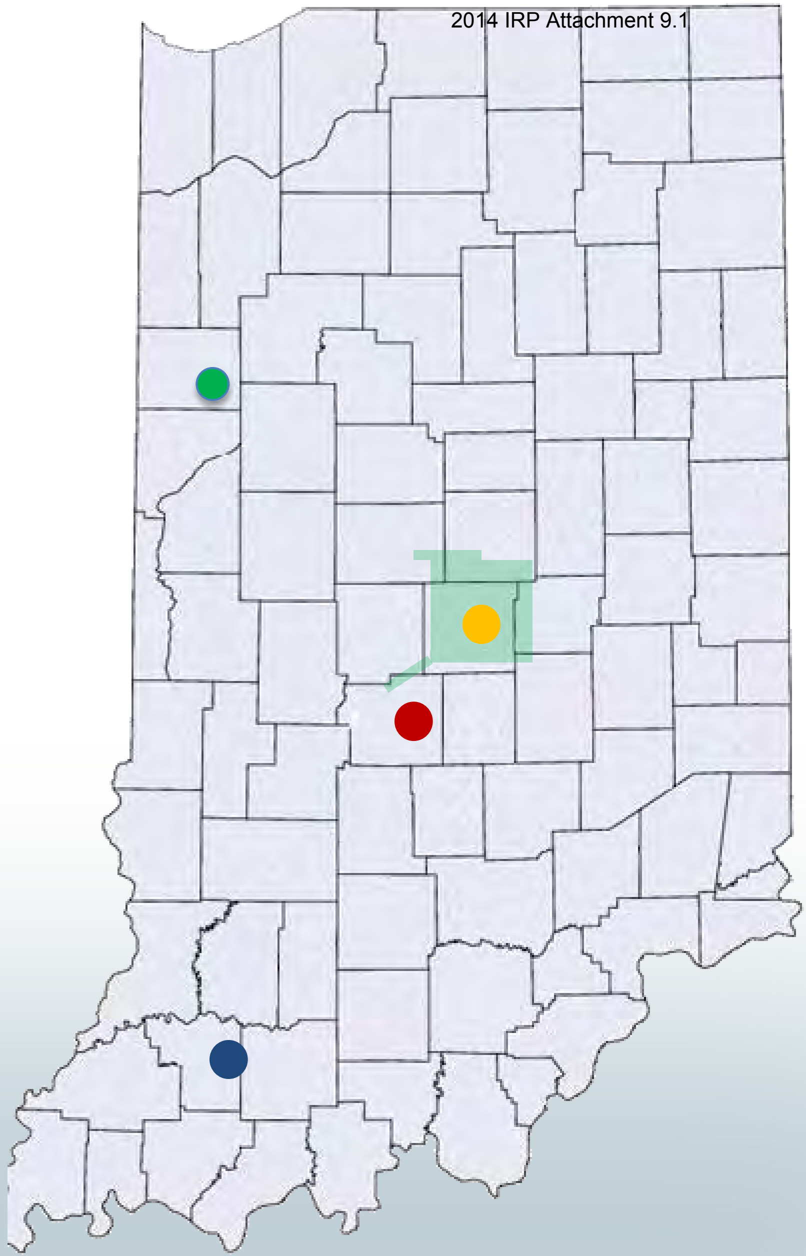
Harding Street Station, Georgetown Station, Solar REP Projects - 1,322 MW**

Eagle Valley Generating Station - 263 MW**

Petersburg Generating Station – 1,760 MW**

Hoosier Wind Park PPA – 100 MW**

Lakefield Wind Park PPA – 201 MW**
(In Minnesota – Not pictured)



*approximate numbers
**nameplate capacity

IRP Process Overview

1. Develop IPL's **Total** Supply Resource Needs
2. Determine IPL's **New** Supply Resource Needs
3. Identify Key Risk Parameters
4. Identify and Screen Resource Technologies
5. Evaluate Resource Expansion Plans
6. Identify IPL's Reference and Short Term Action Plans

Environmental Regulations

- Current Environmental Regulations/Environmental Projects
  - Mercury and Air Toxics Standard (MATS)
  - NPDES Water Discharge Permits

- Future Environmental Regulations
  - Coal Combustion Residuals (CCR)
  - 316(b) – Cooling water intake structures
  - Clean Power Plan (Greenhouse Gas (GHG) Rule)
  - National Ambient Air Quality Standards (NAAQS)
  - Cross State Air Pollution Rule (CSAPR)

NPDES - National Pollutant Discharge Elimination System

Distributed Generation

- Distributed generation can be difficult to implement on a large scale
- Solar has the best opportunity for growth in the IPL service territory but is currently challenging as a least cost resource
- Actively monitoring trends in Distributed Generation and Distributed Energy Resources

IRP Public Advisory Meeting #2

July 18, 2014 --- Agenda Topics

- Summary of IRP Public Advisory Meeting #1
- Demand Side Management Update
- Environmental Update
- Overview of Stakeholder Comments and Questions
- Incorporating Stakeholder Input
- Presentation of Scenario Results
- Stakeholder Feedback and Comments

Recent DSM Developments

- IPL has made a filing for approval of a DSM Plan for 2015/2016 in Cause No. 44497
- Testimony filed in Cause No. 44441 regarding large customer’s ability to opt-out of DSM
- Numerous comments on the IURC General Administrative Order have been made, providing recommendations for future DSM in Indiana

2015-2016 DSM Plan Filed - Cause No. 44497

- Cause No. 44497 seeks Commission approval of a 2 Year Plan (2015-2016); however, a 3 Year Action Plan (2015-2017) was included in the prepared filing
- Petition filed on May 30, 2014
- Plan includes 13 DSM Programs
  - 9 Residential and 4 Business
- Forecast EE Savings approx. 1.12% of sales (total sales before large customer opt-outs)
- Expect to continue collaboration with Citizens Gas

Proposed Clean Power Plan

- EPA's Proposed Clean Power Plan would reduce carbon emissions from the power sector nationwide by 30% by 2030 from 2005 levels

- Compliance with "interim goal" on average over the ten-year period from 2020-2029. Compliance with "final goal" in 2030 and thereafter.

- Impacts will be heavily dependent upon the final rule (expected June 1, 2015) and State Implementation Plans and remain largely uncertain at this time, but may include:
  - Required heat rate improvements
  - Decreased dispatch of coal-fired units
  - Increased dispatch of renewables and existing NGCCs
  - Additional demand side EE measures

Addressing Top Stakeholder Risk Factors

- Cost assumptions for wind turbines
  - Reduced the Ventyx reference case cost assumption for new wind resources by $200/KW to reflect declining costs for wind generation
- Carbon/GHG Assumptions
  - Included in the Ventyx environmental scenario
  - Will incorporate the “EPA Clean Power Plan” into the IPL base case scenario

Addressing Top Stakeholder Risk Factors

- DSM/EE
  - Incorporate updated projections from Applied Energy Group analysis
  - Provide transparency on cost/benefit analysis evaluated on a consistent basis with supply-side options
  - Ventyx Model is not the best tool for DSM cost/benefit analysis
- Distributed Generation Impact
  - Will reduce energy forecast to reflect increasing level of customer dis gen (e.g. 2% by 2020, 4% by 2030)

Conclusions from IPL's Initial Modeling

- IPL does not have a need for new capacity resources for the next 15 years
  - Refuel HS units in 2015/2016
  - Eagle Valley CCGT in 2017
  - Low load growth + DSM/EE
  - Subject to change if NPDES evaluation indicates earlier retirement of big 5 coal units
- Combined cycle is a preferred capacity resource addition in all scenarios
- Wind is added in the environmental and high gas scenarios

IPL's Feedback Response Tables

	May 16, 2014 IRP Meeting	July 18, 2014 IRP Meeting
Number of Comments and Questions Received	112	29
Date IPL's Response Was Posted on IRP Webpage	June 20, 2014	August 15, 2014

- IPL responded to all stakeholder comments and questions received
- The Feedback Response Tables are posted on the IPL IRP webpage (https://www.iplpower.com/IRP/)

Stakeholder Comments and Questions from IPL's July 18th IRP Public Advisory Meeting

Feedback topics included:

- DSM 2018-2034 Forecast
- Future Environmental Cost Estimates
- Clean Power Plan Evaluation
- NPDES Analysis Results
- Wind Congestion Assumptions
- Flexible Retirement Dates within the Model

Questions?

START OF NEW MATERIAL

NPDES Analysis

Presented by Tate Ayers, Director Corporate Planning and Analysis

IPL Maintains NPDES Permits on Each of its Power Plants

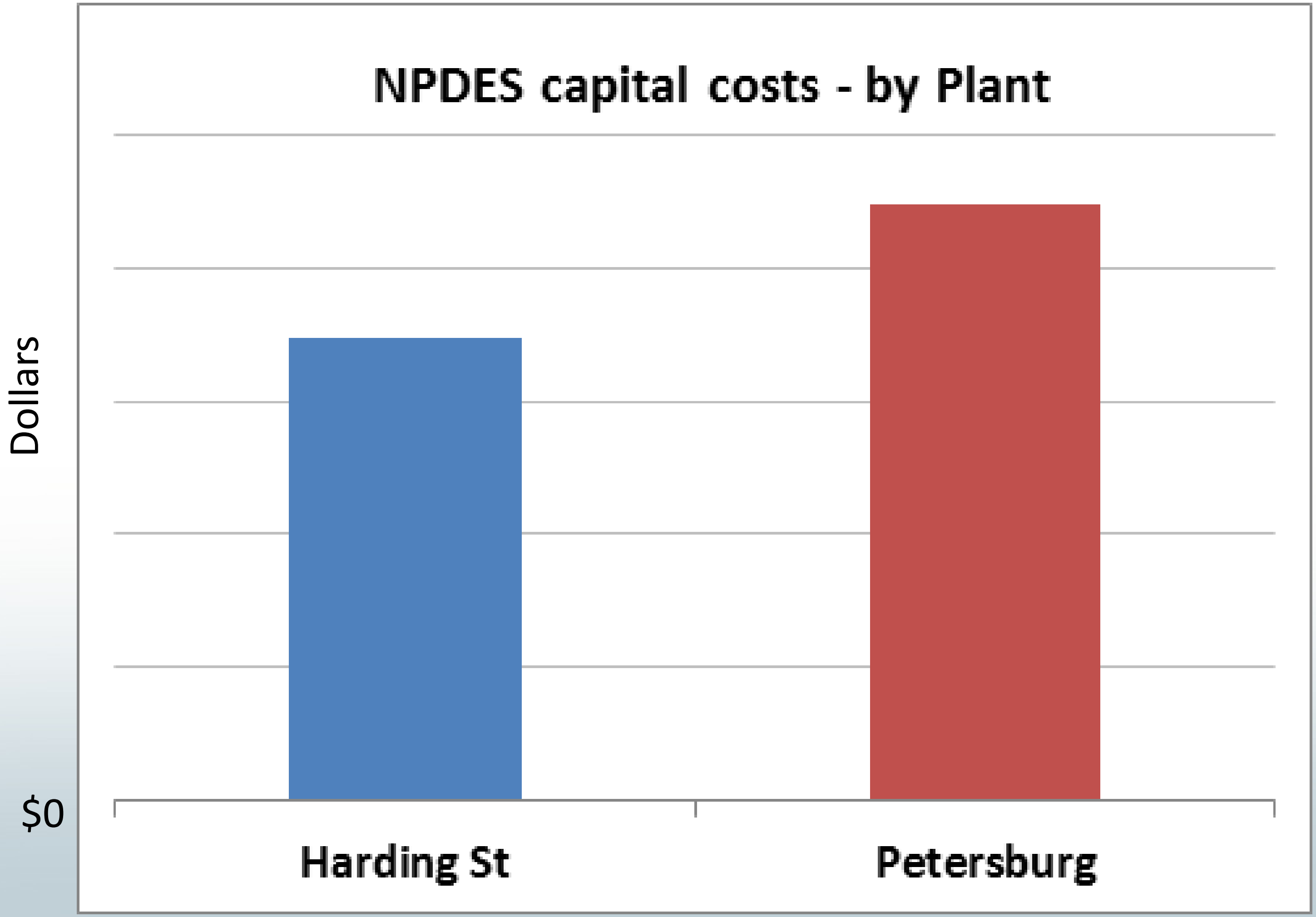
- The NPDES permits require compliance with the following:
  - Technology based and water quality based effluent limitations
  - Monitoring and reporting requirements
- On August 28, 2012, the IDEM issued NPDES permit renewals to IPL's Petersburg and Harding Street generating plants
  - The permit includes new technology based and water quality based effluent limitations
  - These new limitations and requirements drive the need for additional wastewater treatment technologies
  - Compliance due by September 2017

NPDES - National Pollutant Discharge Elimination System
IDEM- Indiana Department of Environmental Management
CWA – Clean Water Act

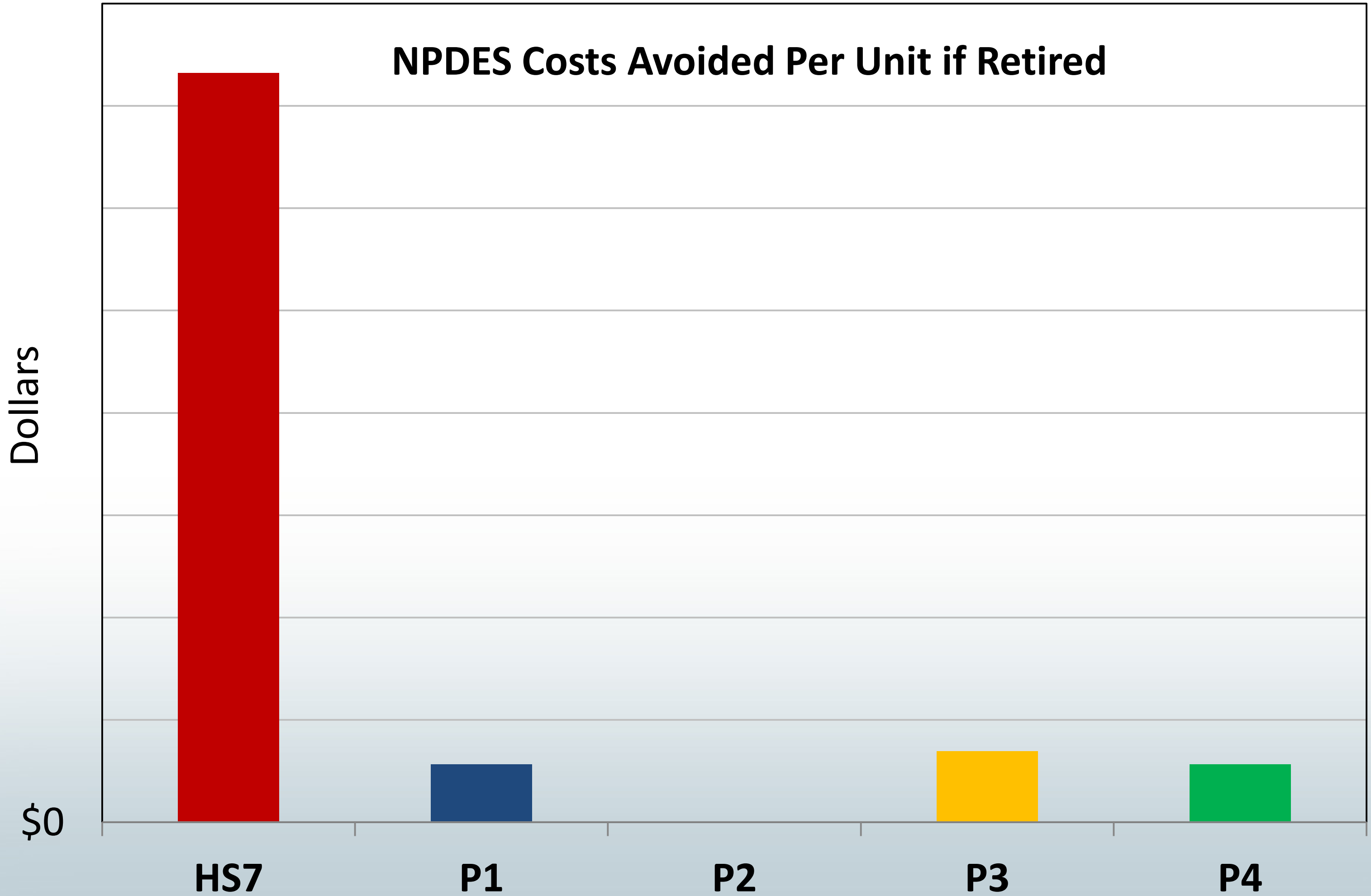
NPDES Analysis

- Performed for IPL Coal units: HS 7 and Petersburg 1-4
- Full life-cycle evaluation to capture impact of potential future risks
  - Multiple composite risk-scenarios were used to perform decision-tree analysis
  - Probabilities and costs applied to risks to derive an overall ‘expected’ revenue-requirement
  - Simple payback assessment
- Evaluated against alternative resource-options

