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?

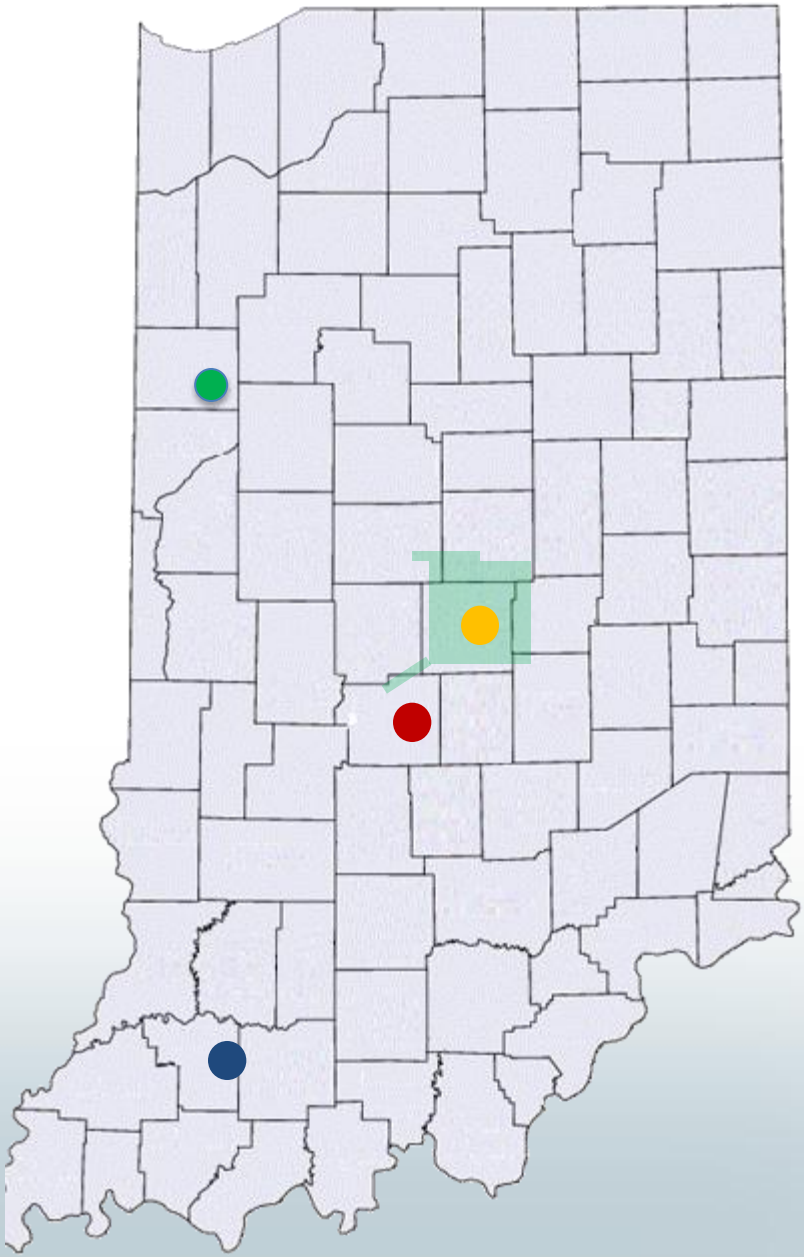
Introduction to IPL

Presented by Herman Schkabla, Director of Resource Planning

Profile

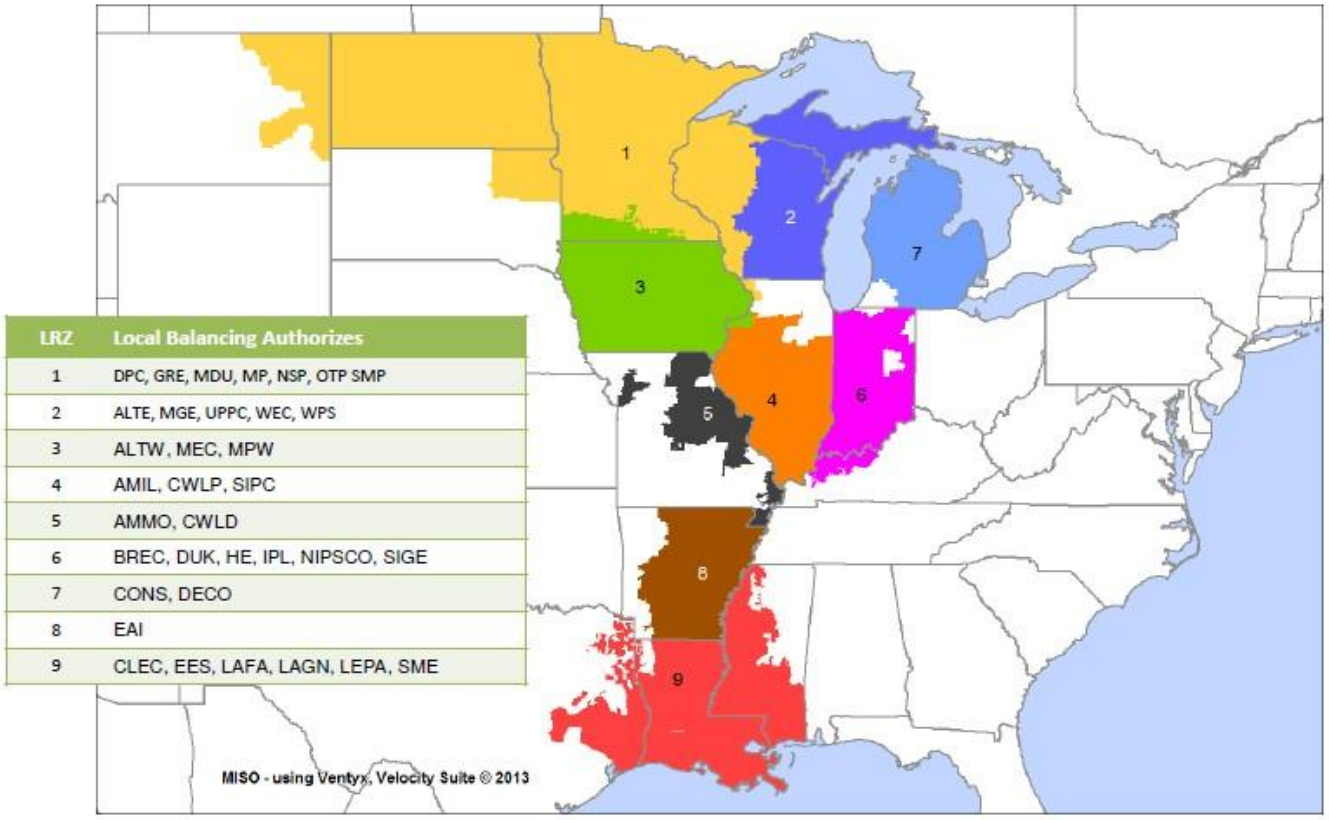
- 470,000 customers*
- 1,400 employees*
- 528 sq. miles territory
- 144 substations

- **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

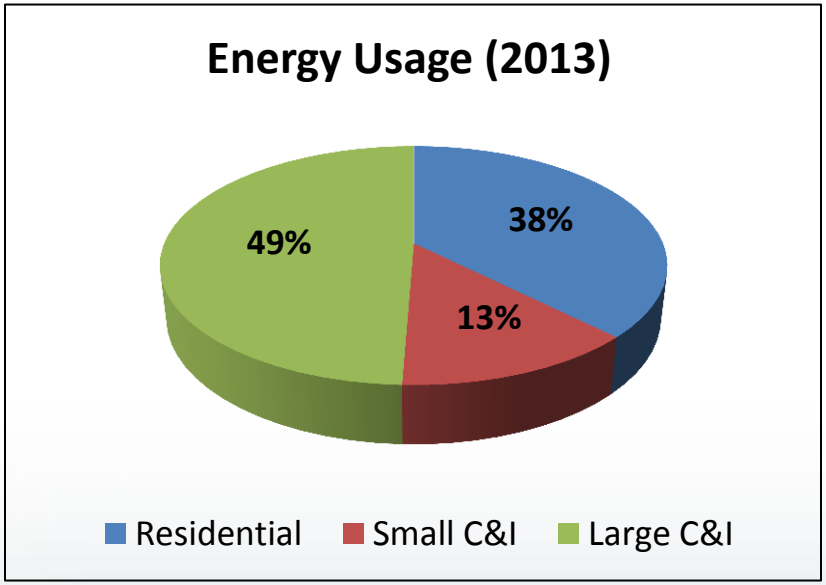
IPL Is In MISO Load Resource Zone (LRZ) 6

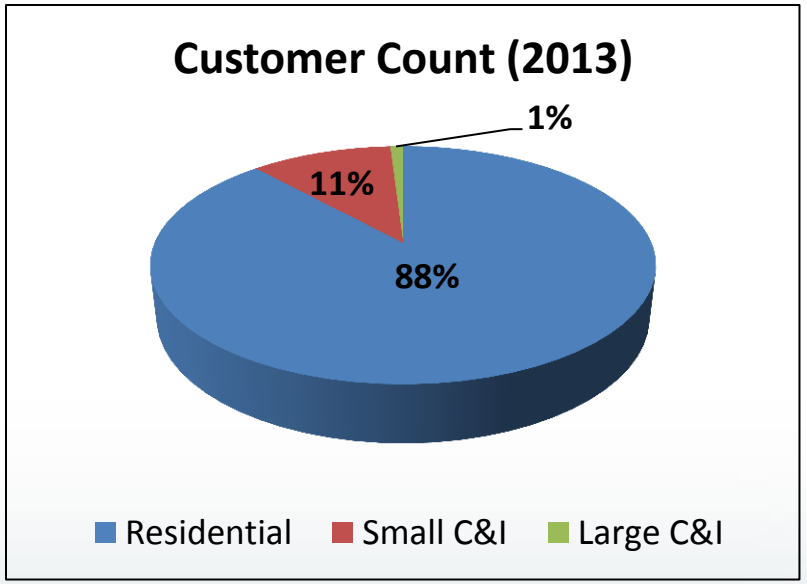


LRZ	Local Balancing Authorizes
1	DPC, GRE, MDU, MP, NSP, OTP SMP
2	ALTE, MGE, UPPC, WEC, WPS
3	ALTW, MEC, MPW
4	AMIL, CWLP, SIPC
5	AMMO, CWLD
6	BREC, DUK, HE, IPL, NIPSCO, SIGE
7	CONS, DECO
8	EAI
9	CLEC, EES, LAFA, LAGN, LEPA, SME

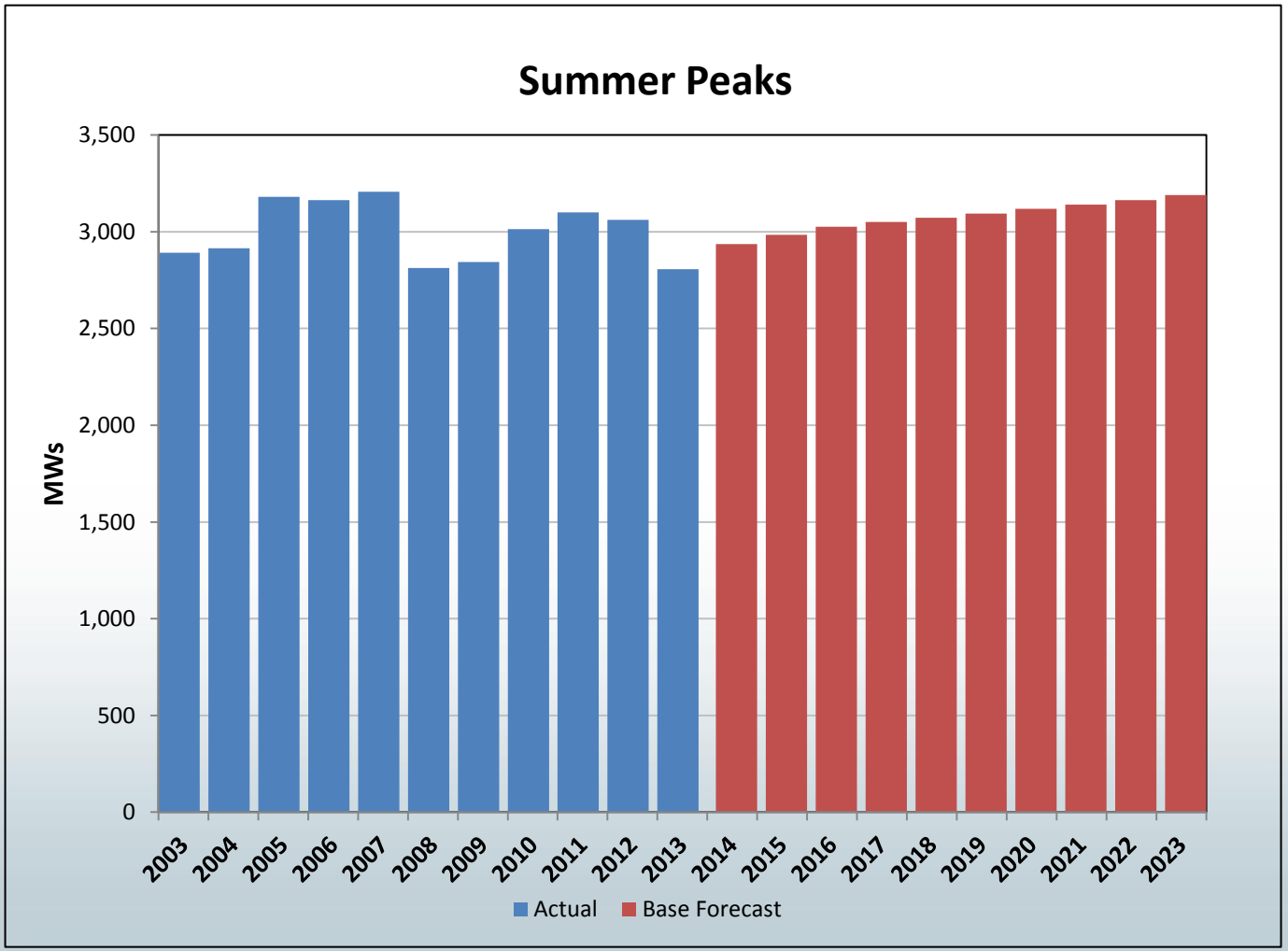
MISO – Midcontinent Independent System Operator, Inc.

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





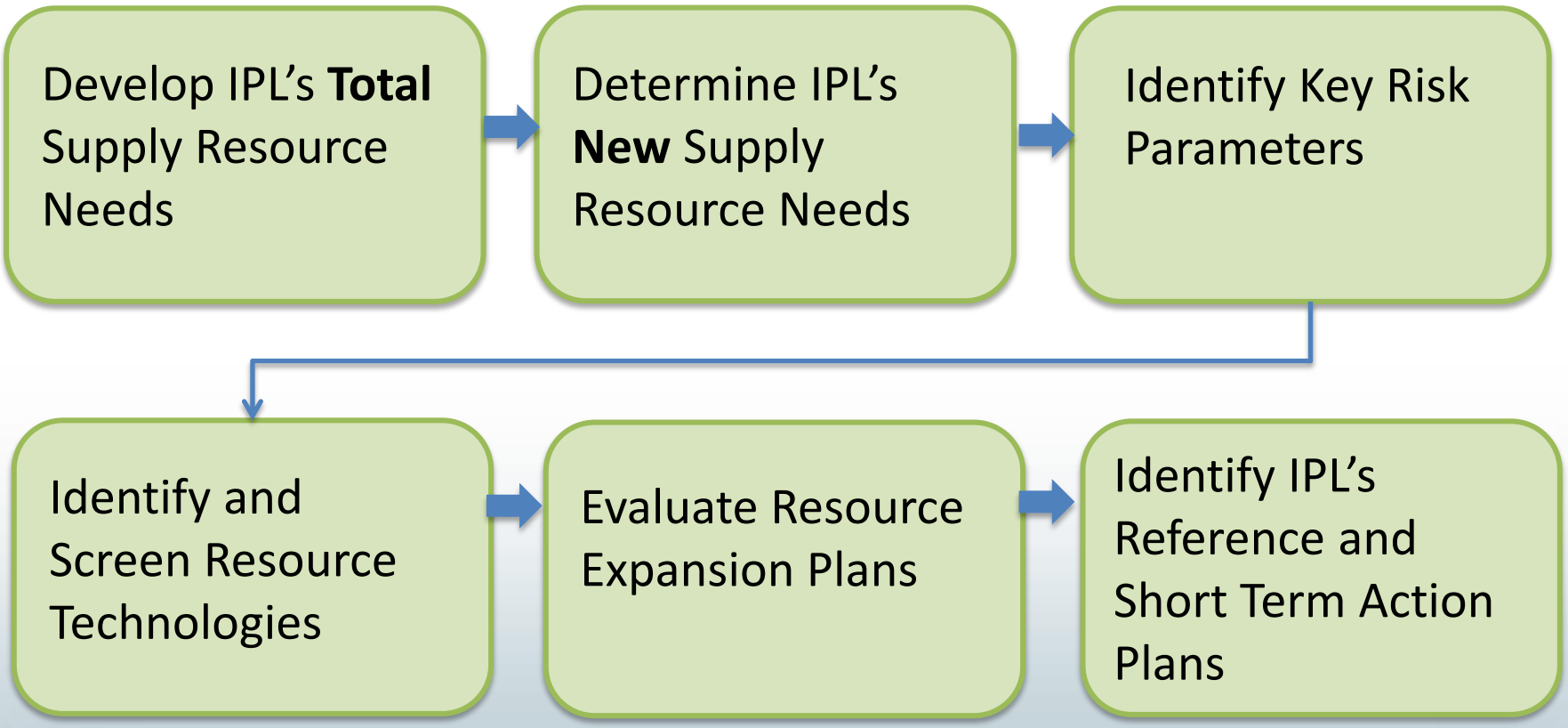
IPL Summer Peaks – Slow Recovery from Post-Recession Levels



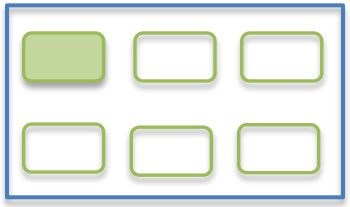
Integrated Resource Planning Process

Presented by Herman Schkabla, Director of Resource Planning

IRP Process Overview



IPL's Total Resource Needs



Net Load Forecast and Reserve Margin Requirement

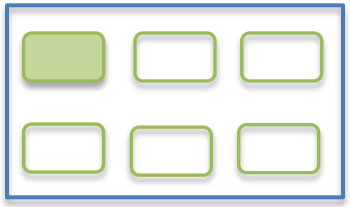
- Net Load Forecast includes:
  - Load Forecast – economic driven
  - Less the projected Demand Side Management (DSM): Energy Efficiency (EE) and Demand Response (DR) resources

- 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)

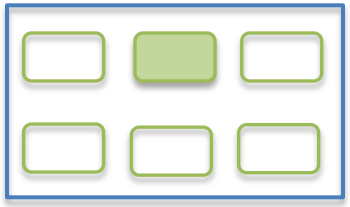
IPL's Total Supply Resource Needs



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



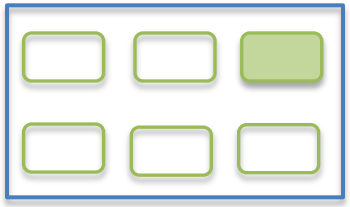
Compare Projected Resources with Total Supply Resource Needs

- To determine if IPL needs any New Supply Resources, IPL evaluates its existing generation plan as needed based on environmental compliance
  - Existing generation plan includes projects approved and/or pending at the IURC (e.g. Replacement Generation CPCN)
  - 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

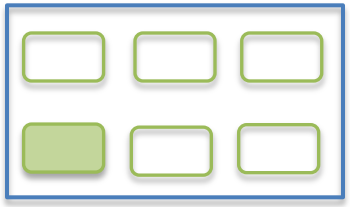


Ventyx Screening Model Inputs

- Define key risk parameters for modeling and portfolio evaluation

- Stakeholder feedback on key risk parameters
  - Please write down on worksheet provided your top 3 risk parameters that IPL should address in its IRP planning process

Identify and Screen Resource Technologies

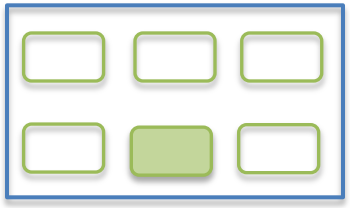


- Identify supply technologies for modeling
  - Input from Ventyx, IPL, and stakeholders
  - Subject to environmental constraints

- 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

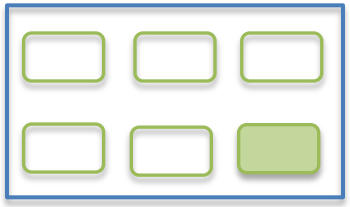
- If appropriate, IPL may also select other resource alternatives that were not chosen by the Ventyx Capacity Expansion Screening Model for further evaluation