Petersburg Plant Costs Compared to Harding St Plant Costs with HS 7 on Coal



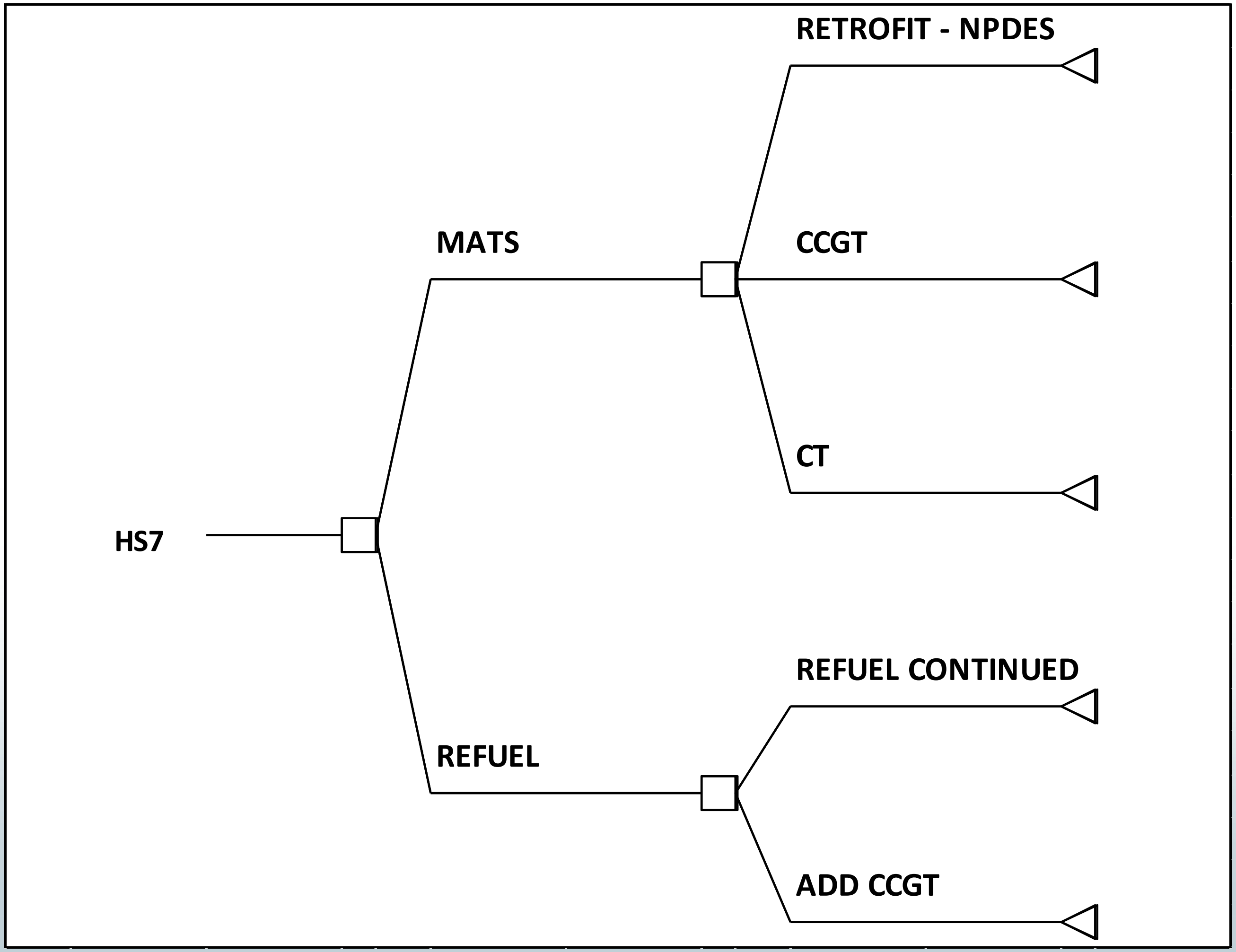
IPL Coal Unit Incremental Capital Costs



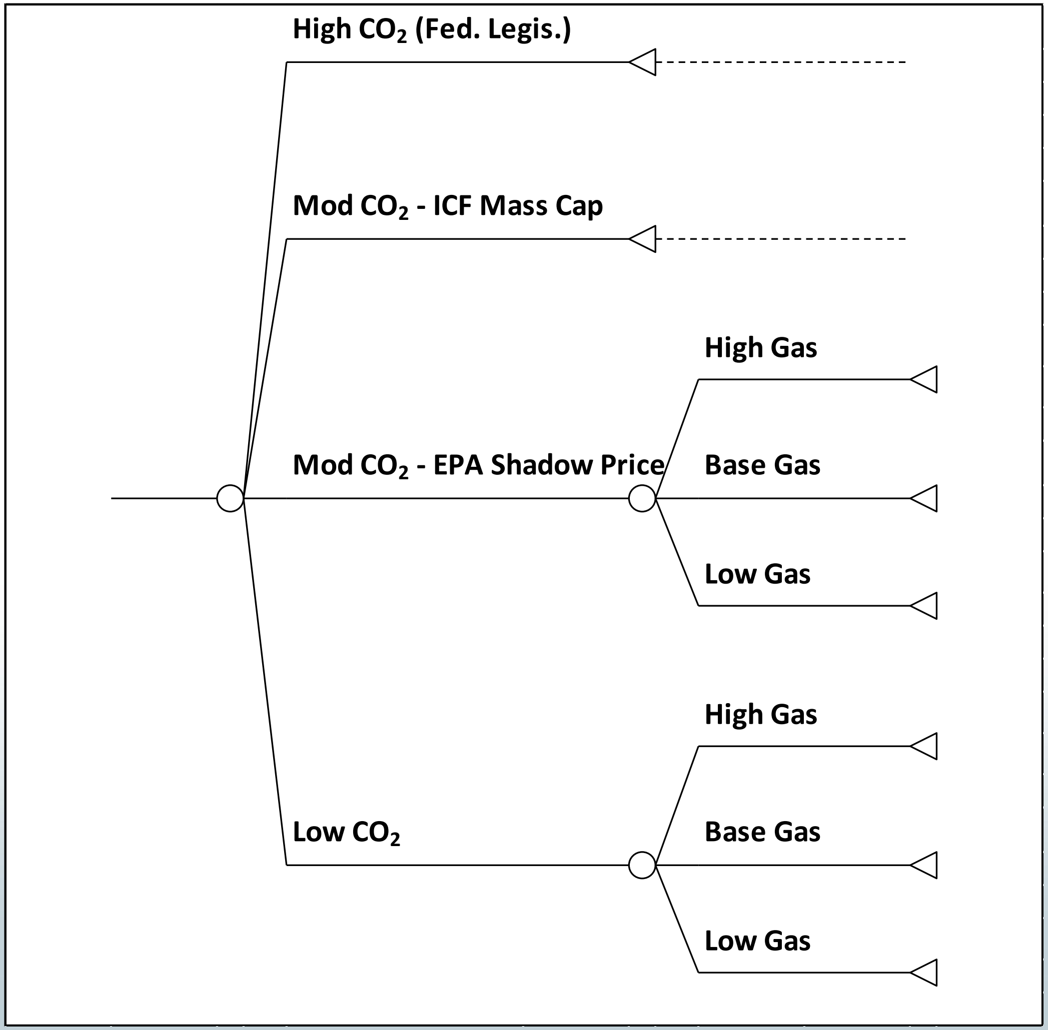
Future Risks Considered

- Natural Gas prices
- GHG/CO_2 requirements
  - Clean Power Plan
  - Federal Legislation
- Other Environmental regulations including:
  - Coal Combustion Residuals (CCR)
  - 316(b) – Cooling water intake structures
  - National Ambient Air Quality Standards (NAAQS)
- Reliability (HS7)

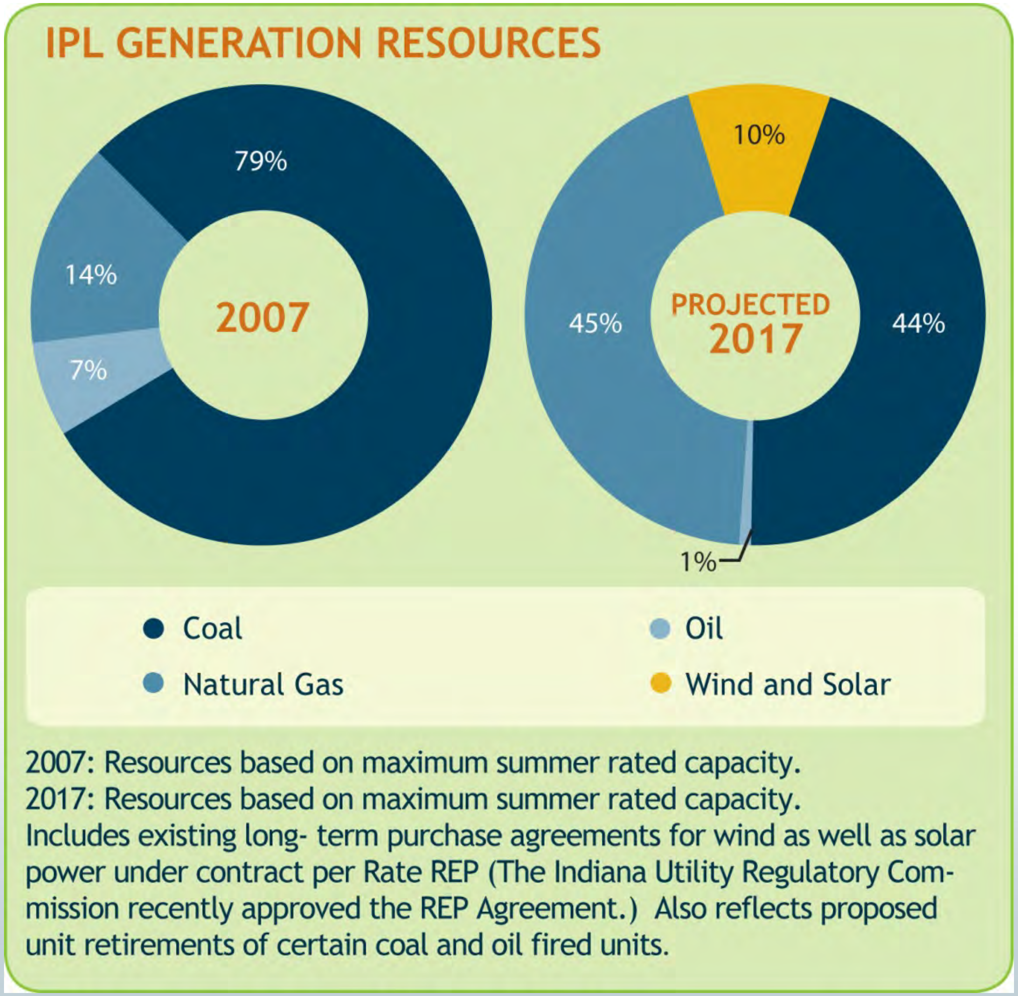
HS7 Decision Tree Resource Options



Decision Tree – CO2 and Natural Gas Risk Scenarios



Converting Harding Street Unit 7 to Natural Gas is the Reasonable Least Cost Plan



IPL modeled HS 7 as a natural gas unit in the IRP and as shown here in the 2017 projection

Questions?

Updated Modeling Assumptions and Inputs

Presented by:
Joan Soller, Director of Resource Planning
Dave Costenaro, Applied Energy Group
John Haselden, Principal Engineer, Regulatory Affairs
Lake Hainz, Resource Planning Analyst
Angelique Oliger, Director of Environmental Policy

Additional Modeling Adjustments to Incorporate New Information and Stakeholder Feedback

1. DSM Forecast was developed for the full 20-year planning period
   - Developed and presented today by AEG
2. Load sensitivities were included (high/low/base)
3. IPL modeled a sensitivity for wind
4. IPL estimated possible future environmental cost ranges
5. Possible environmental effects of the Clean Power Plan were included in most scenarios through CO_2 costs
6. Modeled economic generation retirements vs full planning life

Indianapolis Power & Light DSM Potential Forecast

Prepared for IRP Stakeholder Meeting

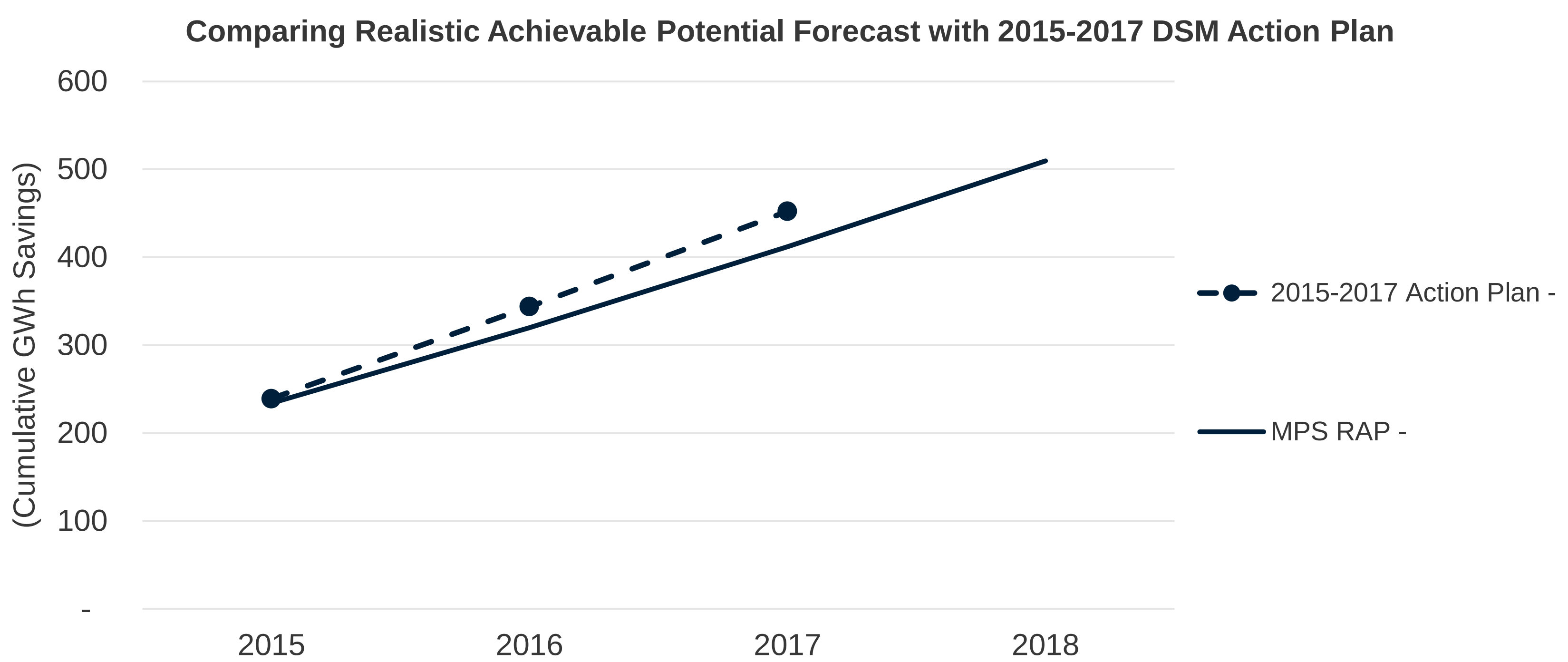
Forecasting DSM Potential for IPL

- Began with AEG's LoadMAP Model from 2012 DSM Potential Study* and made the following updates:
  1. Refined base year energy use based on improved IPL customer data
  2. Calibrated kWh sales to match 2012 and 2013 actual sales
  3. Updated forecast variables such as avoided costs and discount rates
  4. Aligned measure mix to Filed IPL 2015-2017 DSM Action Plan (added Residential Peer Comparison Program, Residential & Business AC Management Programs)
  5. Updated measure & baseline assumptions for LED lamps, TVs, and Set-top boxes
  6. Tuned market adoption rates, impacts, and budget to align with Filed IPL 2015-2017 DSM Action Plan

** "Energy Efficiency Market Potential Study and Action Plan" dated December 21, 2012 was completed by EnerNOC Utility Solutions Consulting Group, which has since been acquired by Applied Energy Group. The same core team members completed the analysis in both the previous and present work.*

Forecasting DSM Potential for IPL

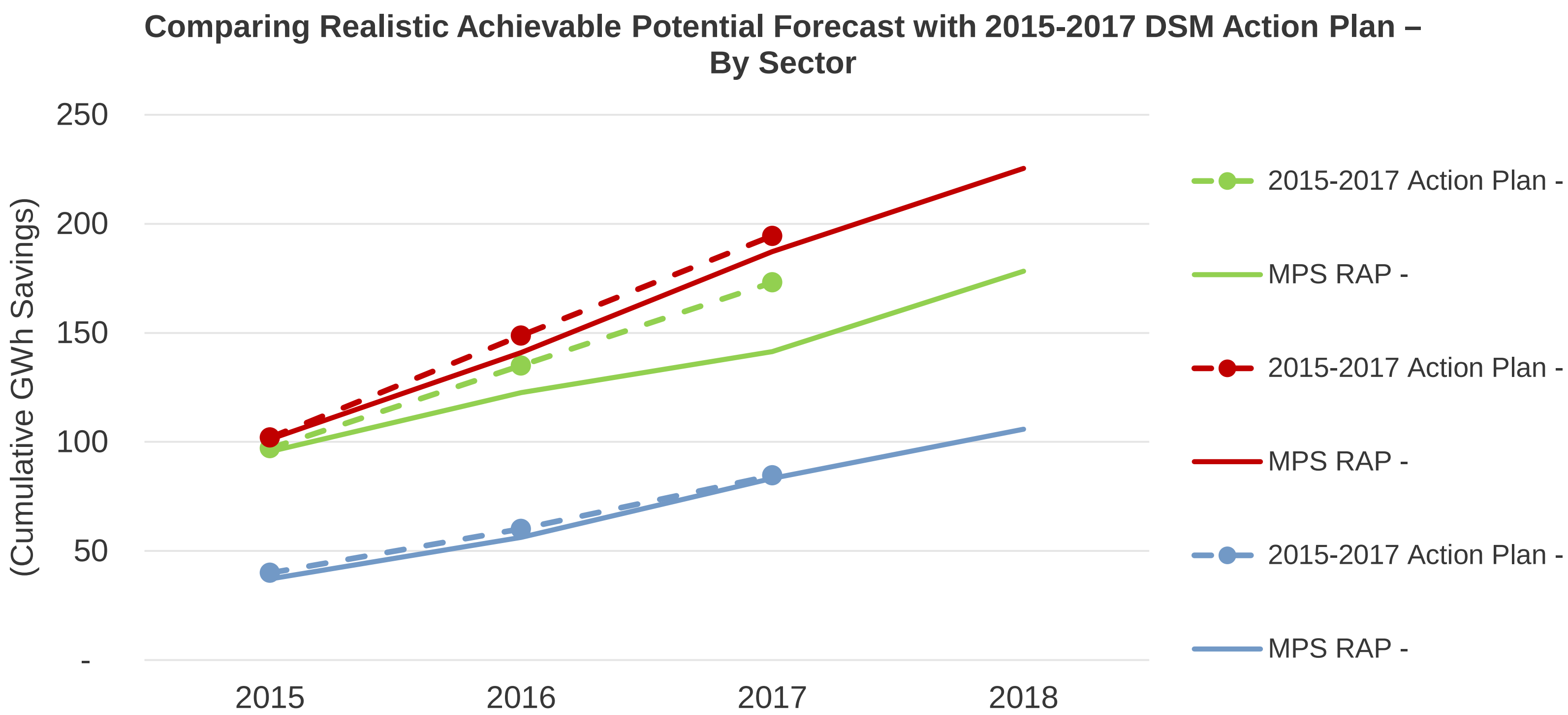
- DSM Potential Forecasts are a close match to the Action Plan. We then project trends into the future, to 2024 (last year of previous MPS) and beyond to 2034 (timeframe required to support current IRP).



** "Energy Efficiency Market Potential Study and Action Plan" dated December 21, 2012 was completed by EnerNOC Utility Solutions Consulting Group, which has since been acquired by Applied Energy Group. The same core team members completed the analysis in both the previous and present work.*

Forecasting DSM Potential for IPL

- Customer segment breakdown of the DSM Potential Forecasts are a close match to the Action Plan.



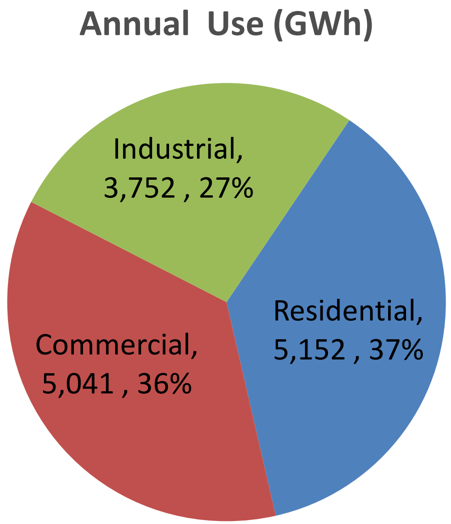
Green – Residential, Red – Commercial, Blue - Industrial

** "Energy Efficiency Market Potential Study and Action Plan" dated December 21, 2012 was completed by EnerNOC Utility Solutions Consulting Group, which has since been acquired by Applied Energy Group. The same core team members completed the analysis in both the previous and present work.*

Overall Market Characterization

All Sectors in 2011 (Base Year)

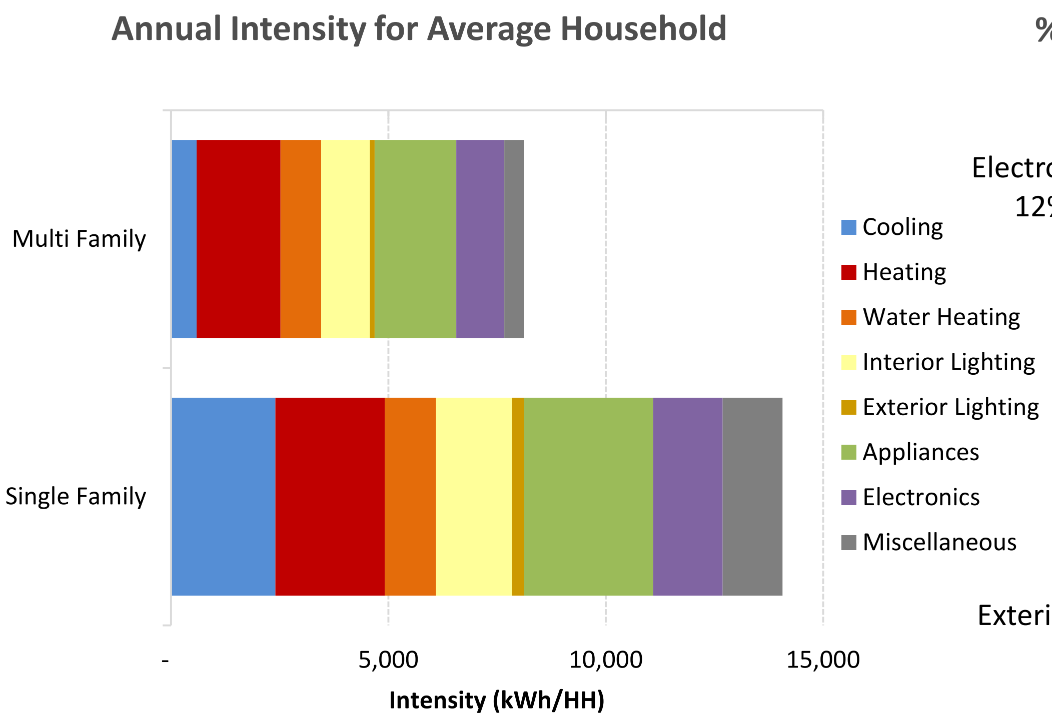
Segment	Annual Use (GWh)	% of Sales
Residential	5,152	37%
Commercial	5,041	36%
Industrial	3,752	27%
Total	**13,946**	**100%**

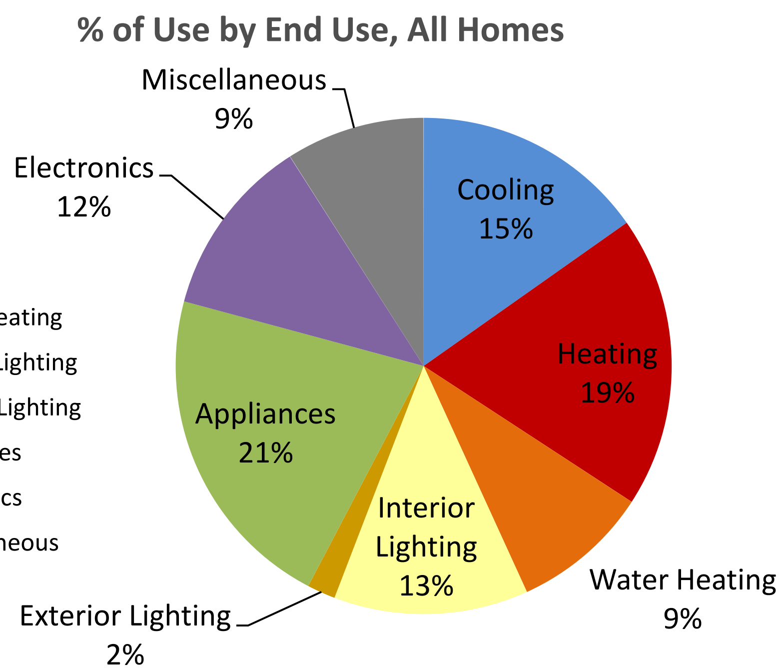


- Relative to the 2012 MPS, the split between commercial and industrial usage has shifted.
- Estimated 27% commercial and 36% industrial usage in 2012 MPS based on regional averages and investigation of IPL's top 30 customers
- Updates to NAICS codes in the IPL billing system refined this split to be the opposite: 36% commercial and 27% industrial.
- The residential control totals were not affected.

Residential Market Profile, 2011

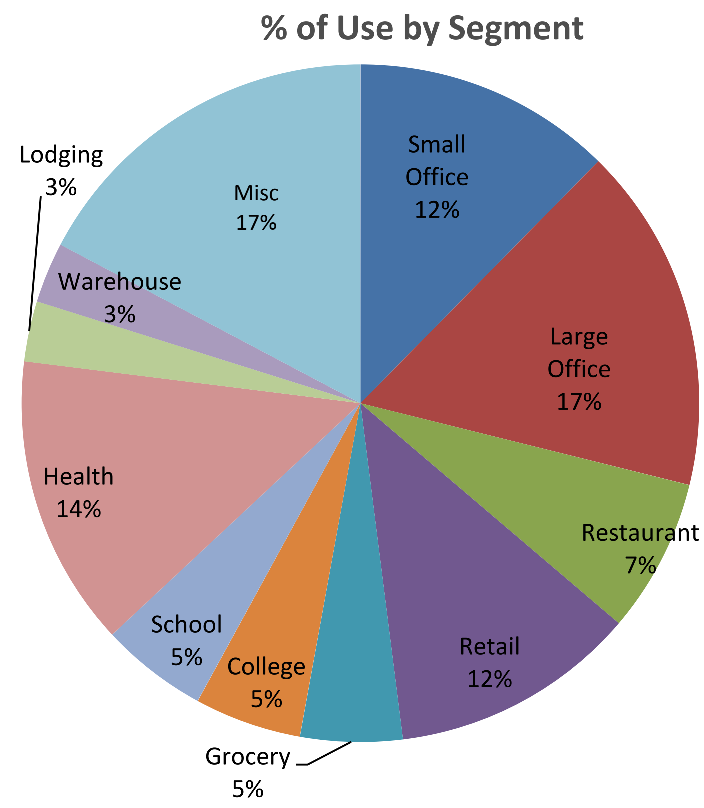
Segment	Households	Intensity (kWh/HH)	2011 Electricity Use (GWh)
Single Family	298,461	14,071	4,200
Multi Family	117,307	8,120	952
Total	**415,768**	**12,392**	**5,152**





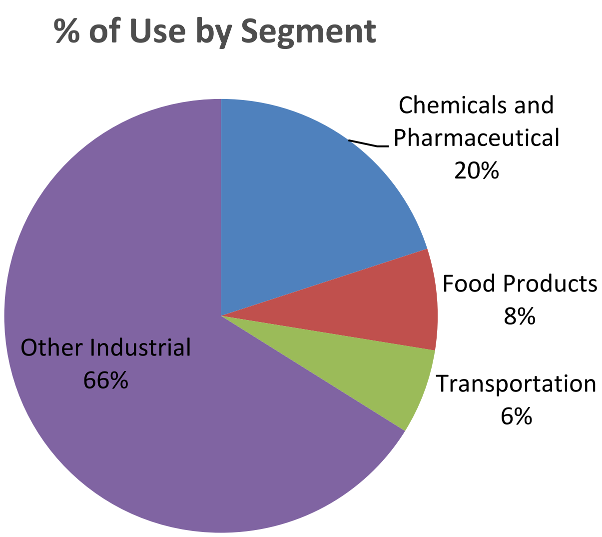
Commercial Market Profile, 2011

Segment	Floor Space (1,000 Sq.Ft.)	2011 Electricity Use (1,000 MWh)	Summer Peak Demand (MW)
Small Office	41,023	624	186
Large Office	46,263	832	125
Restaurant	9,571	370	63
Retail	42,648	594	135
Grocery	5,023	245	88
College	22,259	257	61
School	31,959	257	67
Health	28,537	701	106
Lodging	10,609	145	21
Warehouse	22,553	145	49
Miscellaneous	114,106	870	193
Total	**374,553**	**5,041**	**1,094**

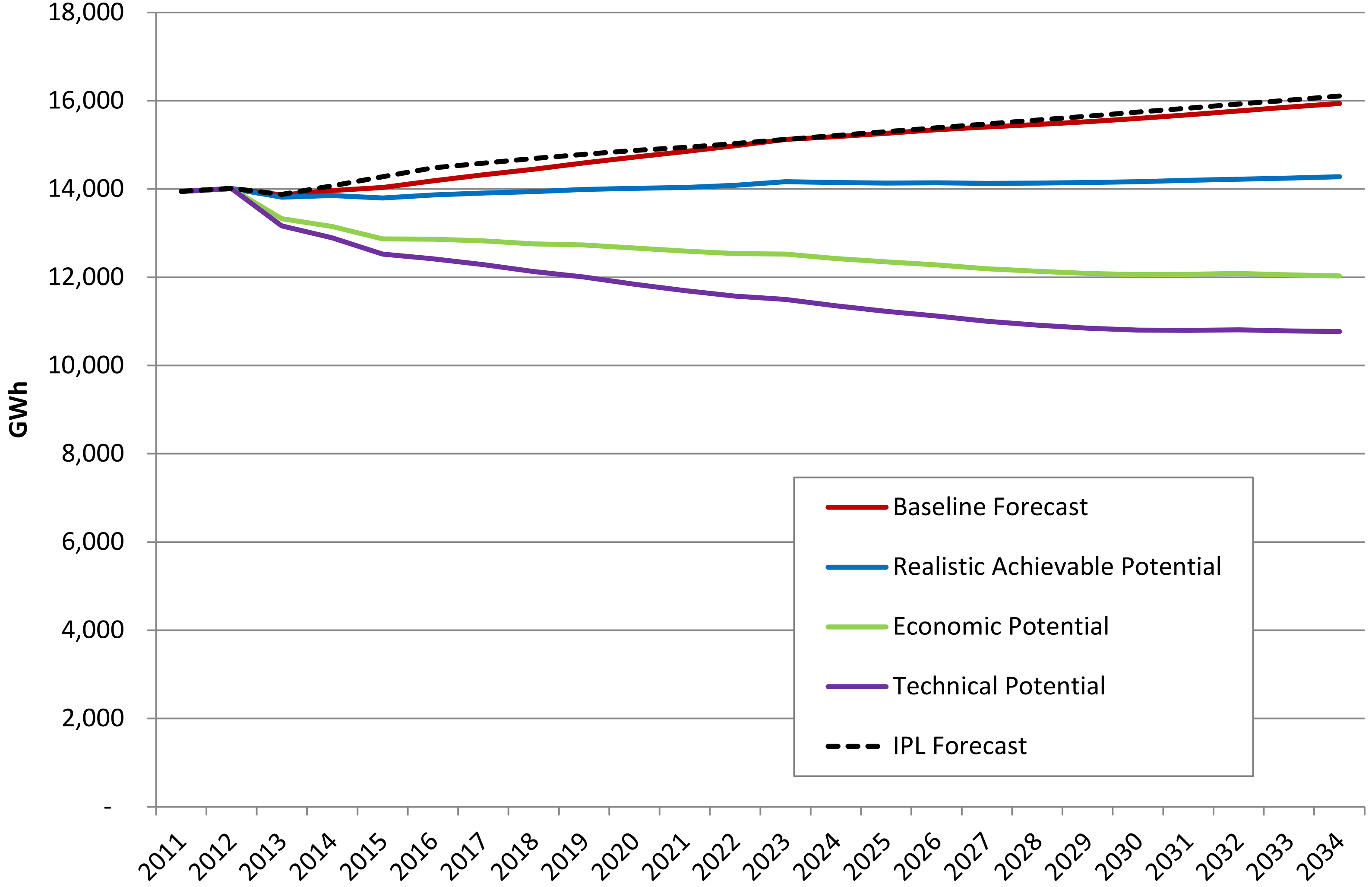


Industrial Market Profile, 2011

Segment	Number of Employees	2011 Electricity Use (GWh)	Summer Peak Demand (MW)
Chemicals and Pharmaceutical	3,079	751	100
Food Products	3,592	283	38
Transportation	4,054	238	46
Other Industrial	90,634	2,481	540
Total	**101,358**	**3,752**	**724**