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

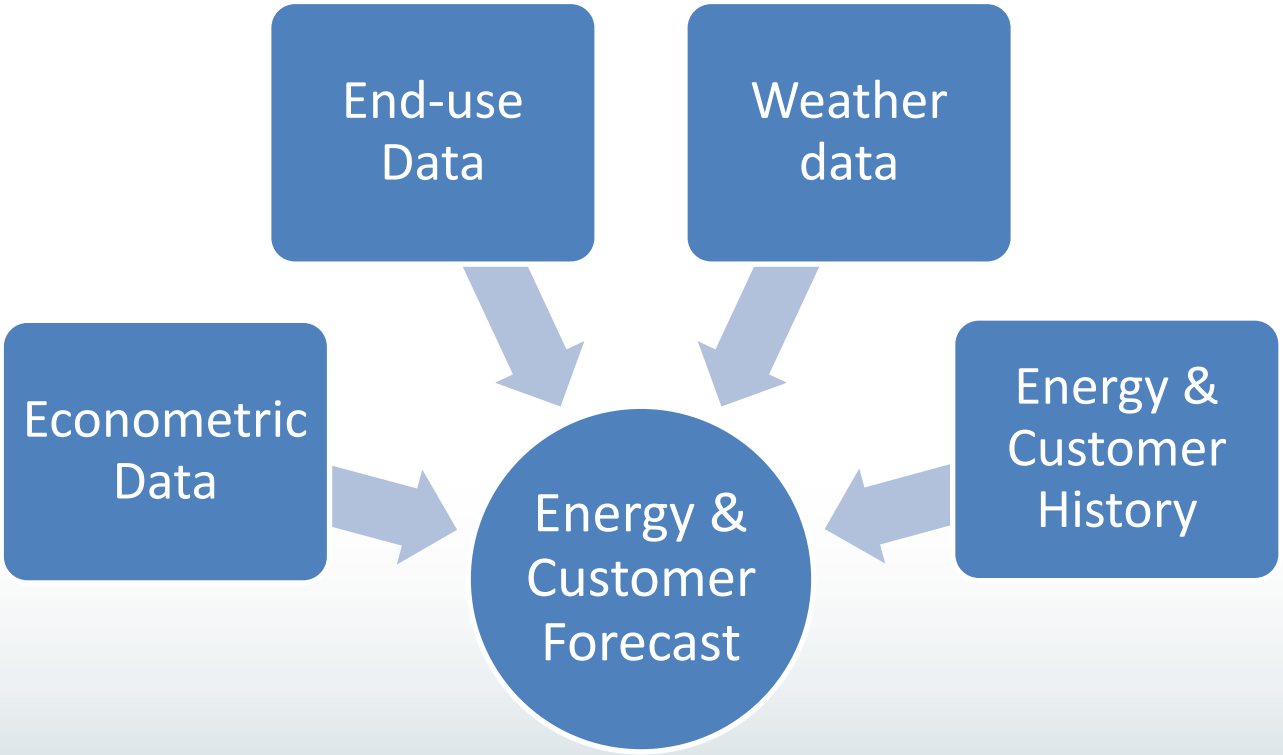
Improving lives by providing safe, reliable and affordable energy solutions in the communities we serve.

Questions?

Energy and Peak Forecasts

Presented by Swetha Sundar, Resource Planning Analyst

Energy Forecast Model



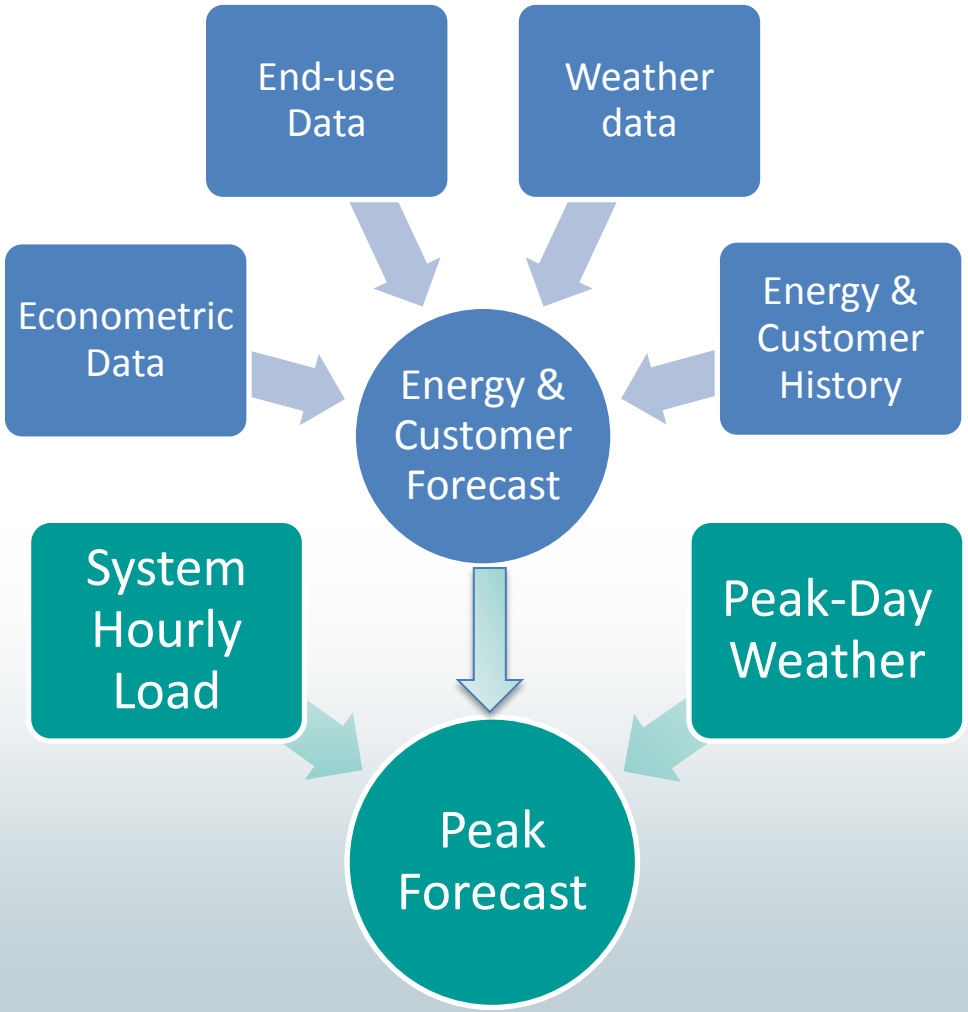
Hybrid model captures economic effects as well as energy-efficiency trends.

Energy Forecast Process

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

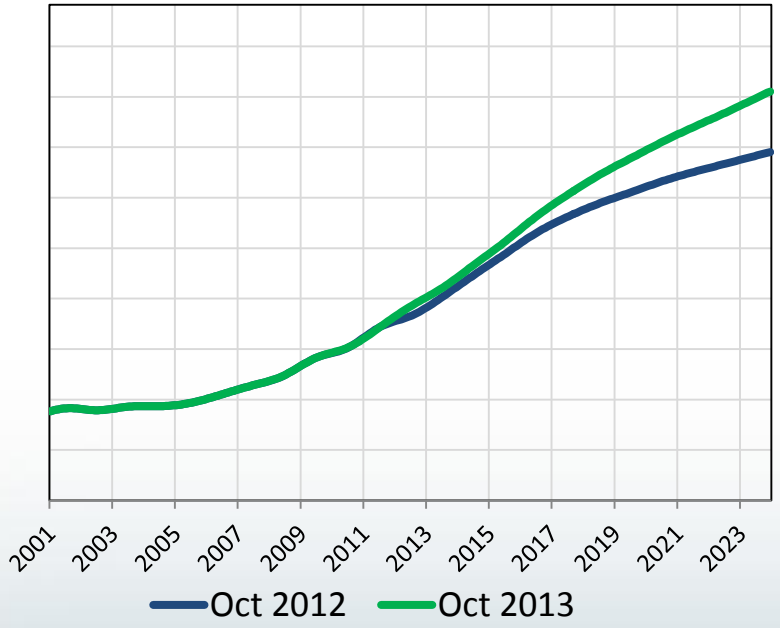
- No. of households; Household income; Employment
- Updated quarterly

End-Use
(Source: EIA/Itron Inc.)

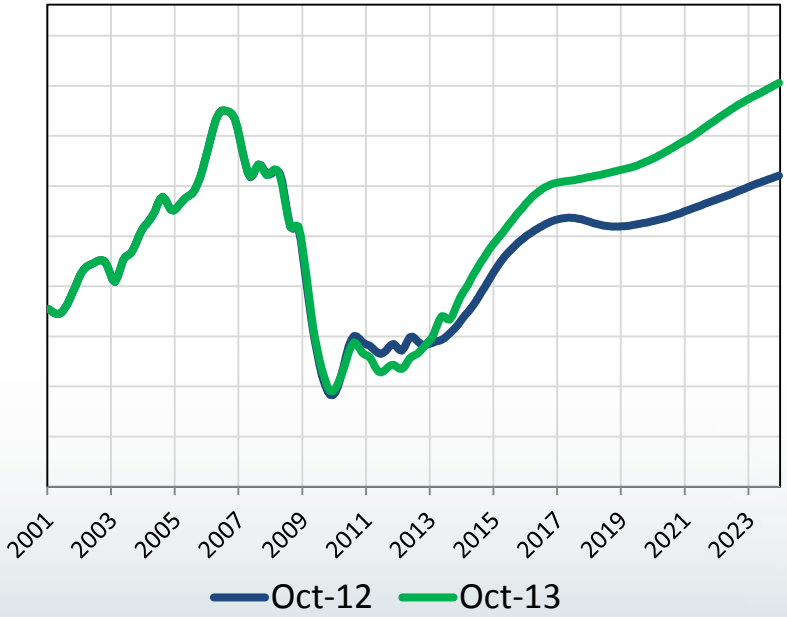
- EIA forecast for appliance saturation and efficiency
- Updated Annually

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

Marion County No. of Households



Marion County Household Income

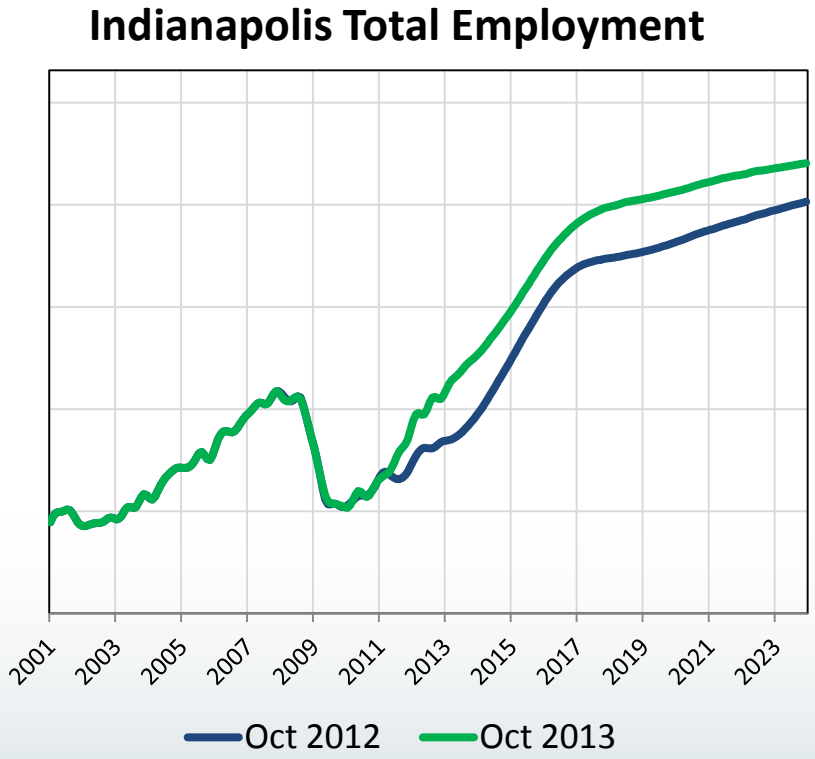


Projected Growth rates (2014 – 2023)

- # 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)

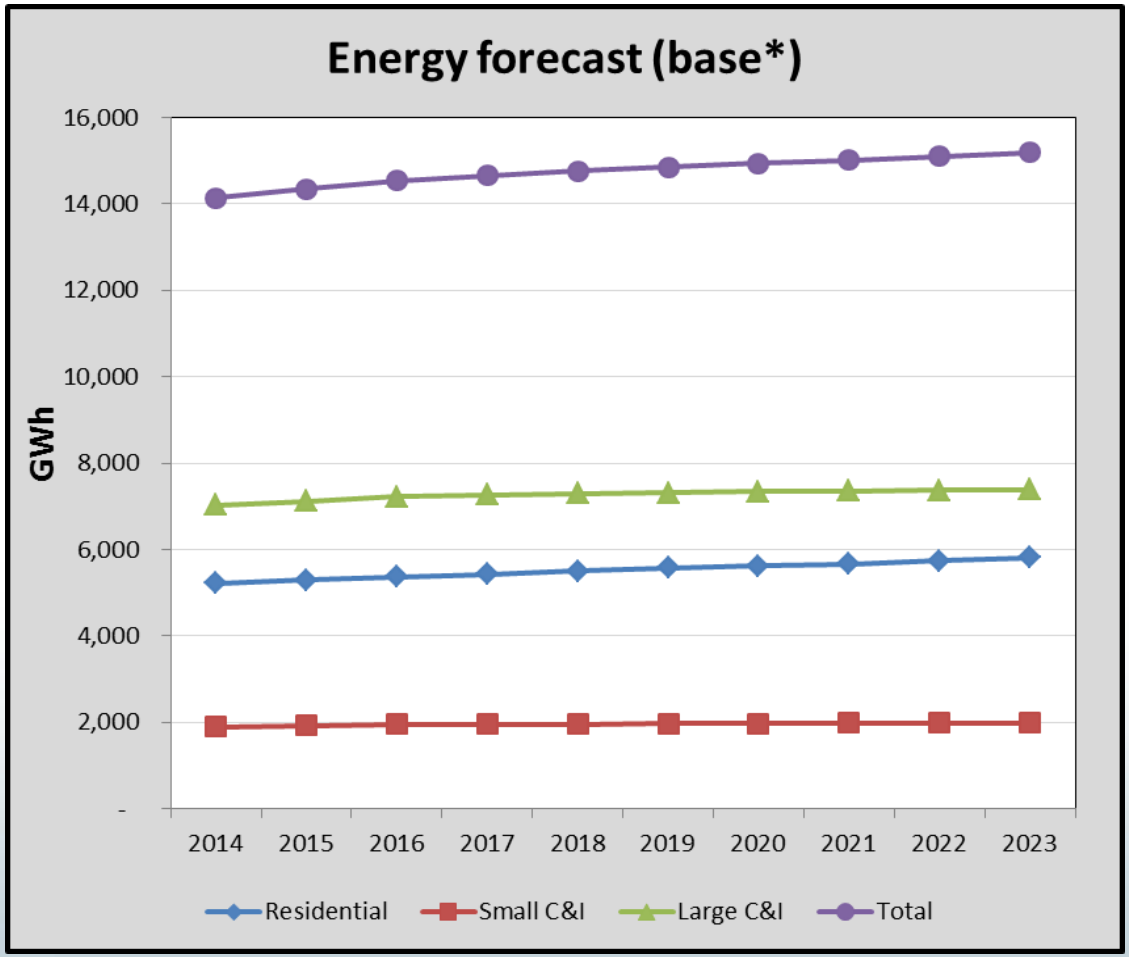
- Manufacturing employment: 0.1%
- Non-Manufacturing employment: 1.1%

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

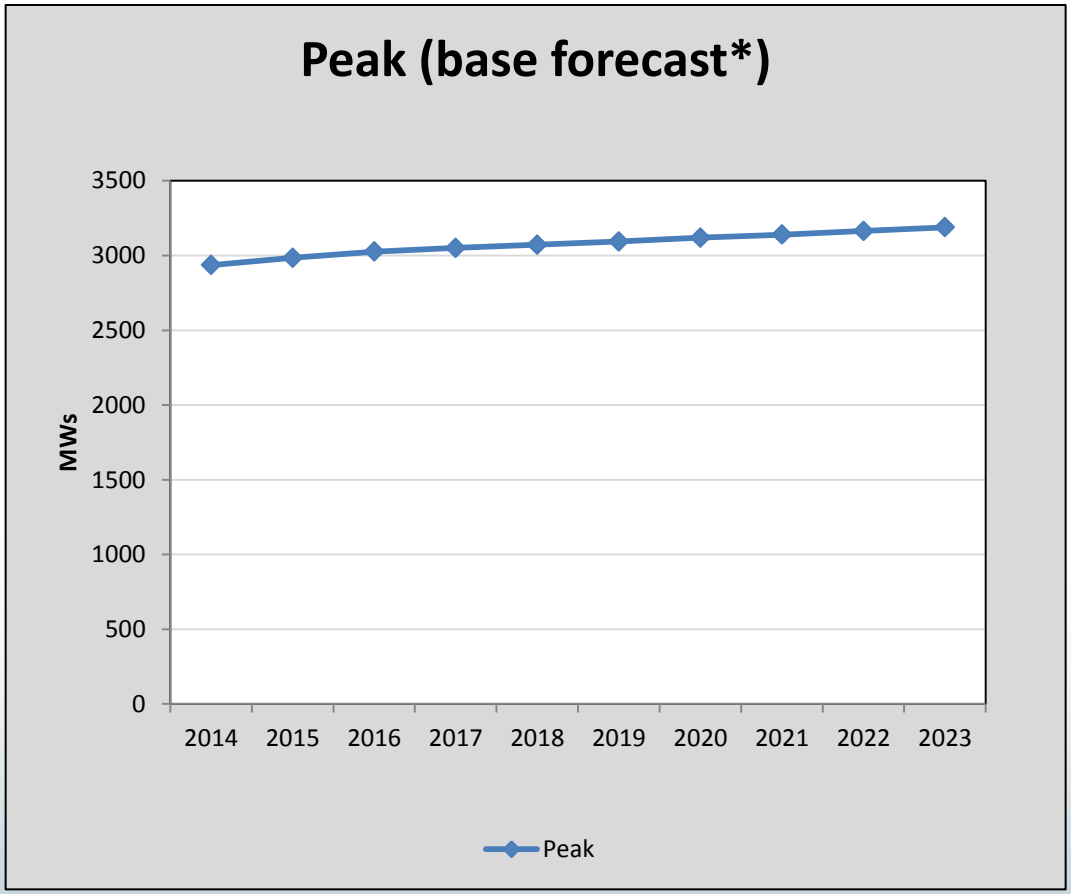


Average **Energy** growth rates (2014-23):

- 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 must be performed using the five 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
  - 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
  - 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