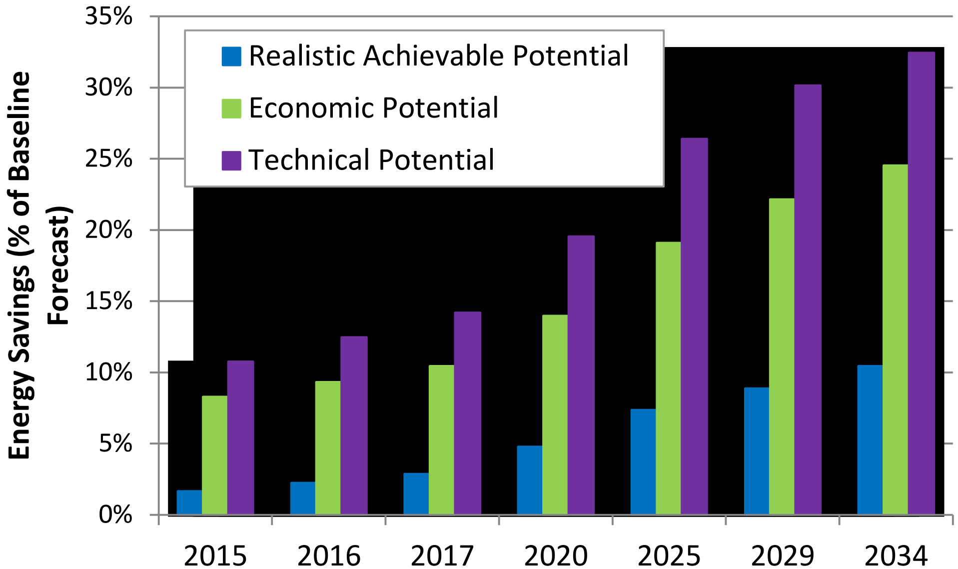


Impact of DSM Potential on Load Forecast



Overall DSM Potential (Energy)

For 2015 to 2034, 20-year Realistic Achievable Potential savings are 10.4% of the baseline forecast. This is 1,665 net* GWh.

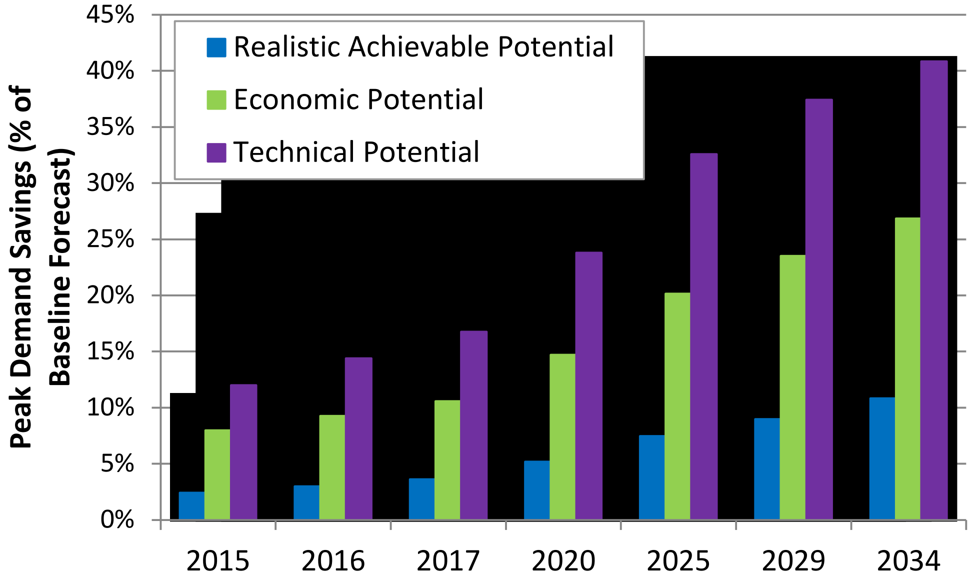


	2015	2016	2017	2020	2025	2029	2034
Baseline Forecast (GWh)	14,033	14,186	14,319	14,722	15,260	15,526	15,940
Net Cumulative Savings (GWh)							
Realistic Achievable Potential	234	320	412	706	1,125	1,378	1,665
Economic Potential	1,163	1,323	1,495	2,057	2,914	3,438	3,911
Technical Potential	1,509	1,770	2,034	2,877	4,030	4,681	5,172
Net Energy Savings (% of Baseline)							
Realistic Achievable Potential	1.7%	2.3%	2.9%	4.8%	7.4%	8.9%	10.4%
Economic Potential	8.3%	9.3%	10.4%	14.0%	19.1%	22.1%	24.5%
Technical Potential	10.8%	12.5%	14.2%	19.5%	26.4%	30.2%	32.4%

**All savings, unless otherwise noted, are provided as net values rather than gross, because LoadMAP uses a baseline forecast that includes naturally occurring EE.*

Overall DSM Potential (Peak Demand)

For 2015 to 2034, 20-year Realistic Achievable Potential savings are 10.8% of the baseline forecast. This is 396 net* MW.

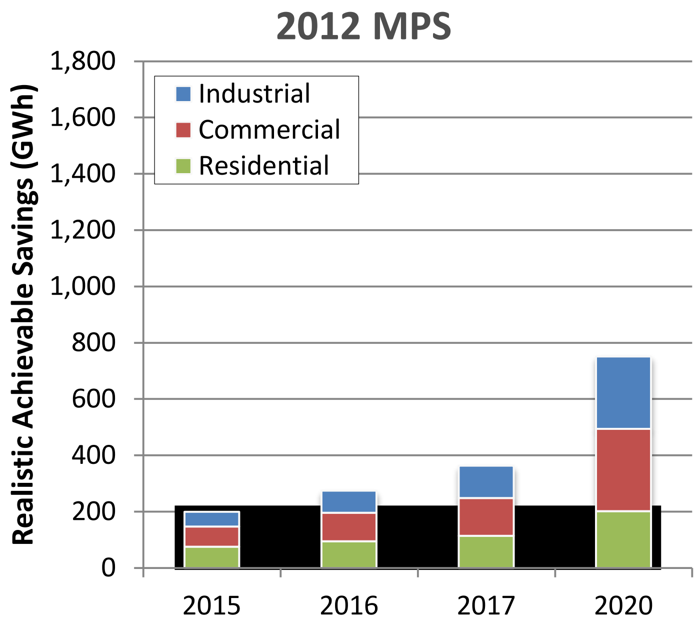


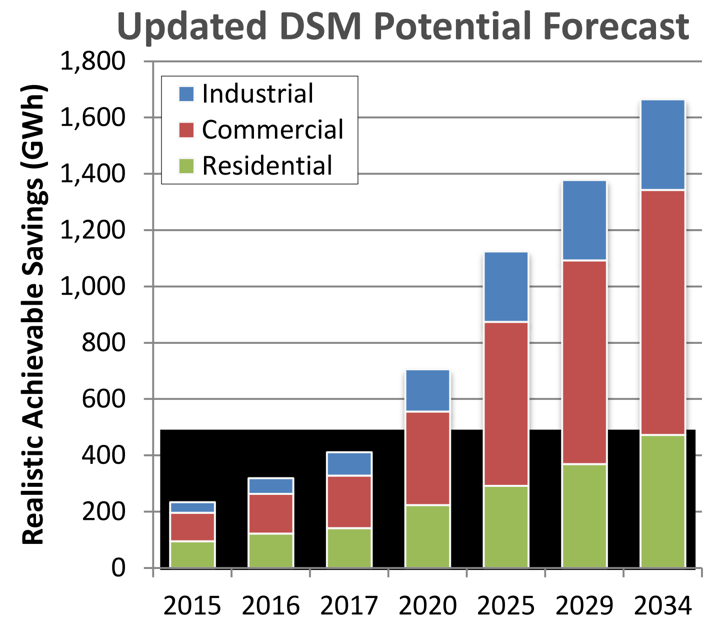
	2015	2016	2017	2020	2025	2029	2034
Baseline Forecast (MW)	3,181	3,225	3,265	3,383	3,535	3,586	3,662
Net Cumulative Savings (MW)							
Realistic Achievable Potential	76	96	117	175	263	322	396
Economic Potential	254	298	345	497	712	843	983
Technical Potential	381	464	547	805	1,152	1,342	1,495
Net Energy Savings (% of Baseline)							
Realistic Achievable Potential	2.4%	3.0%	3.6%	5.2%	7.5%	9.0%	10.8%
Economic Potential	8.0%	9.2%	10.6%	14.7%	20.1%	23.5%	26.8%
Technical Potential	12.0%	14.4%	16.8%	23.8%	32.6%	37.4%	40.8%

*All savings, unless otherwise noted, are provided as net values rather than gross, because LoadMAP uses a baseline forecast that includes naturally occurring EE.

2012 MPS vs Updated Potential Forecast (by sector)

Allocation of cumulative achievable potential over time





	2015	2016	2017	2020
RAP Savings (GWh)				
Residential	75.5	95.7	114.8	202.5
Commercial	71.8	100.2	133.7	292.6
Industrial	52.4	79.4	115.5	256.6
Total	**199.7**	**275.3**	**364.0**	**751.7**

	2015	2016	2017	2020	2025	2029	2034
RAP Savings (GWh)							
Residential	95.5	122.6	141.3	223.2	291.7	368.9	472.5
Commercial	101.2	140.9	187.3	333.1	582.5	724.0	870.4
Industrial	37.2	56.3	83.2	149.8	250.5	285.2	322.0
Total	**234.0**	**319.8**	**411.9**	**706.2**	**1,124.8**	**1,378.1**	**1,664.9**

- In 2020, Updated forecast of 706 GWh is slightly lower than previous study at 751 GWh
- Updated potential includes the estimated effects of C&I customers opting out of DSM programs, based on current levels of opt-out. 2012 MPS does not.

Thank You!

David M Costenaro
Senior Project Manager
dcostenaro@appliedenergygroup.com

IPL's View on AEG's 20 Year DSM Forecast

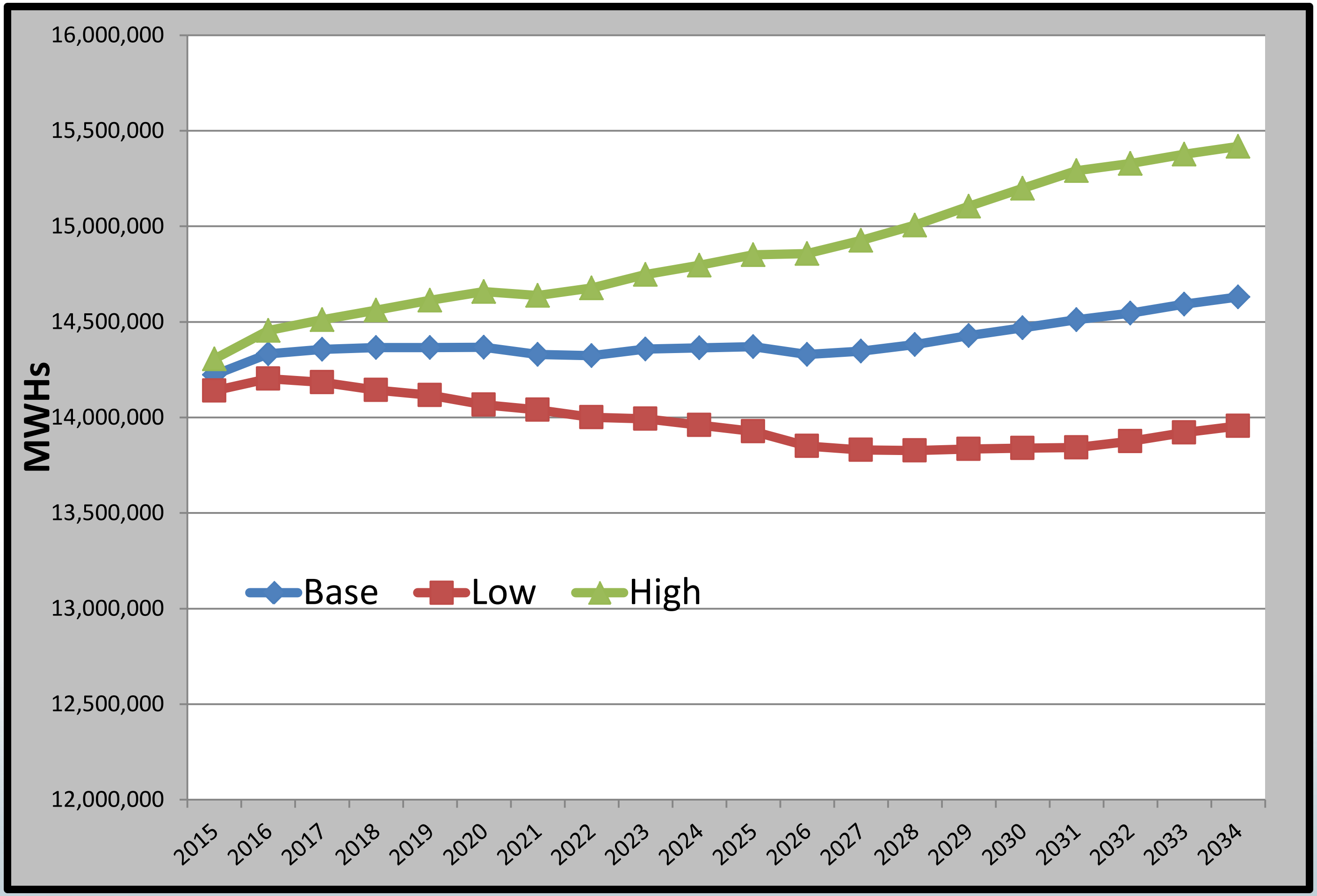
- AEG's forecast represents the market potential from a 2014 viewpoint
- IPL's future DSM filings and results will likely vary from the forecast
  - Legislation and public policy will help shape future DSM
  - Customer behavior including additional large customer opt-outs will affect outcomes
  - Programs were included in the forecast based on a Total Resource Cost (TRC) threshold result of 1 or greater, while IPL's DSM portfolio offerings typically have an aggregate TRC value greater than 1

IPL has Created its High, Low, and Base Load Forecasts

- AEG's Realistic Potential DSM Savings Forecast was deducted from the Gross Internal Demand ("GID") to establish the Base Forecast
- High and Low Forecast were developed using range from IPL-specific State Utility Forecasting Group ("SUFG") forecast
- Range reflects uncertainty stemming from the following factors:

Factors Causing Potential Variance
Economic Activity
Changes in Technology
Consumer Behavioral Changes
State and Federal Energy Policies