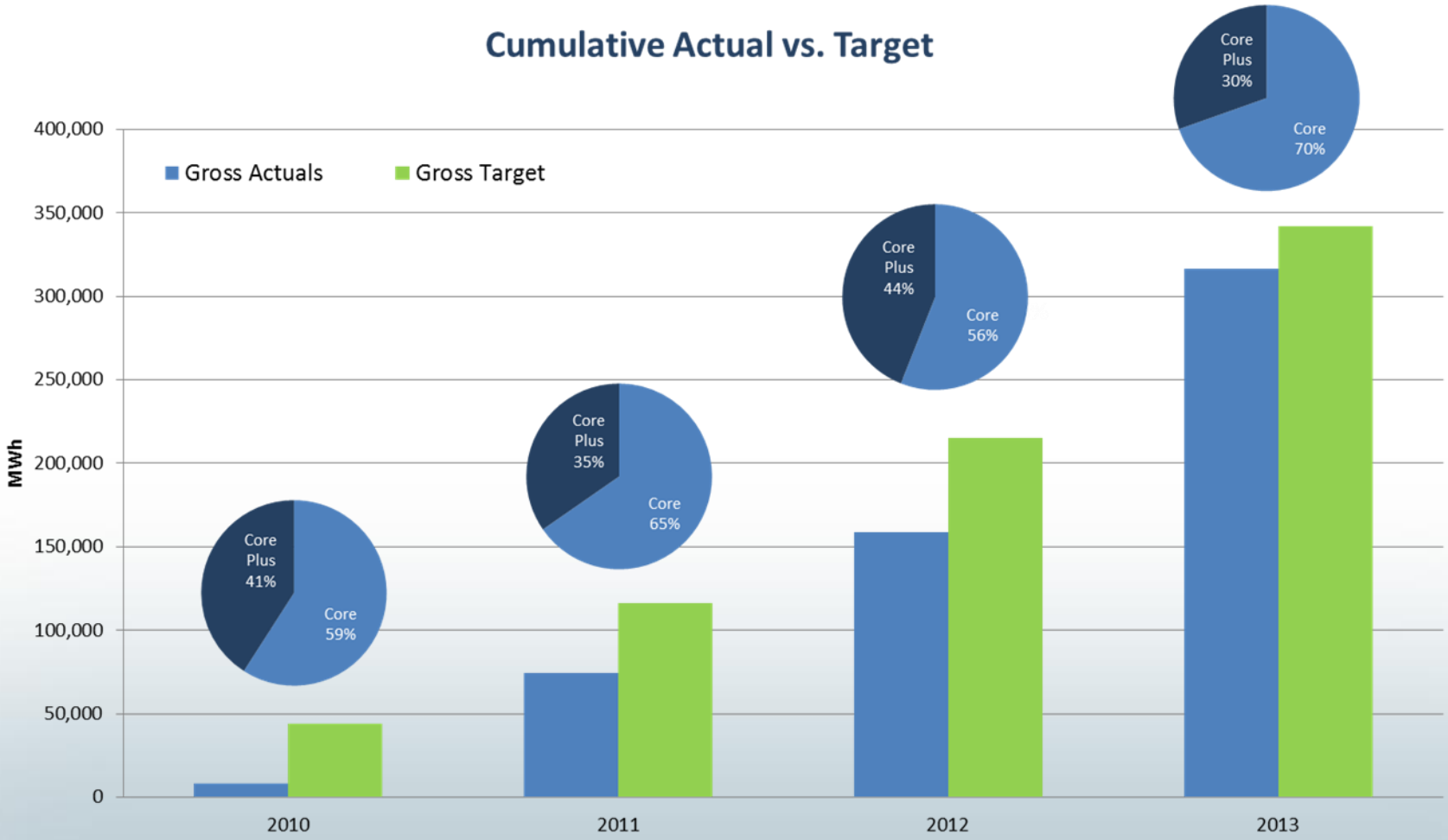
Residential

- 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

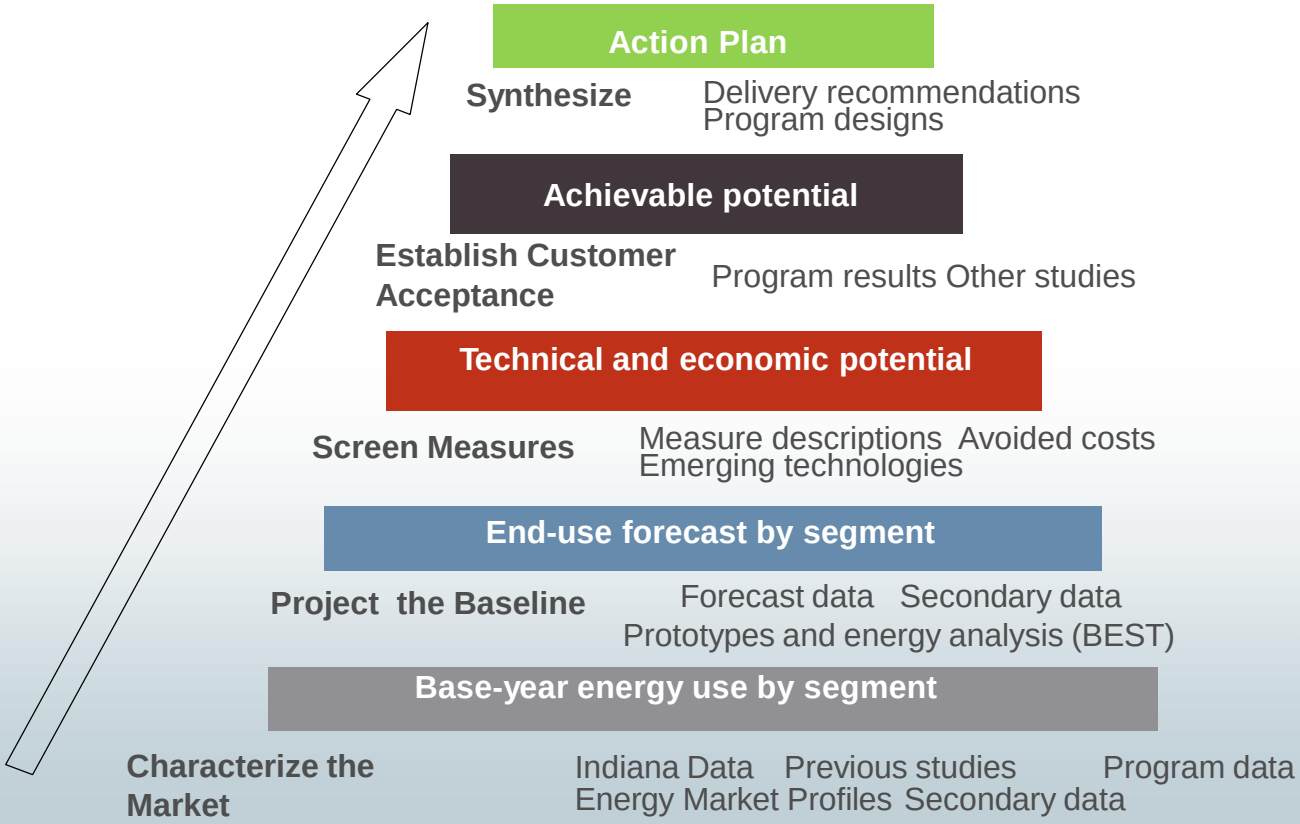
- In 2012, IPL completed a DSM Market Potential Study (MPS) in cooperation with the DSM Oversight Board to identify the potential savings from energy efficiency programs
  - The Oversight Board is comprised of IPL, the OUCC, and the CAC
  - IPL contracted with EnerNOC to perform the MPS
  - The EnerNOC 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

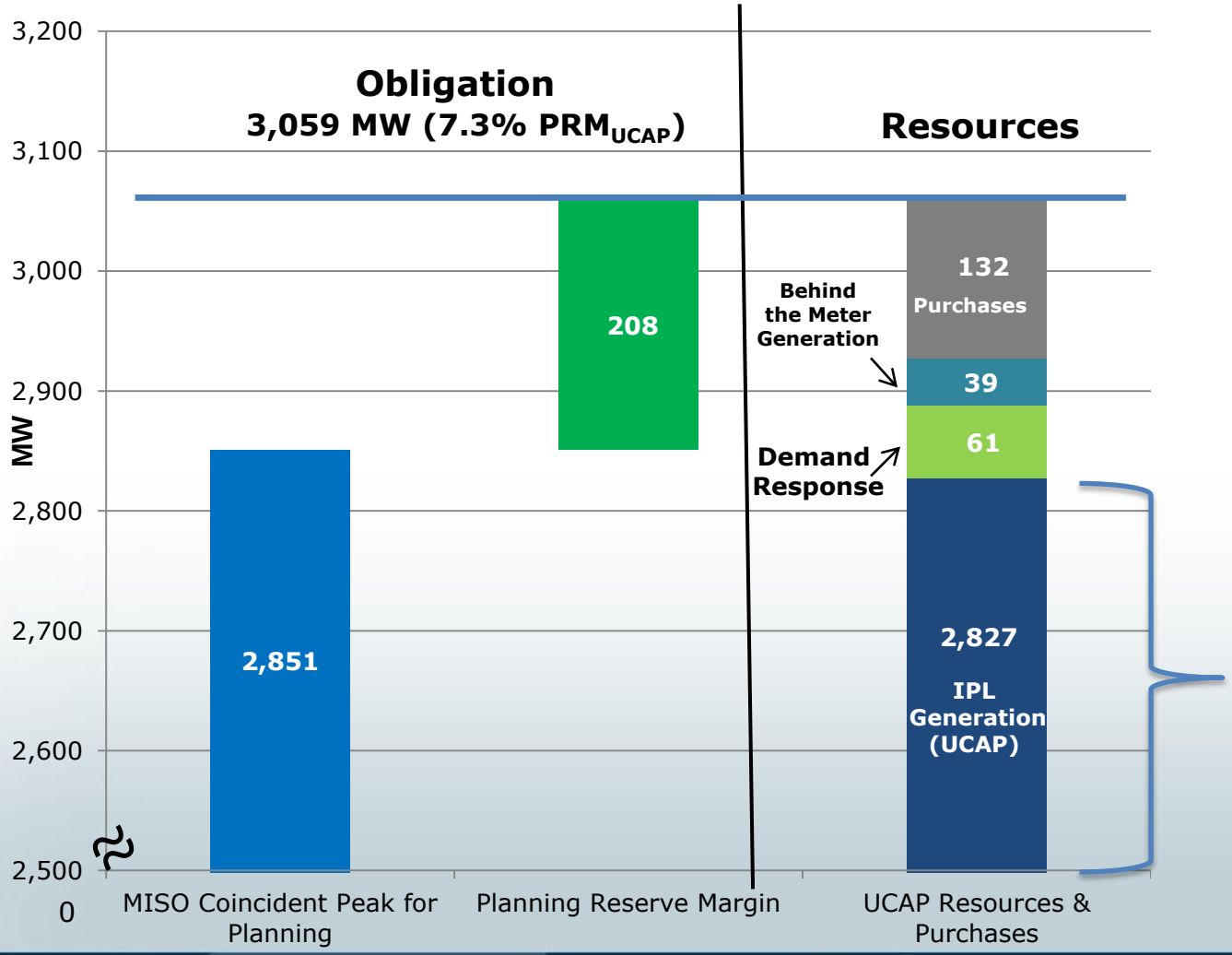
Presented by Herman Schkabla, Director of Resource Planning

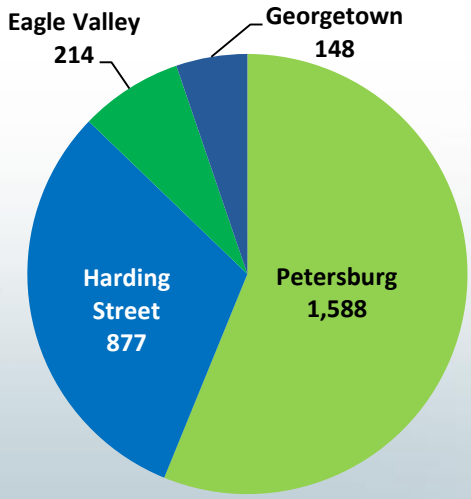
MISO Capacity Construct - Installed Capacity vs. Unforced Capacity

- 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

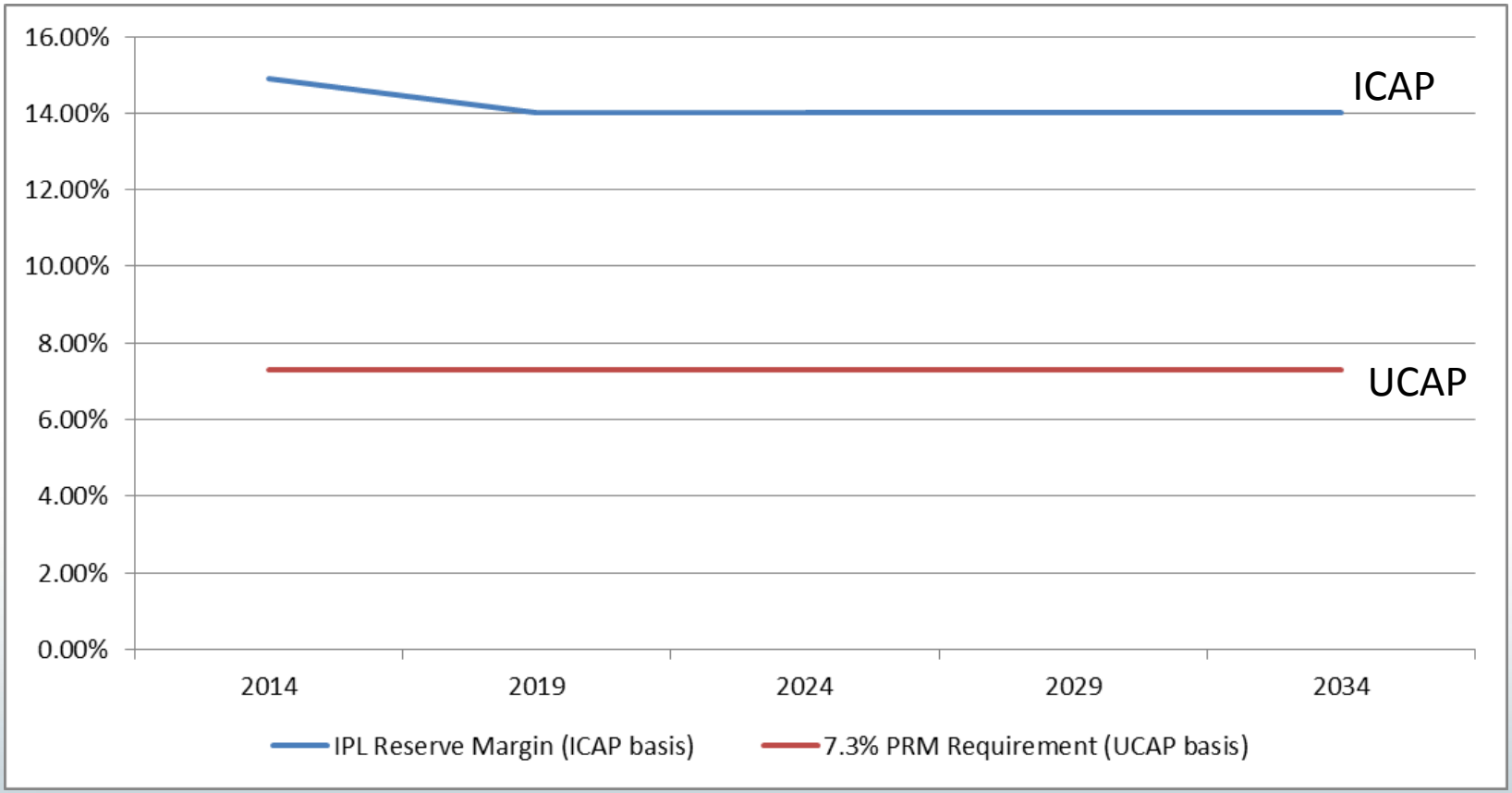
NRIS - Network Resource Integration Service

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

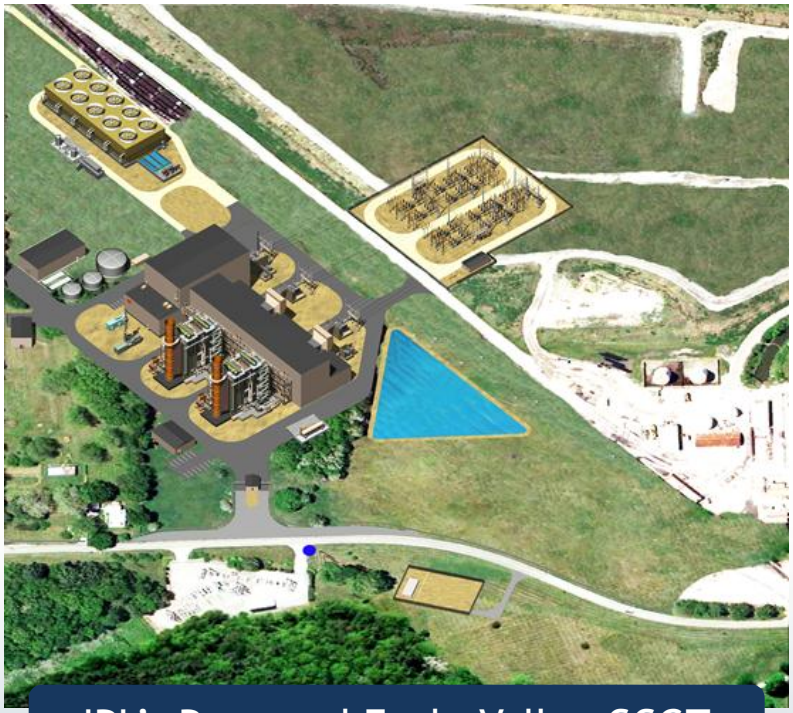
IPL Generating Stations—Wind and Solar

	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 65 MW are in service

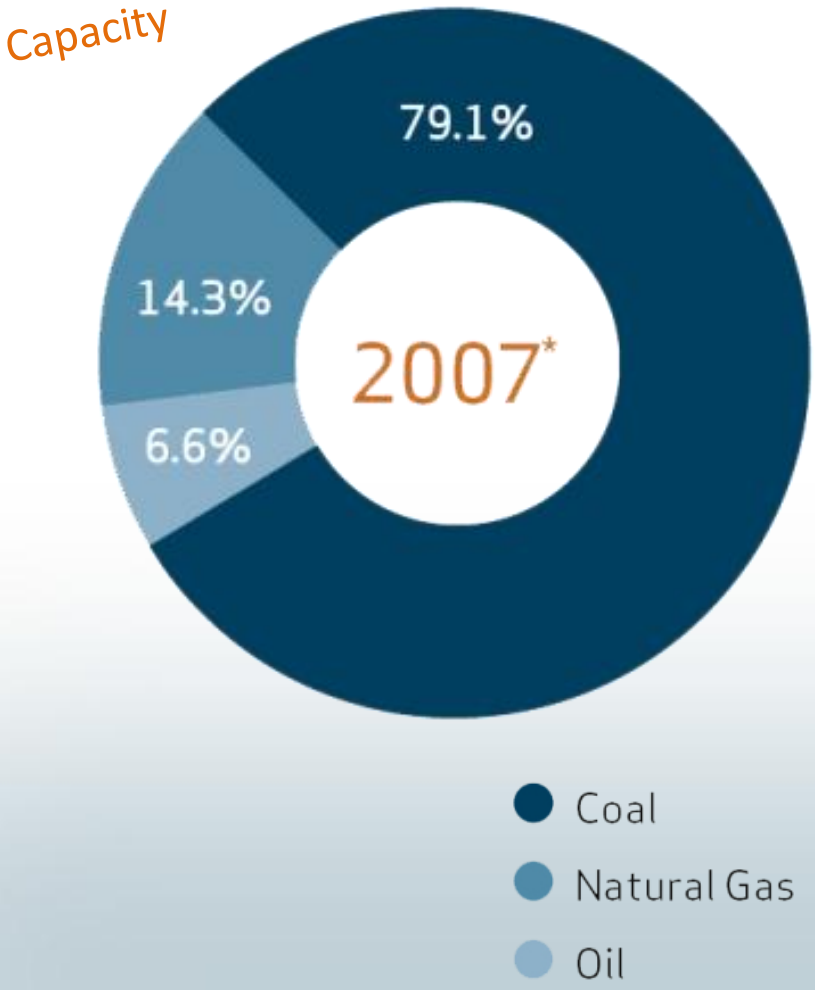
Planning for the Future | Generation

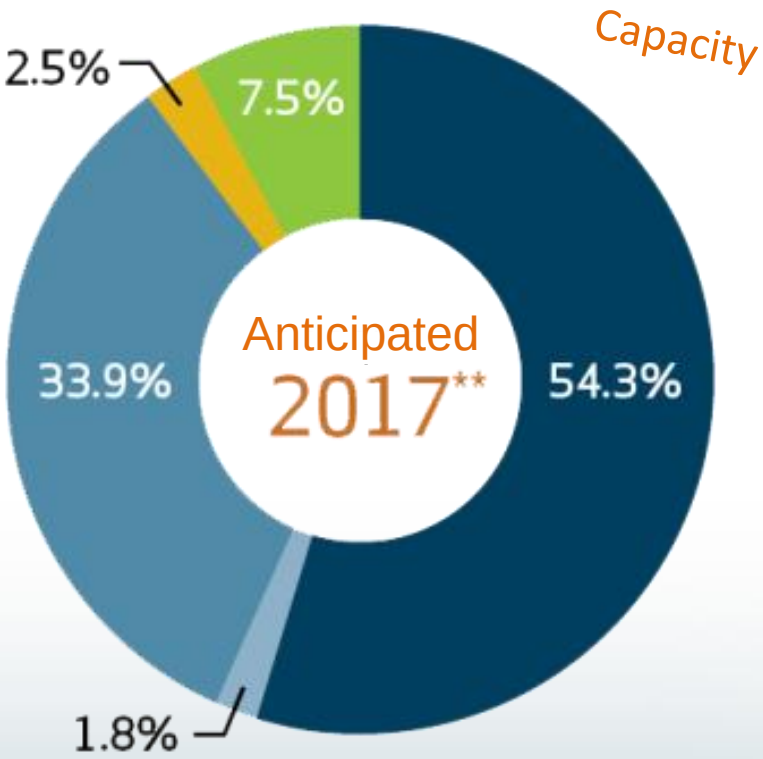
- Diversifying portfolio by retiring or refueling less efficient coal & oil units and replacing with CCGT
- Investment in wind and solar resources



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
  - Compliance Date of April 16, 2015
  - One-year extensions obtained
  - Potential Agreed Order with EPA for one additional year

- Impact
  - $511 million in controls approved by IURC in 2013
  - Retire or repower older, smaller coal-fired units
  - 80% reduction in Mercury emissions