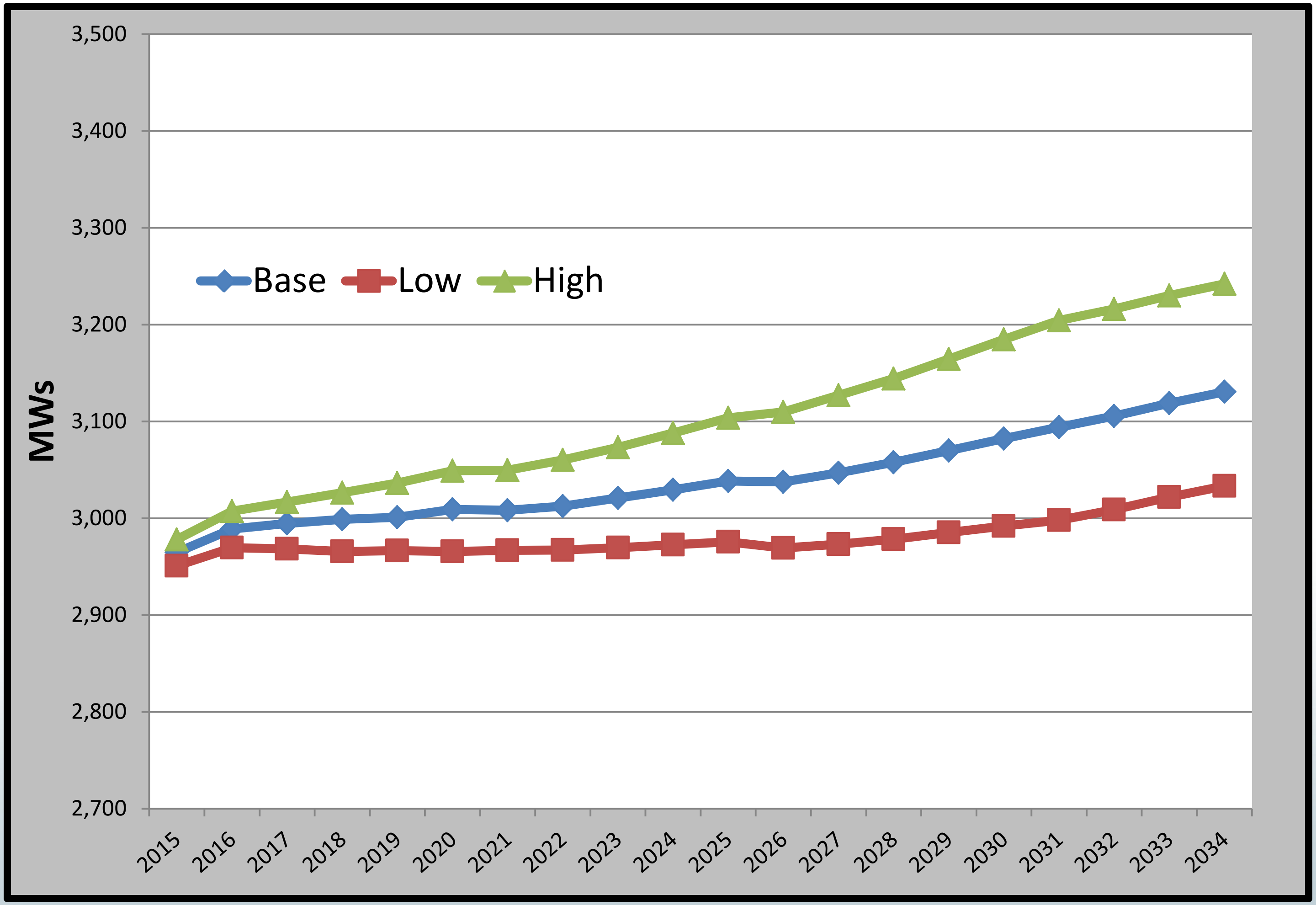
Energy Forecast (Net of DSM)



Average **Energy** Growth Rates (2015-2034):

- Base: 0.1%
- Low : -0.1%
- High: 0.4%

Peak Forecast (Net of DSM)



Average **Peak** Growth Rates (2015-2034):

- Base: 0.3%
- Low : 0.1%
- High: 0.4%

IPL has Modeled a Sensitivity for Wind

- New Wind Resources are modeled using a 35% Capacity Factor and Locational Marginal Price (LMP) equivalent to MISO-IN Market Prices

- Sensitivities focus on applying present characteristics of wind along with potential wind improvements to new wind resources

  - Current Transmission Congestion Characteristics
    1. Market price differences
    2. Current Capacity Factors(≈25%)

  - Potential Improvements
    3. Pair with batteries to relieve transmission congestion
    4. 50% Capacity Factor

IPL has Estimated Possible Future Environmental Compliance Costs

- The potential Rules in the table below could possibly require IPL to incur additional expenses for compliance

Potential Rule	Earliest Expected Compliance Date	Preliminary Estimated Capital	Preliminary Estimated Annual O&M
CSAPR	January 2015	$0	$0
CCR*	Late 2019	$21M-$30M	$3M-$35M
CWA 316(b)	2020	$6M-$154M	$0M-$6M
ELG	2018	$0M-$43M	$0M-$1M
GHG	2020	TBD	TBD
NAAQS	2017	$27M-$174M	$13M-$15M

*Includes estimated pond closure costs.

Please see slide 12 for potential Rule explanations.

IPL has Evaluated Potential Impacts of Greenhouse Gas Requirements

- Five (5) scenarios include the EPA's shadow price for CO_2 starting in 2020
- The environmental scenario includes ICF's Mass Cap CO_2 price starting in 2020
- The high environmental scenario is based on federal legislation modeled after Waxman-Markey in Ventyx's Fall 2013 CO_2 price starting in 2025
- The low environmental scenario does not include a CO_2 price

Questions?

Presentation of Scenario Results

Presented by Joan Soller, Director of Resource Planning and Swetha Sundar, Resource Planning Analyst

Supply and Demand Resource Alternatives - Costs & Performance Attributes

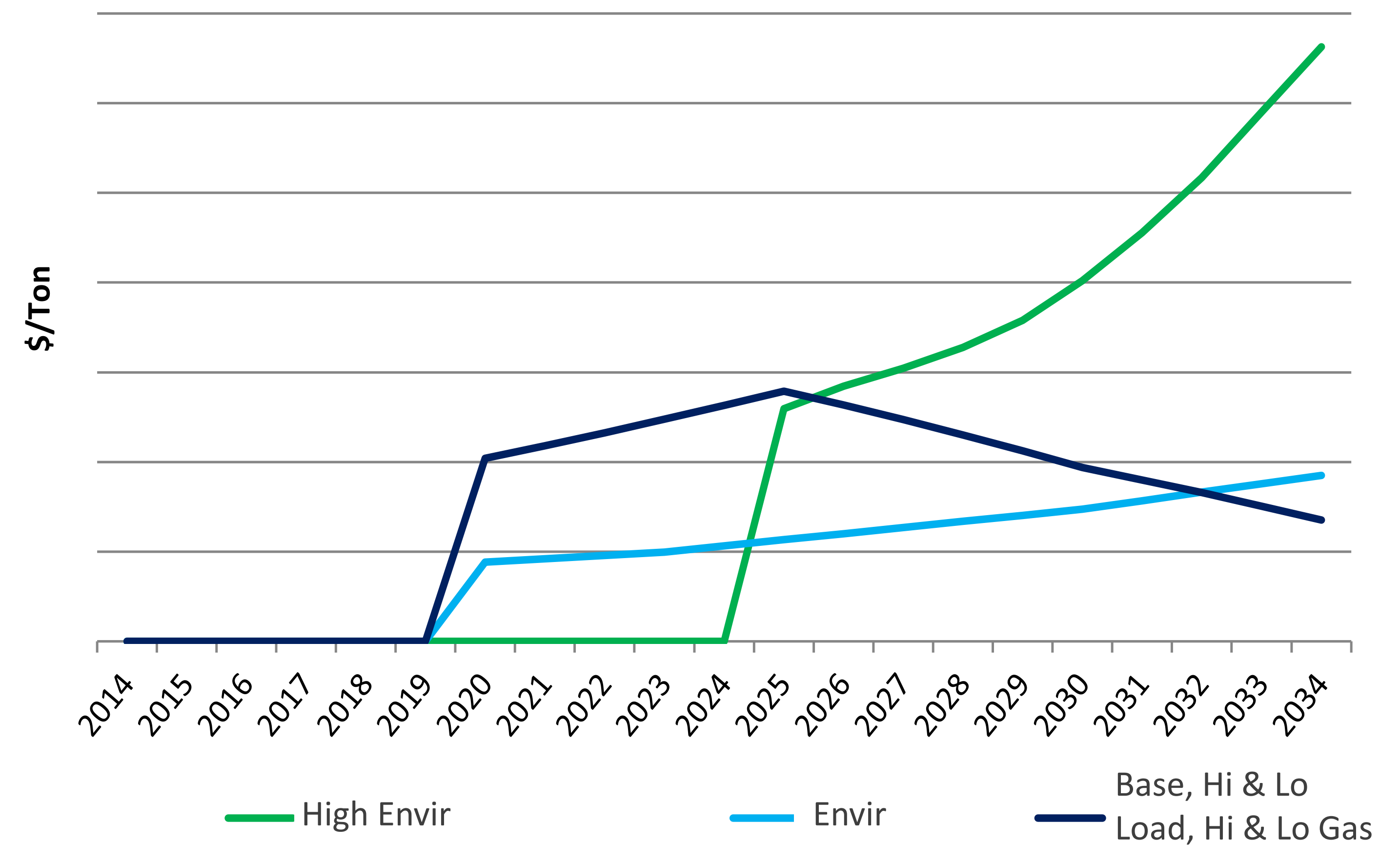
IRP Resource Technology Options			
	MW Capacity	Performance Attributes	Representative Cost per Installed KW*
Simple Cycle Gas Turbine	160	Peaker	$676
Combined Cycle Gas Turbine - H-Class	200	Base	$1,023
Nuclear	200	Base	$5,530
Wind	50	Intermittent	$2,213
Solar	10	Intermittent	$3,873
Demand Response/Interruptibles	62	Peak Use	Varies by Program
Smart Grid - Conservation Voltage Reduction	20	Peak Use	Field assets are in place for this capacity

*These costs from EIA Updated Capital Cost Estimates for Utility Scale Electricity Generating Plants Report (published April 2013) are shared as proxies for IPL's confidential costs.
http://www.eia.gov/forecasts/capitalcost/pdf/updated_capcost.pdf

IPL's Eight IRP Scenarios

Scenario No	Scenario Name	Gas/Market Price	CO2 Price	Load Forecast
1	Base	Ventyx Base	IPL-EPA Shadow price starting 2020	Base
2	High Load	Ventyx Base	IPL-EPA Shadow price starting 2020	High
3	Low Load	Ventyx Base	IPL-EPA Shadow price starting 2020	Low
4	High Gas	Ventyx High	IPL-EPA Shadow price starting 2020-	Base
5	Low Gas	Ventyx Low	IPL-EPA Shadow price starting 2020-	Base
6	High Environmental	Ventyx Environmental	Waxman-Markey proxy Ventyx Fall 2013 prices starting 2025	Base
7	Environmental	Ventyx Mass Cap	Mass Cap ICF Prices beginning in 2020	Base
8	Low Environmental	Ventyx Base	None	Base

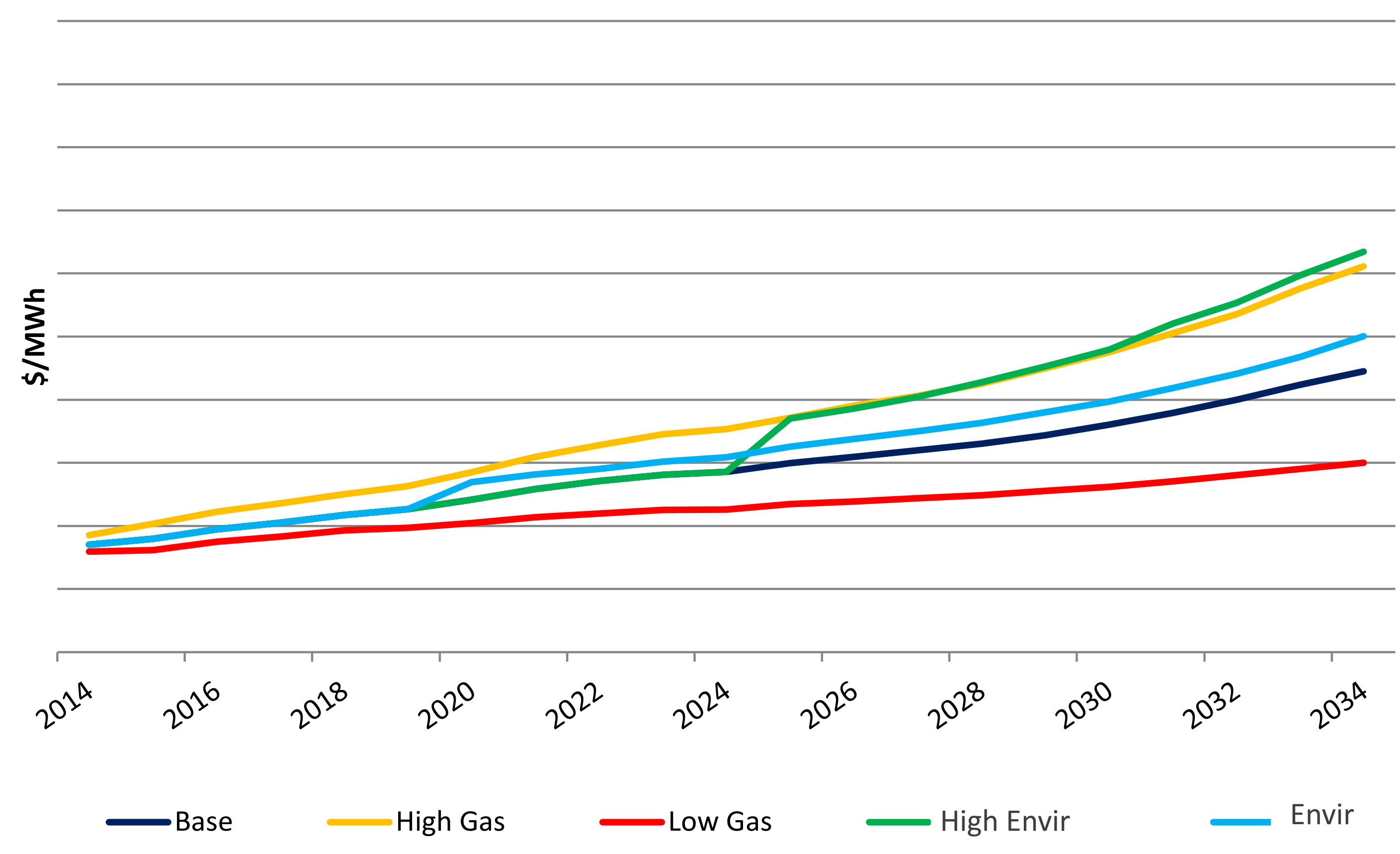
Carbon Prices ($/Ton)



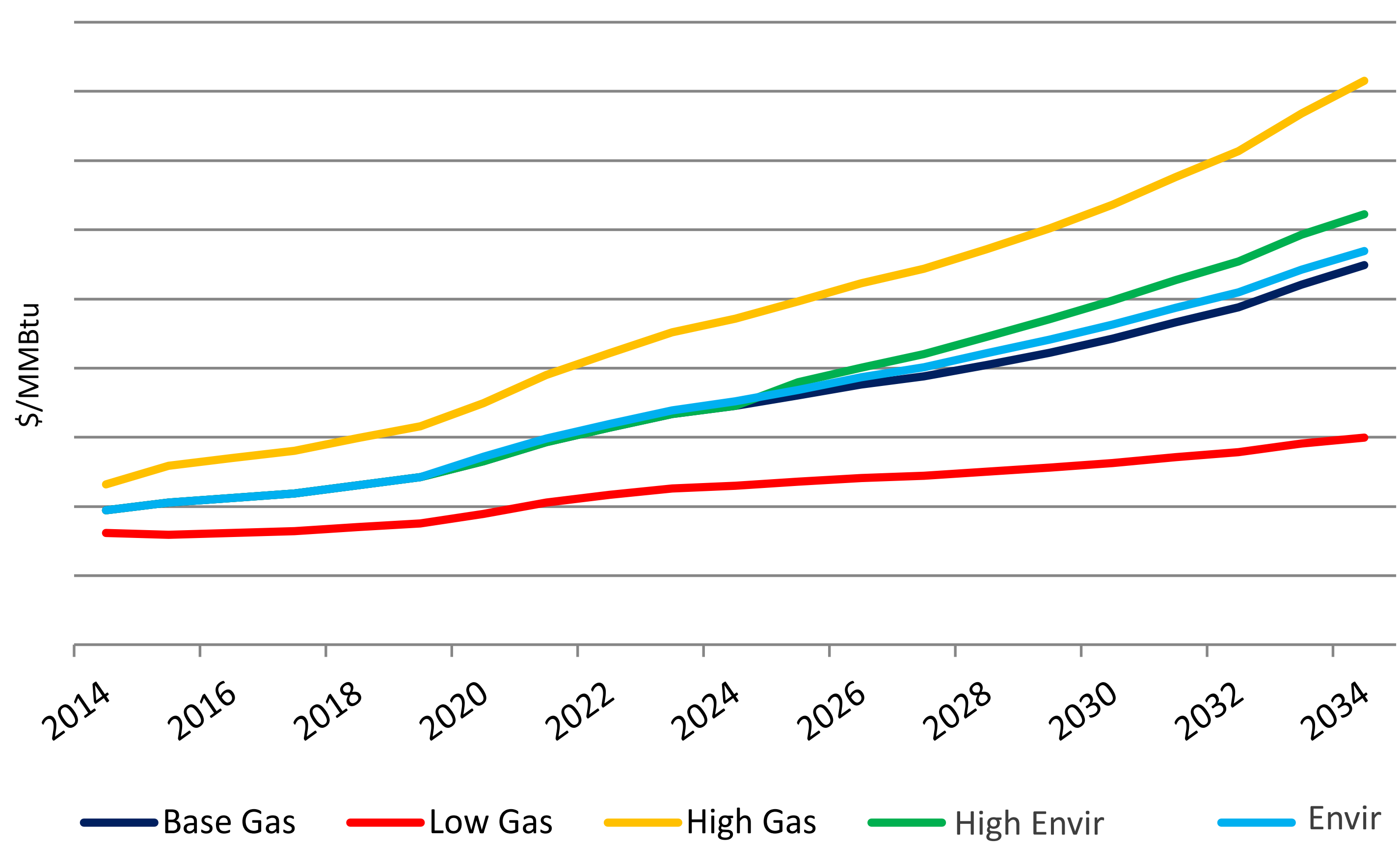
NOTE: These carbon costs are applied differently to the scenarios and not directly comparable. Although, the shape shows the carbon costs' projection.