Mercury and Air Toxics Standard (MATS)

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

* 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))
  - 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
  - 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
  - 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)
  - SO2
    - Compliance required in 2017
    - Unscrubbed units would likely be unable to comply
  - PM2.5
    - Compliance required by 2020
    - EPA believes most areas will be in attainment by 2020 due to other requirements
  - 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
  - Cross State Air Pollution Rule vacatur overturned by Supreme Court
  - 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

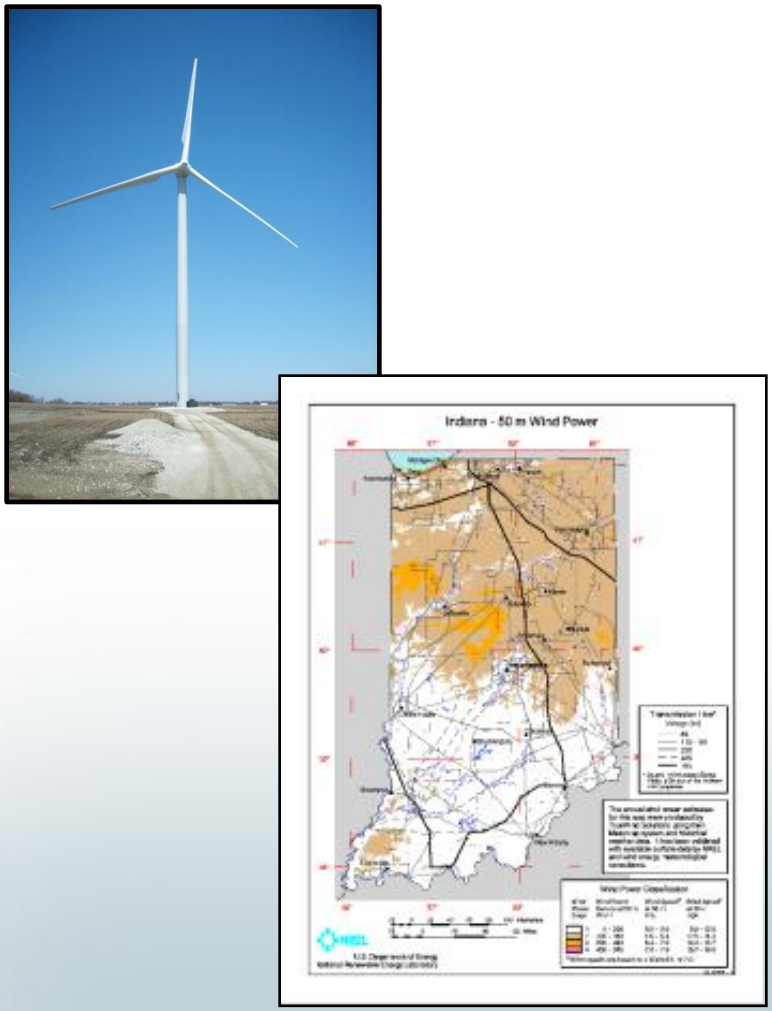
Characteristics – Customer-Sited Emergency Generation

- 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
  - Usually customer sited and owned
  - Heat requirements
- Technology options
  - Conventional
    - Natural gas reciprocating engines
    - Natural gas turbines
  - 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

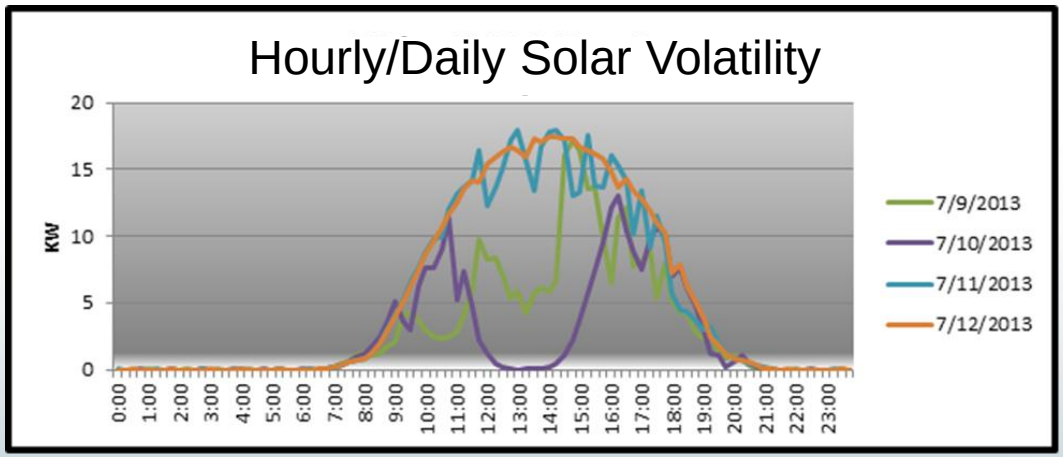
Characteristics - Biomass

- 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

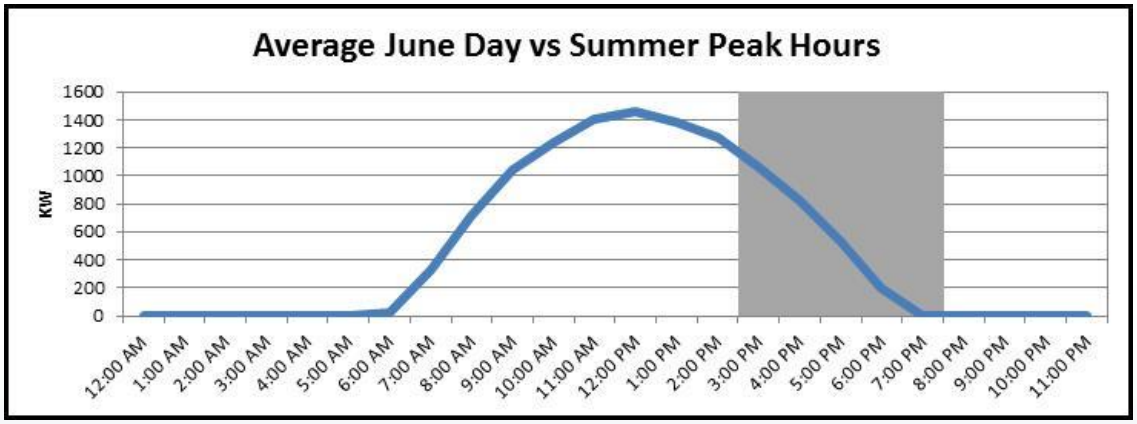
- Permitting and construction are usually quick and not complicated
- Location determined by others
- Requires large space
- Low capacity factor – 15%. Intermittent production

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)
  - 65 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?

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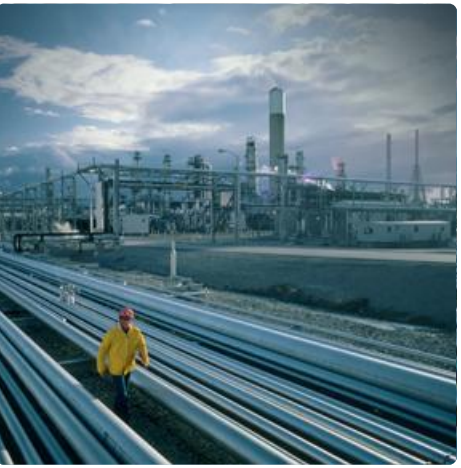
Indianapolis Power & Light