*Coal Units Only

Annual MISO-Indiana Market Prices (7x24)(Fall 2013 Reference Case/Ventyx Advisors $/MWh)



Henry Hub Annual Gas Price Forecast (Fall 2013 Reference Case/Ventyx Advisors $/MMBtu)



Capacity Expansion Plan Results

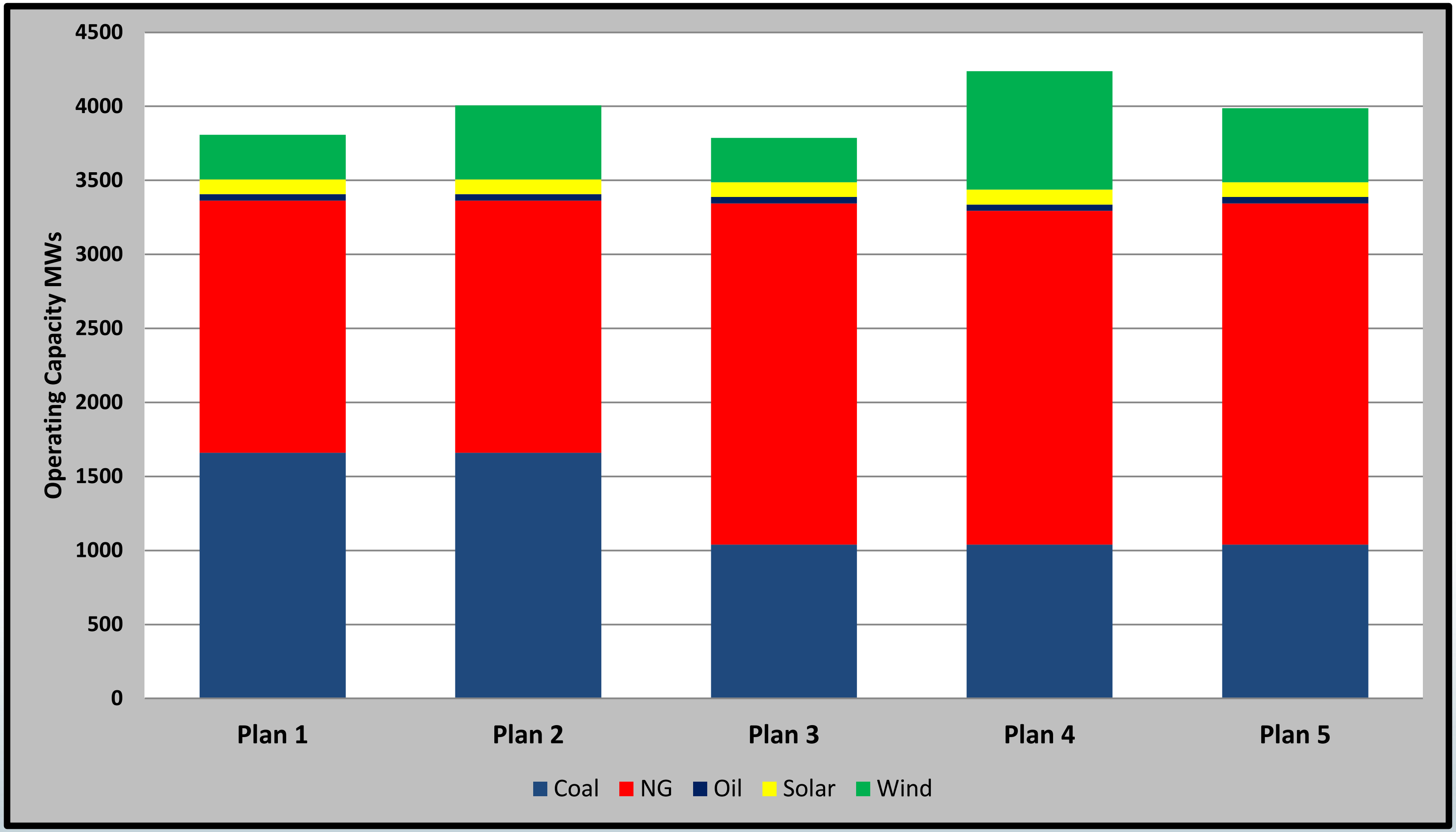
YEAR	Base	High Gas	Low Gas	High Load	Low Load	High Environmental	Environmental	Low Environmental
2015	Market 200 MW	Market 200 MW	Market 200 MW	Market 200 MW	Market 200 MW	Market 200 MW	Market 200 MW	Market 200 MW
2016	Market 450 MW	Market 450 MW	Market 450 MW	Market 500 MW	Market 450 MW	Market 450 MW	Market 450 MW	Market 450 MW
2017 -2019								
2020			Retire Pete 1,2, and 4 CC 200 MW					
2021			CC 800 MW Market 100 MW					
2022			CC 200 MW					
2023								
2024				Market 50 MW		Retire Pete 1		
2025				Market 50 MW		CC 200 MW		
2026				Market 50 MW				
2027				CC 200 MW				
2028						Wind 100 MW		
2029						Wind 150 MW		
2030	Market 50 MW	Wind 100 MW				Wind 100 MW	Market 50 MW	Market 50 MW
2031	Retire HS 5 and 6 CC 200 MW Market 50 MW	Retire HS 5 and 6 CC 200 MW Wind 150 MW	Retire HS 5 and 6 CC 200 MW	Retire HS 5 and 6 CC 200 MW	Retire HS 5 and 6 CC 200 MW	Retire HS 5 and 6 CC 200 MW Market 50 MW Wind 50 MW	Retire HS 5 and 6 CC 200 MW Market 50 MW	Retire HS 5 and 6 CC 200 MW Market 50 MW
2032	Market 50 MW	Wind 100 MW				Market 50 MW	Market 50 MW	Market 50 MW
2033	Retire Pete 1 CC 200 MW Market 100 MW	Retire Pete 1 CC 200 MW Wind 50 MW Market 50 MW	Market 50 MW	Retire Pete 1 CC 200 MW Market 50 MW	Retire Pete 1 CC 200 MW	Market 50 MW	Retire Pete 1 CC 200 MW Market 100 MW	Retire Pete 1 CC 200 MW Market 100 MW
2034	Retire HS7 CC 400 MW Market 150 MW	Retire HS7 CC 400 MW Market 100 MW	Retire HS7 CC 400 MW Market 100 MW	Retire HS7 CC 400 MW Market 50 MW	Retire HS7 GT 180 MW CC 200 MW Market 50 MW	Retire HS7 CC 400 MW Market 100 MW	Retire HS7 CC 400 MW Market 150 MW	Retire HS7 CC 400 MW Market 150 MW

IPL Selected Plans

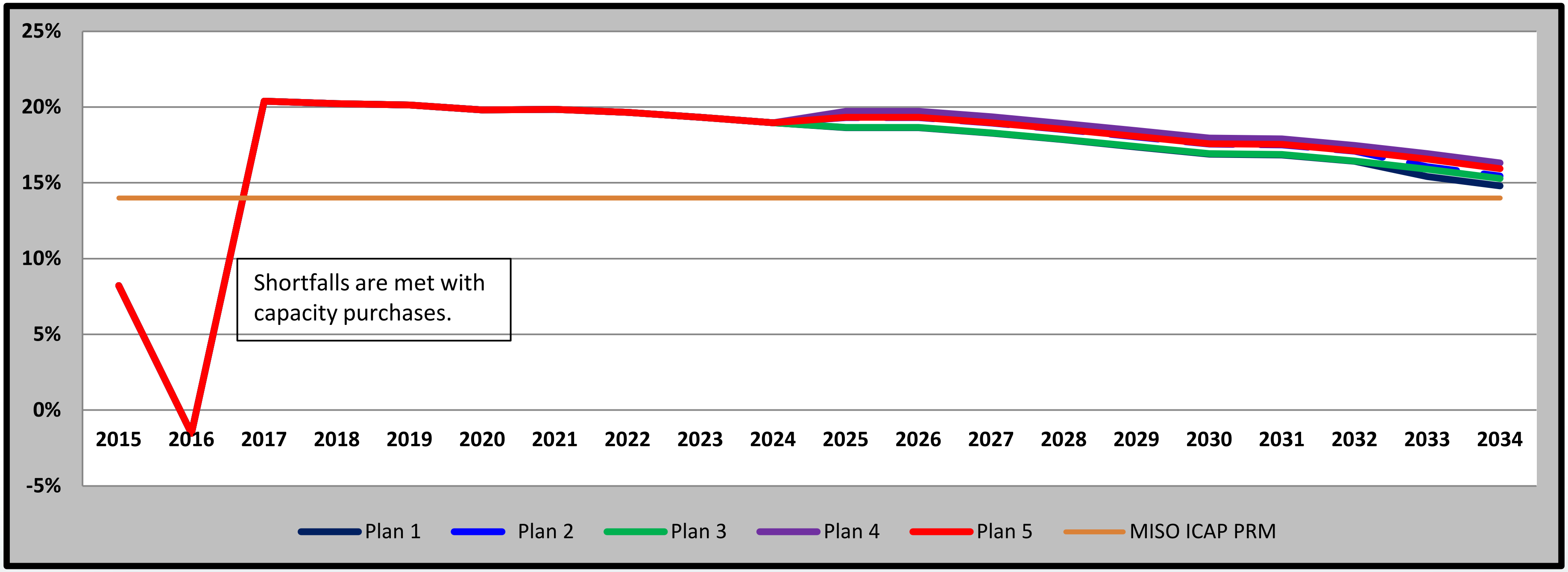
- Based on the Capacity Expansion Plan Results, the following five build out plans were created and modeled each in six of the eight scenarios:

No Early Retirements	
Plan 1	Base Case Expansion Plan
Plan 2	Additional 200 MW Wind (2025)
Pete 1 and 2 Retire in 2024	
Plan 3	600 MW CCGT (2025)
Plan 4	550 MW CT and 500 MW Wind (2025)
Plan 5	600 MW CCGT and 200 MW Wind (2025)

Generation Mix in 2025

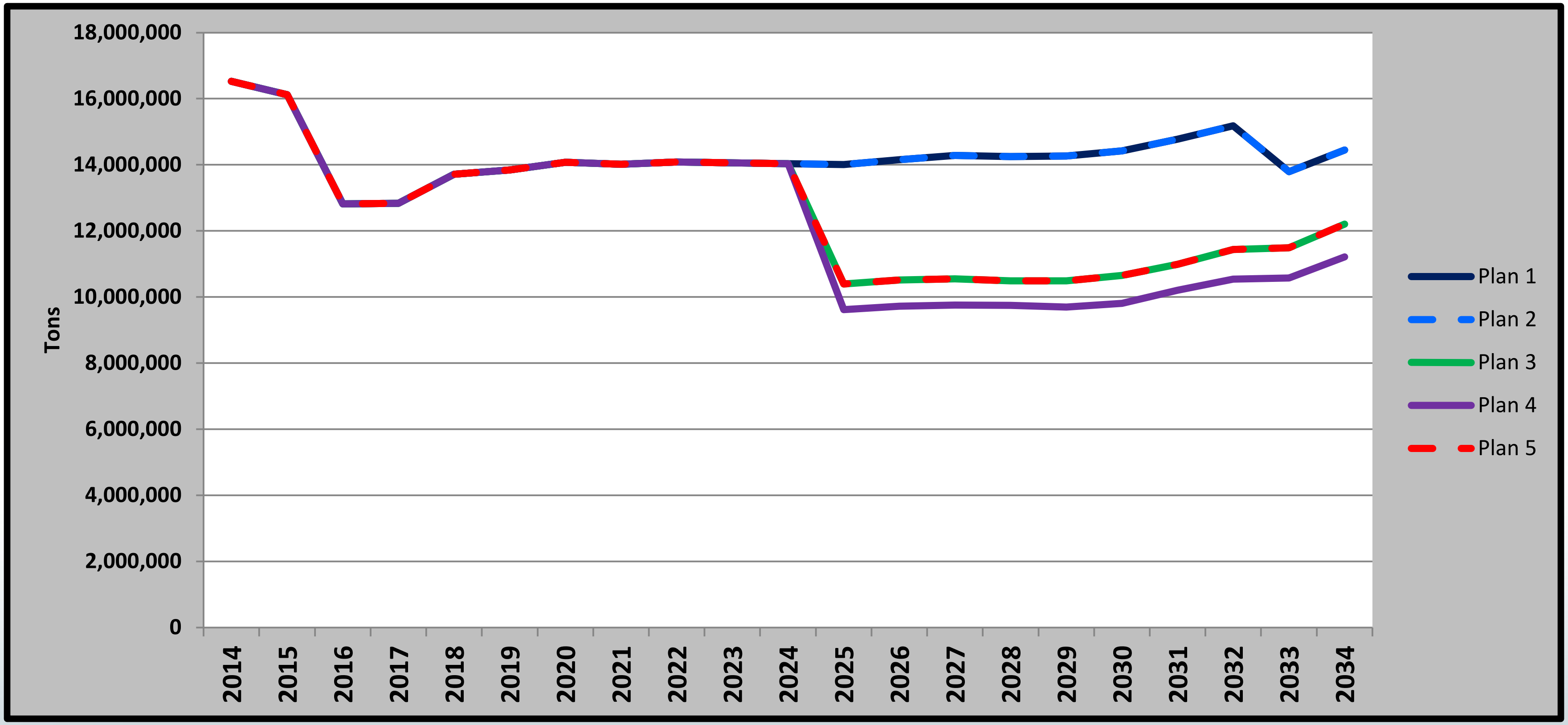


Reserve Margin Per Plan



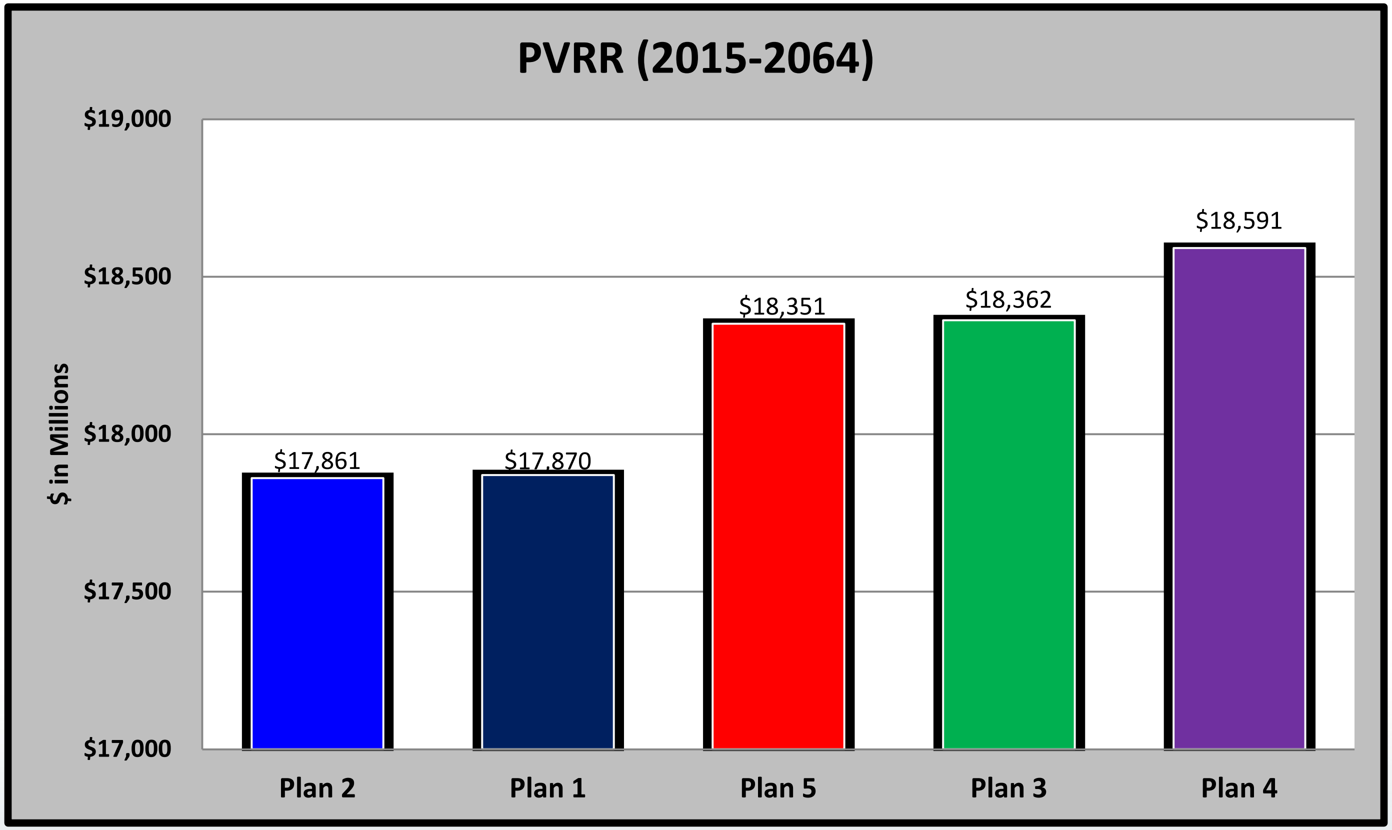
IPL meets its projected 14% reserve margin without capacity purchases for all years after 2017.

CO_2 Emissions Per Plan



Base

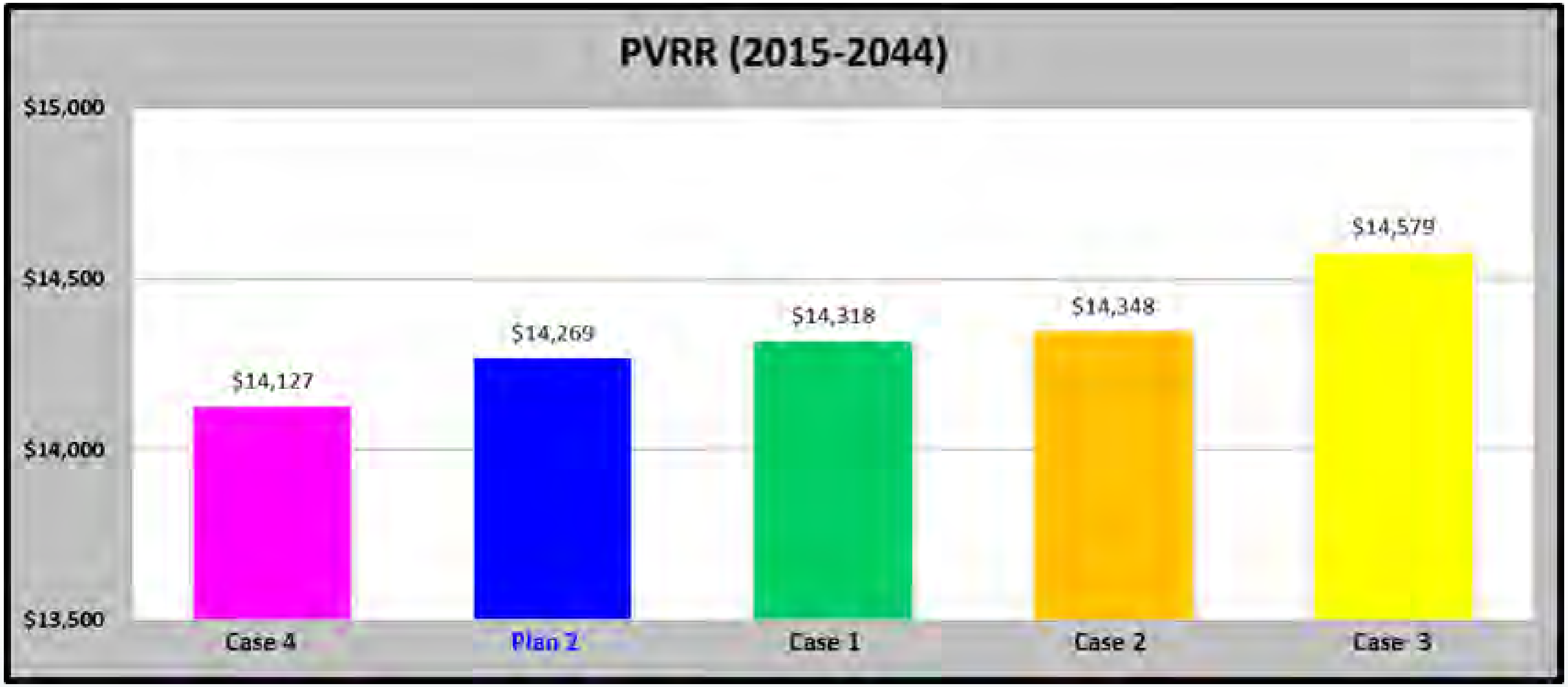
IPL's existing portfolio is cost effective.



Plan 1	Base Case Expansion Plan
Plan 2	Additional 200 MW Wind (2025)

Plan 3	600 MW CCGT (2025)
Plan 4	550 MW CT and 500 MW Wind (2025)
Plan 5	600 MW CCGT and 200 MW Wind (2025)

Wind Sensitivity Results

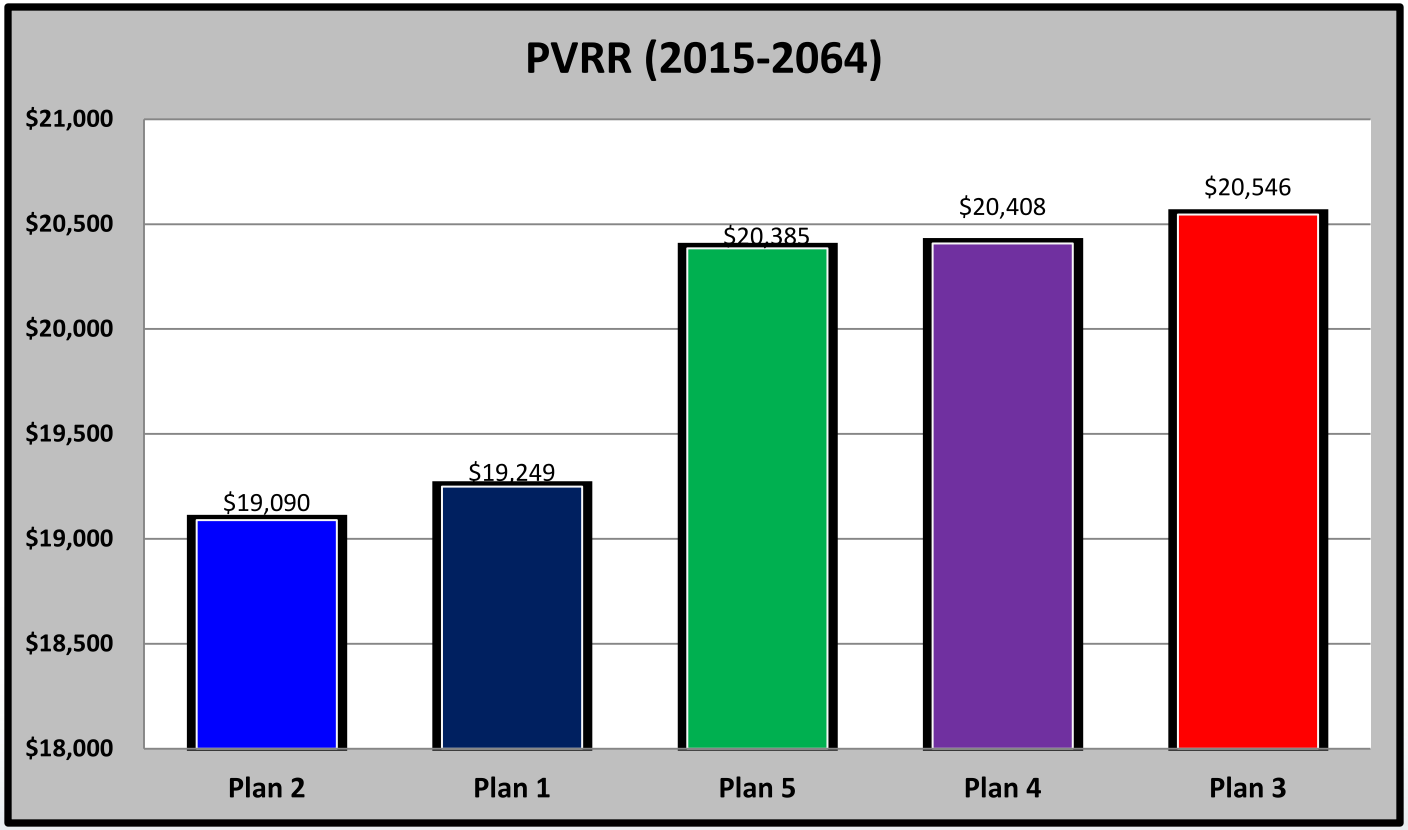


Wind resources are less cost-effective under current market-characteristics

Case 1	LMP Differential Applied
Case 2	25% Capacity Factor
Case 3	Wind with 12 MW Battery
Case 4	50% CF Wind PPA

High Gas

IPL's existing portfolio is cost effective.

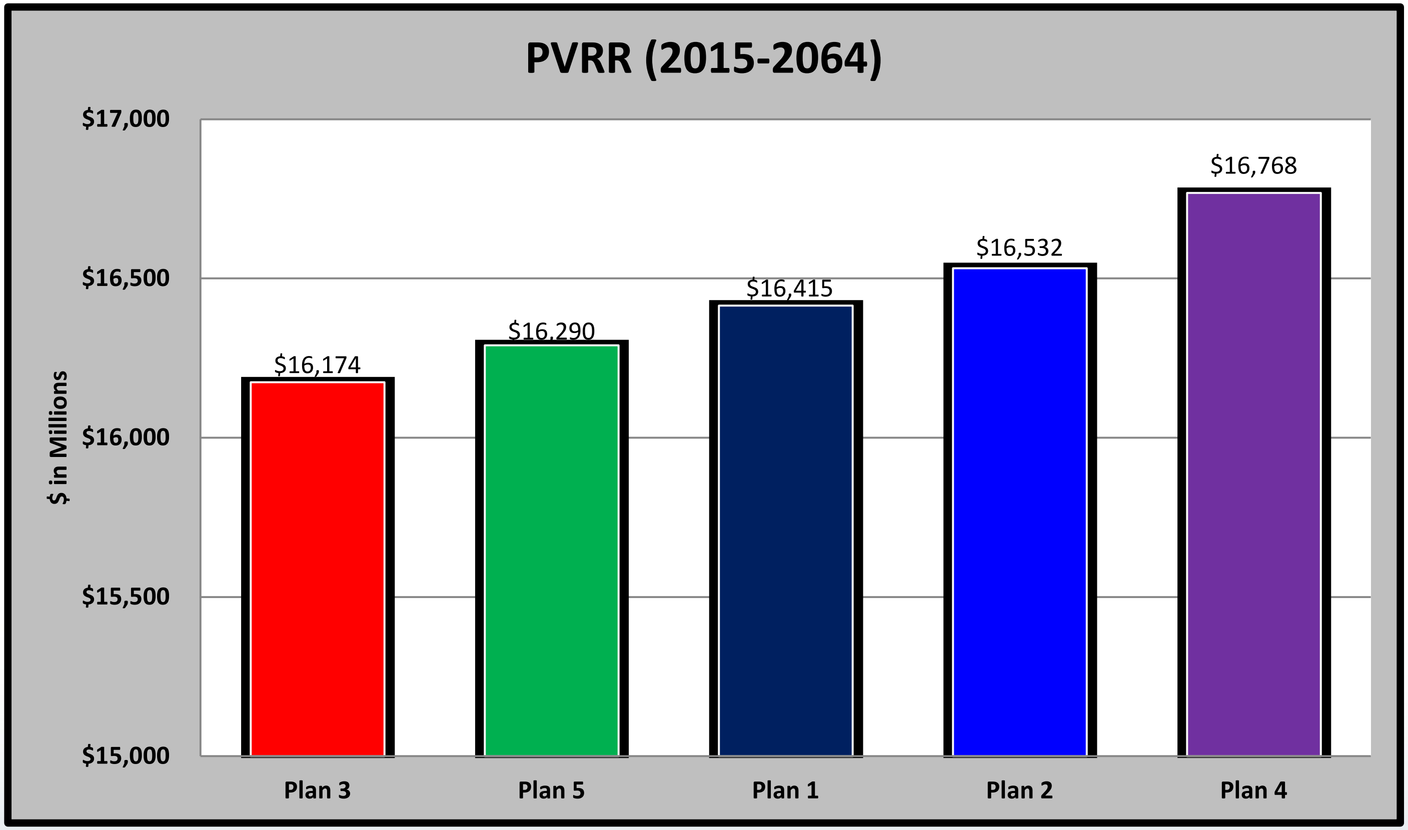


Plan 1	Base Case Expansion Plan
Plan 2	Additional 200 MW Wind (2025)

Plan 3	600 MW CCGT (2025)
Plan 4	550 MW CT and 500 MW Wind (2025)
Plan 5	600 MW CCGT and 200 MW Wind (2025)

Low Gas

Plans with more gas-fired generation are cost effective.

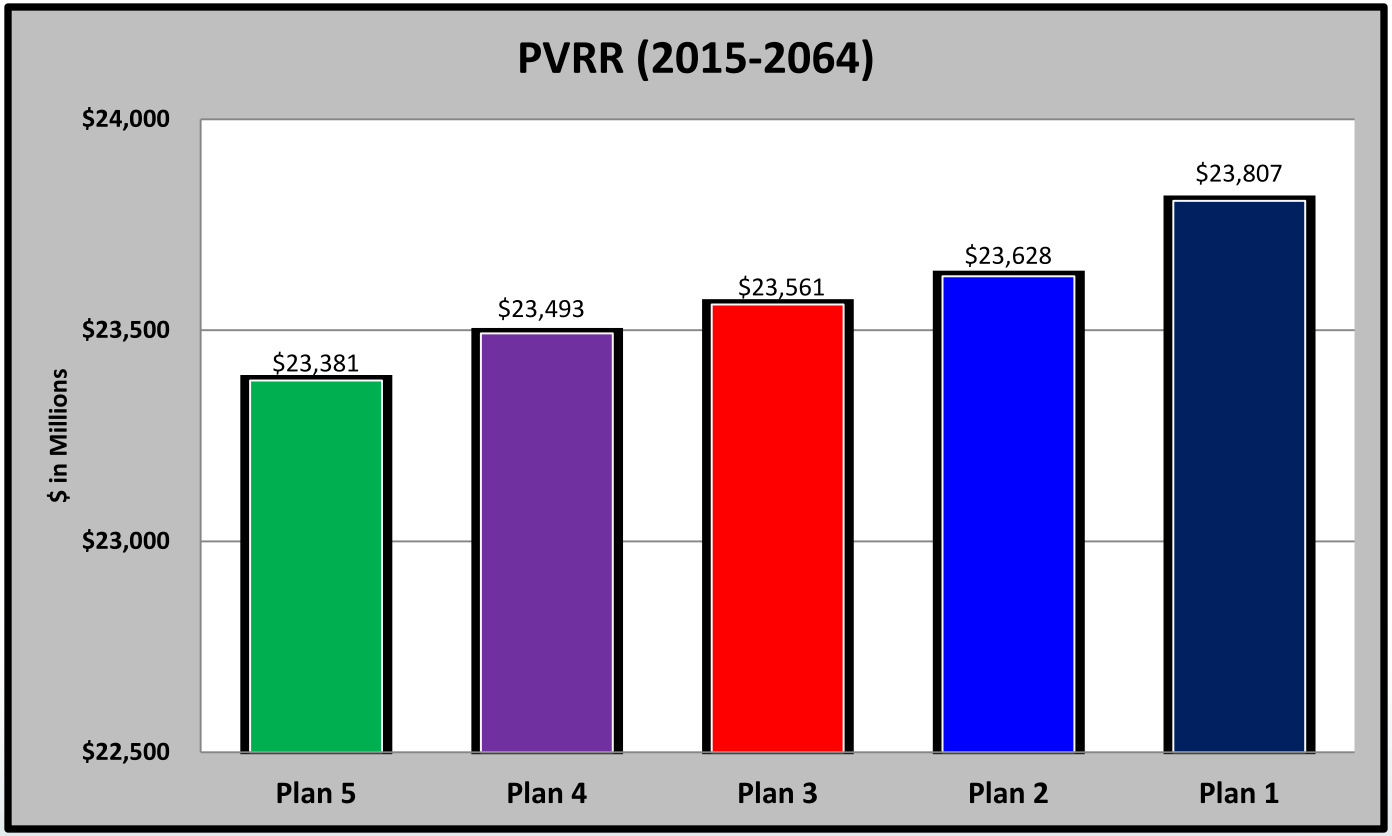


Plan 1	Base Case Expansion Plan
Plan 2	Additional 200 MW Wind (2025)

Plan 3	600 MW CCGT (2025)
Plan 4	550 MW CT and 500 MW Wind (2025)
Plan 5	600 MW CCGT and 200 MW Wind (2025)

High Environmental

Significantly higher costs exist for all plans.

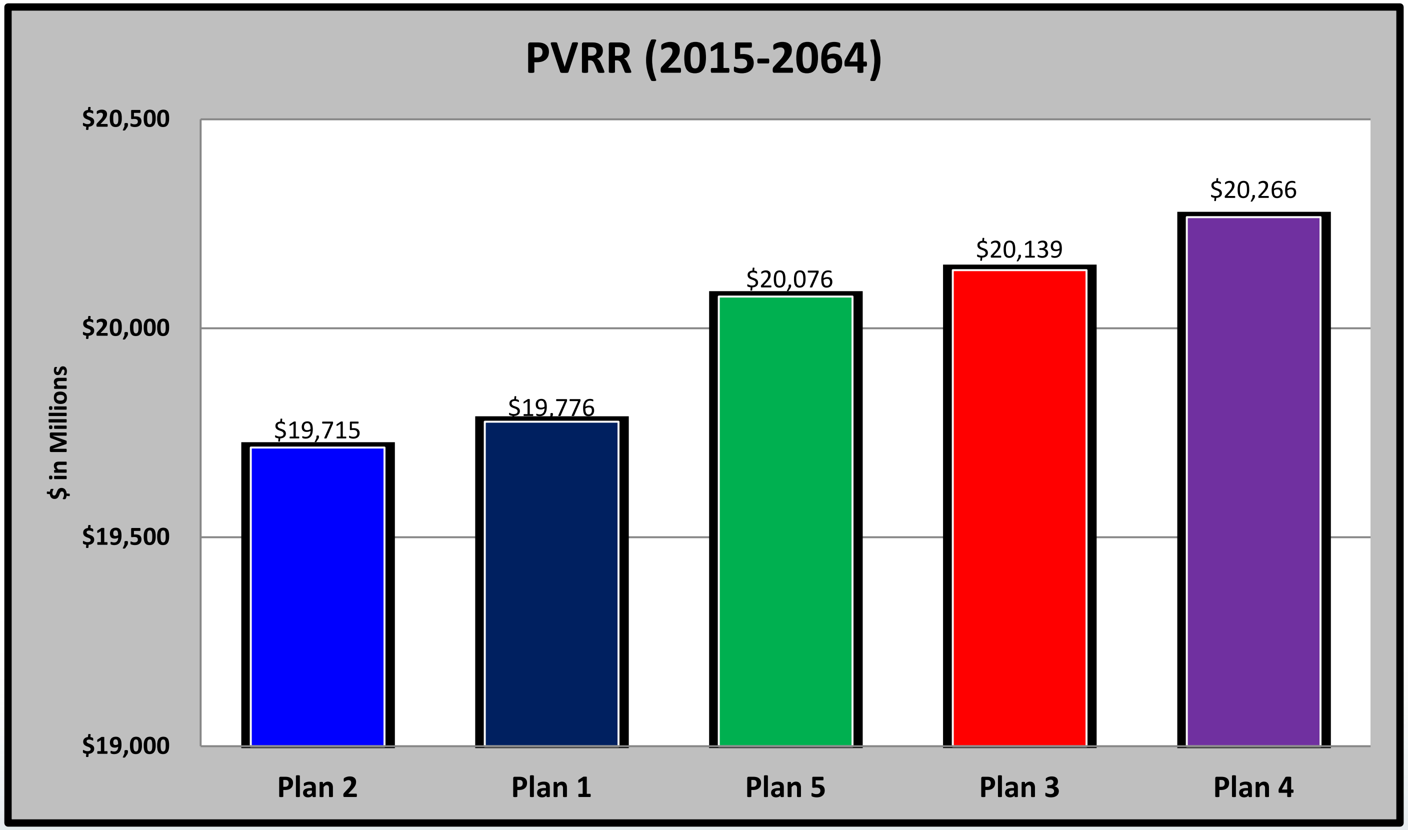


Plan 1	Base Case Expansion Plan
Plan 2	Additional 200 MW Wind (2025)

Plan 3	600 MW CCGT (2025)
Plan 4	550 MW CT and 500 MW Wind (2025)
Plan 5	600 MW CCGT and 200 MW Wind (2025)

Environmental

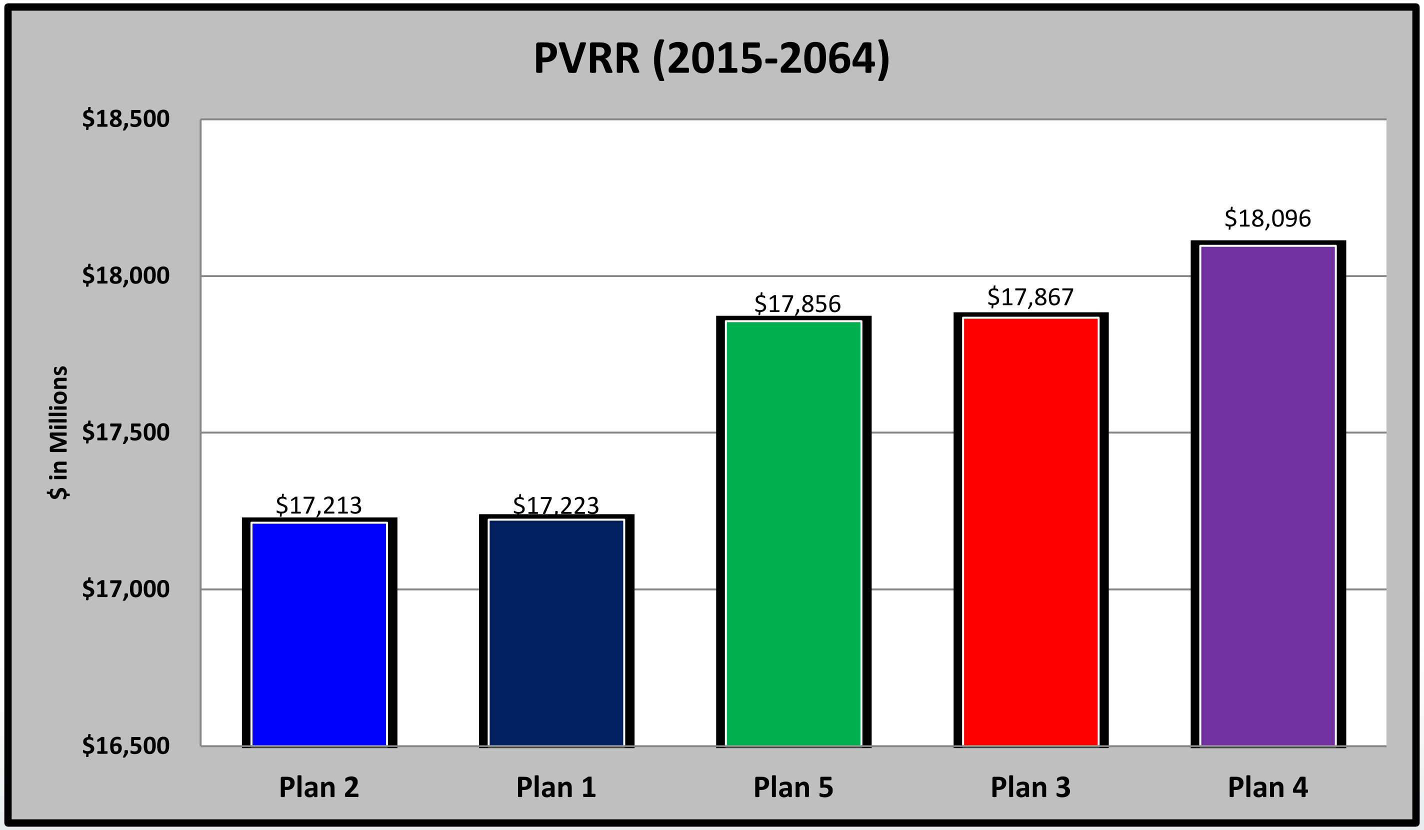
IPL's existing portfolio is cost effective.



Plan 1	Base Case Expansion Plan
Plan 2	Additional 200 MW Wind (2025)

Plan 3	600 MW CCGT (2025)
Plan 4	550 MW CT and 500 MW Wind (2025)
Plan 5	600 MW CCGT and 200 MW Wind (2025)

Low Environmental



IPL's existing portfolio is cost effective.

Plan 1	Base Case Expansion Plan
Plan 2	Additional 200 MW Wind (2025)

Plan 3	600 MW CCGT (2025)
Plan 4	550 MW CT and 500 MW Wind (2025)
Plan 5	600 MW CCGT and 200 MW Wind (2025)

Rationale for Determining Preferred Resource Portfolio

- IPL's base case reflects a combination of the most likely inputs and risks
- Risk management strategies were also incorporated into the development of seven (7) additional scenarios
- The preferred supply-side resource portfolio is the most reasonable cost option based on the lowest Present Value Revenue Requirement (PVRR)

IPL's IRP Preferred Resource Portfolio

- Plan 1 – Base Case Expansion Plan with no additional build is the Company's preferred resource portfolio
- IPL will continue to monitor risks associated with resource planning
- Additional resources may be added to mitigate CO_2 risks
- Since IPL files an IRP every two years, subsequent IRPs will re-analyze future options

Risks Associated with Resource Planning

IPL manages the following risks as a part of everyday business operations and in the IRP planning process

- Weather
- **Load Variation**
- Workforce Availability
- Reliability
- Technology Advancements
- Construction
- **Fuel Supply**
- **Fuel Costs**
- Production Cost Risk
- Generation Availability
- **Environmental Regulation**
- Access to Capital
- MISO Market Changes
- Regulatory
- Miscellaneous - Catastrophic Events

Risk mitigation will be discussed further in the IRP filing

Questions?

Short Term Action Plan

Presented by Joan Soller, Director of Resource Planning

Short Term Action Plan Criteria Proposed in 170 IAC 4-7

- Explanation of the previous short term action plan and differences based on what actually transpired
- 3 year view (2015 through 2017)
- Description of preferred resource portfolio elements
- Implementation schedule

IAC – Indiana Administrative Code

IPL's 2011 IRP Short Term Action Plan

Summary	Implementation as of Sept 2014
• Retire the six (6) small unscrubbed coal-fired units by 2016 (EV Units 3-6 and HSS 5 and 6)	• Eagle Valley Units 3-6 will be retired by April 16, 2016 • Harding Street Station Units 5 and 6 will be refueled to natural gas
• Retire four (4) oil-fired units by 2015 (HSS Units 3 and 4 and EV Units 1 and 2)	• In 2013, IPL retired the four oil-fired units (HSS Units 3 and 4 and EV 1 and 2) mentioned along with HSS GT 3
• Retrofit "Big 5" to comply with EPA MATS regulation (Pete 1 through 4 and HSS 7)	• IPL received IURC approval to proceed to retrofit Petersburg units and construction is underway • IPL will seek approval to refuel HS7 to natural gas
• Meet IURC established DSM targets (Cause No. 42693)	• IPL expects to be at or near cumulative targets at the end of 2014. IURC targets have been suspended with the passage of SEA 340. IPL will continue to offer cost-effective DSM.
• Select and implement preferred resource to replace retirements	• IPL received approval to construct 671 MW EV CCGT (Cause No. 44339)
• Reduce capacity exposure resulting from IPL shortage in Planning Years 2015-2016 and 2016-2017	• IPL has purchased 100 MWs of Capacity for the two stated planning periods and continues to negotiate future needs
• Complete Distributed Automation and Advanced Metering Infrastructure Projects	• Projects have been completed and are fully operational

2014 Short Term Action Plan Generation Portfolio

- Existing Generation
  - Refuel HSS Units 5-7 to natural gas in 2016
  - Retire EV Units 3-6 by April 16, 2016
  - Retrofit Petersburg Units to comply with MATS and NPDES regulations by the end of 2017
- New Generation
  - 671 MW Eagle Valley CCGT expected to be in-service by summer 2017
  - Additional generation is not needed to supply energy in the short term action plan

2014 Short Term Action Plan
Demand Side Management

- Continue to offer cost-effective DSM
- 2015-2017 Action Plan has been filed and is pending IURC approval (Cause No. 44497)
- Possible programs from BlueIndy Case settlement are pending IURC approval (Cause No. 44478)
  - LED street lighting
  - Demand response study with electric vehicle batteries
  - Energy management pilot program using ISO 50001

2014 Short Term Action Plan
Capacity Needs

- Purchased 100 MW of capacity for MISO Planning Years 2015-2016 and 2016-2017
- Waiting for FERC Waiver order for remaining PY 15-16 requirements
- Evaluate purchase options for PY 16-17 capacity shortage
  - o Bi-lateral agreements
  - o MISO auction purchases

FERC – Federal Energy Regulatory Commission

2014 Short Term Action Plan Transmission and Distribution

- Transmission
  - o Install Static VAR system for voltage regulation & VAR support
  - o Improve import capability using the following:
    - Upgraded and new circuits (138 kV and 345 kV)
    - Upgraded autotransformers
    - New 345 kV breakers
    - New 138 kV breakers
- Distribution
  - o Utilize & expand Smart Grid (SG) technology for operations
  - o Complete distributed solar integration (~67 MW on line as of Sept 2014 plus additional 30 MW planned)
  - o Utilize SG data for asset management planning

VAR – Volt-Ampere Reactive

2014 Short Term Action Plan Research, Development, and Technology Applications

- IPL will continue exploring new technologies and resources that are safe, reliable, and efficient such as:
  - Energy Storage (Batteries)
  - Enhanced Combustion Turbine Output (Fogging)
  - Transportation Electrification
  - Leverage AMI Metering Technology

AMI – Advanced Metering Infrastructure

Questions?

Next Steps

Presented by Marty Rozelle, PhD

Next Steps

October 17, 2014	IRP Public Advisory Meeting #3 Notes Will Be Posted to the IPL IRP Website
By November 1, 2014	IPL to Submit IRP Document to the IURC
90 days after filing: ~February 1, 2015	Interested Party Deadline to Submit Comments to the IURC. See 170 IAC 4-7-2* for details.
120 days after filing: ~March 1, 2015	IURC Director's Draft Report will be Published

IAC – Indiana Administrative Code
*The draft proposed rule is available at: http://www.in.gov/iurc/2674.htm

IPL.IRP@aes.com

Thank You!