2014 Integrated Resource Plan (IRP)
Proposed Modeling Assumptions

Presented by Diane Crockett, Ventyx Lead Consultant



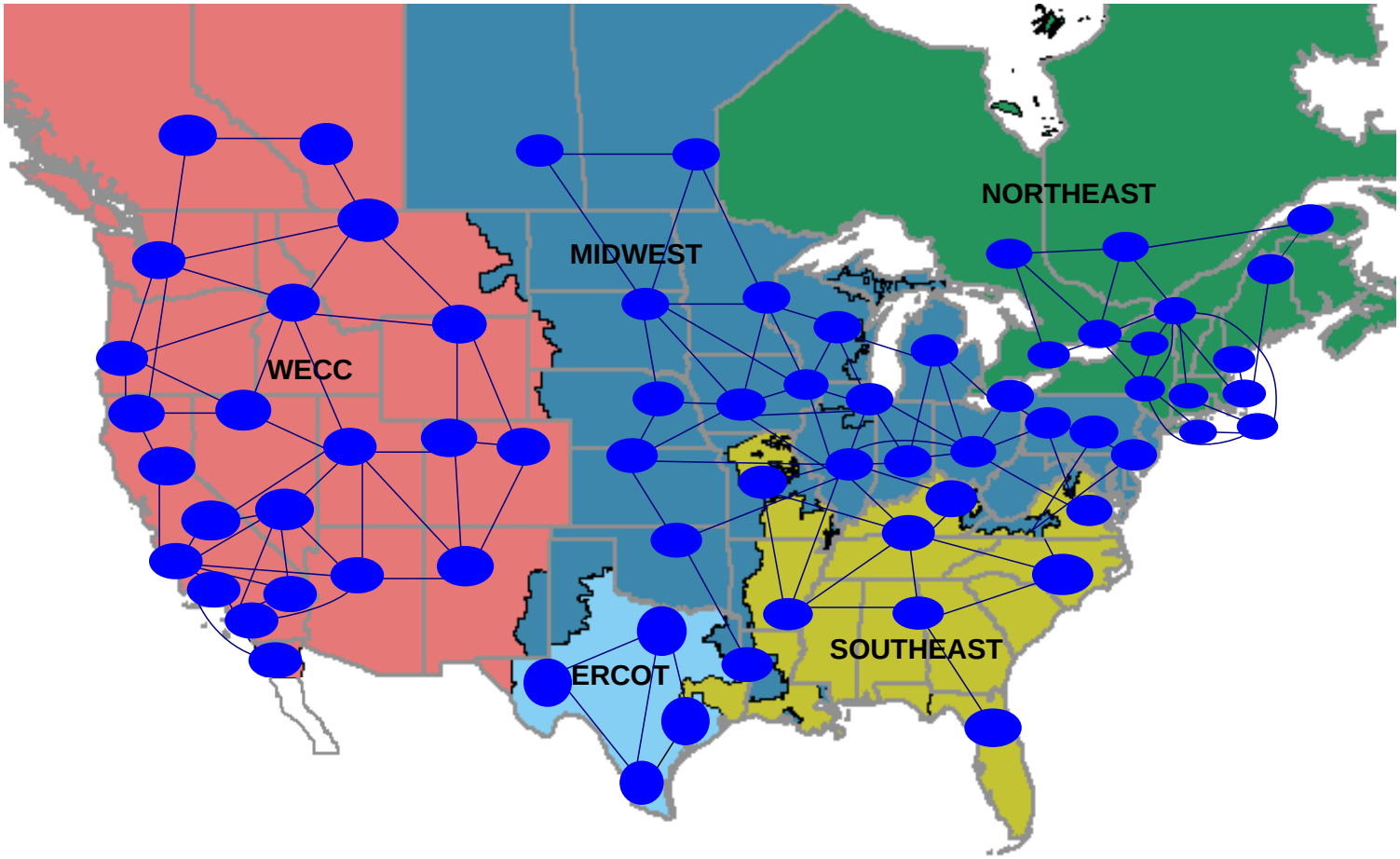

Agenda

- 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

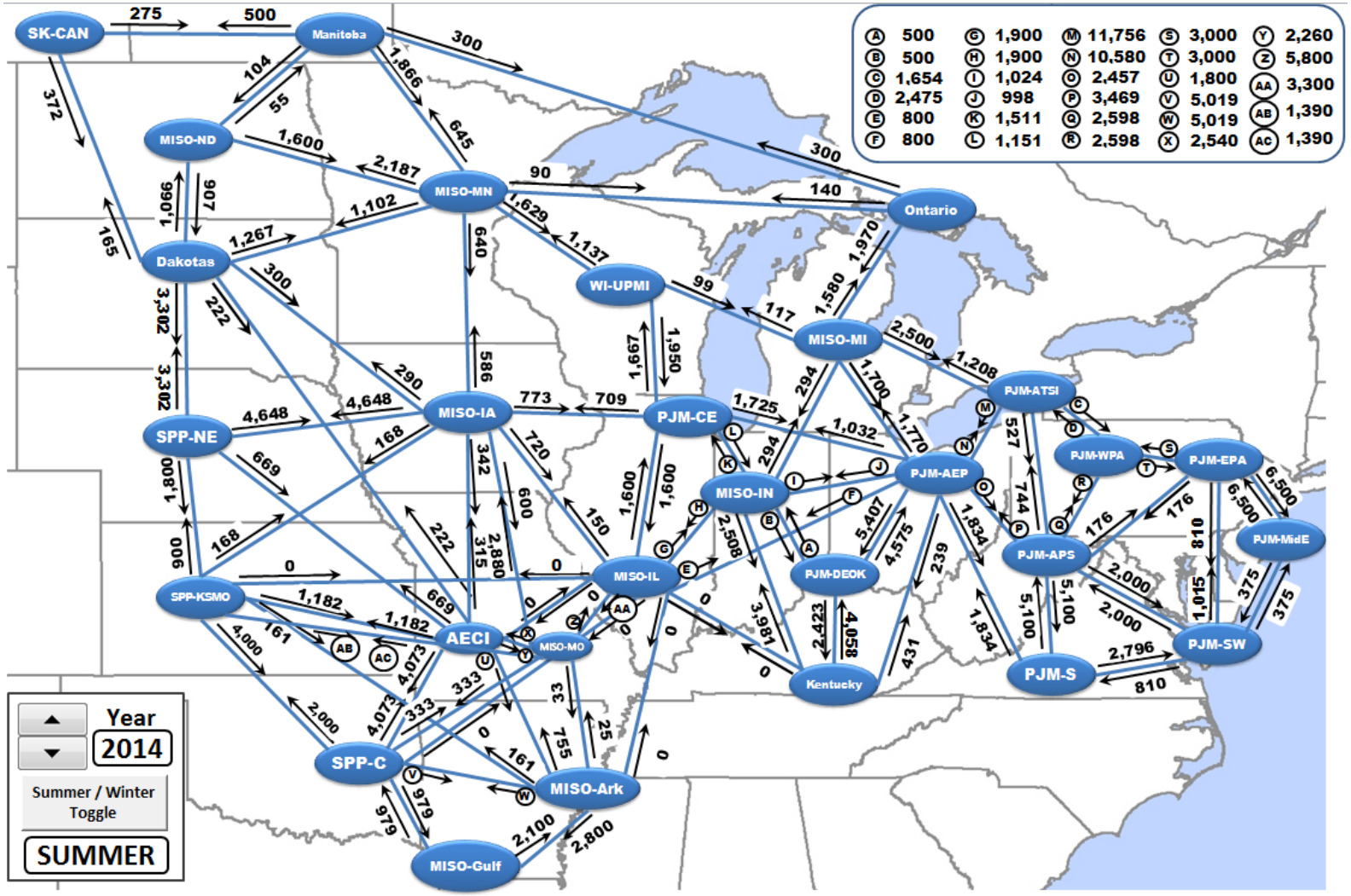
What is the Ventyx North American Power Reference Case?

- 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

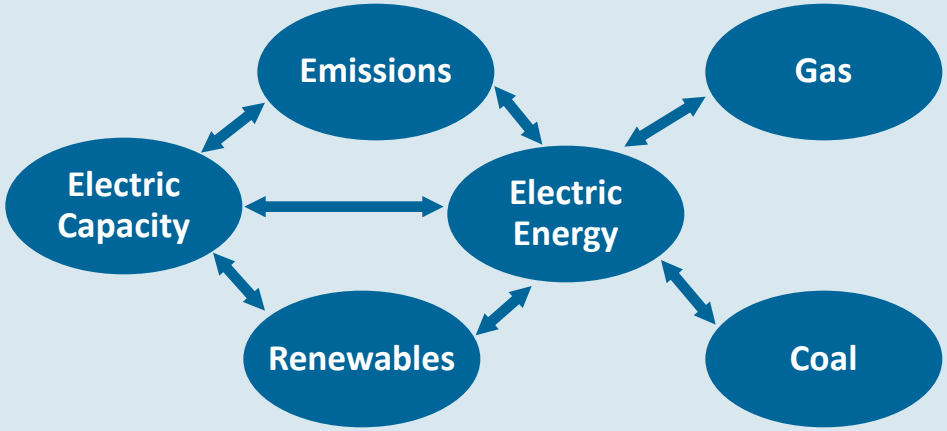


Methodology Overview

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 (%)

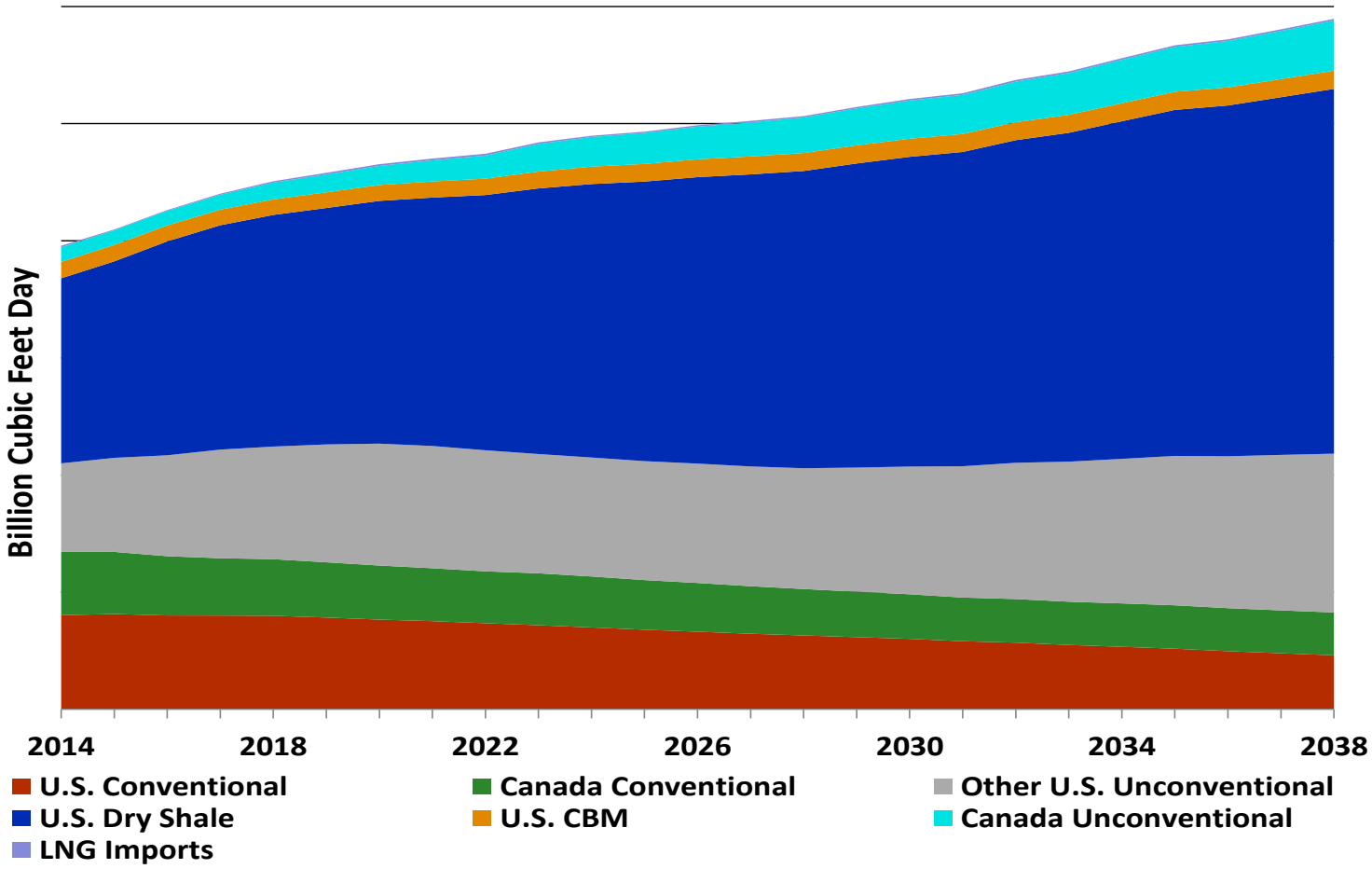
	2014 - 2019	2019 - 2024	2024 - 2038
ERCOT	2.0	0.9	0.7
NWPP	2.1	1.2	1.0
California	0.7	1.0	0.8
DSW+RMPA	1.4	1.4	1.2
NYISO	0.5	0.5	0.4
ISONE	0.4	0.1	0.3
NPCC Canada	0.3	0.6	0.5
SERC	1.2	1.1	0.9
FRCC	1.5	1.1	0.9
MISO/MRO	1.0	0.9	0.8
PJM	1.5	1.1	0.8
SPP	0.5	0.7	0.7
Total	1.2	1.0	0.8

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

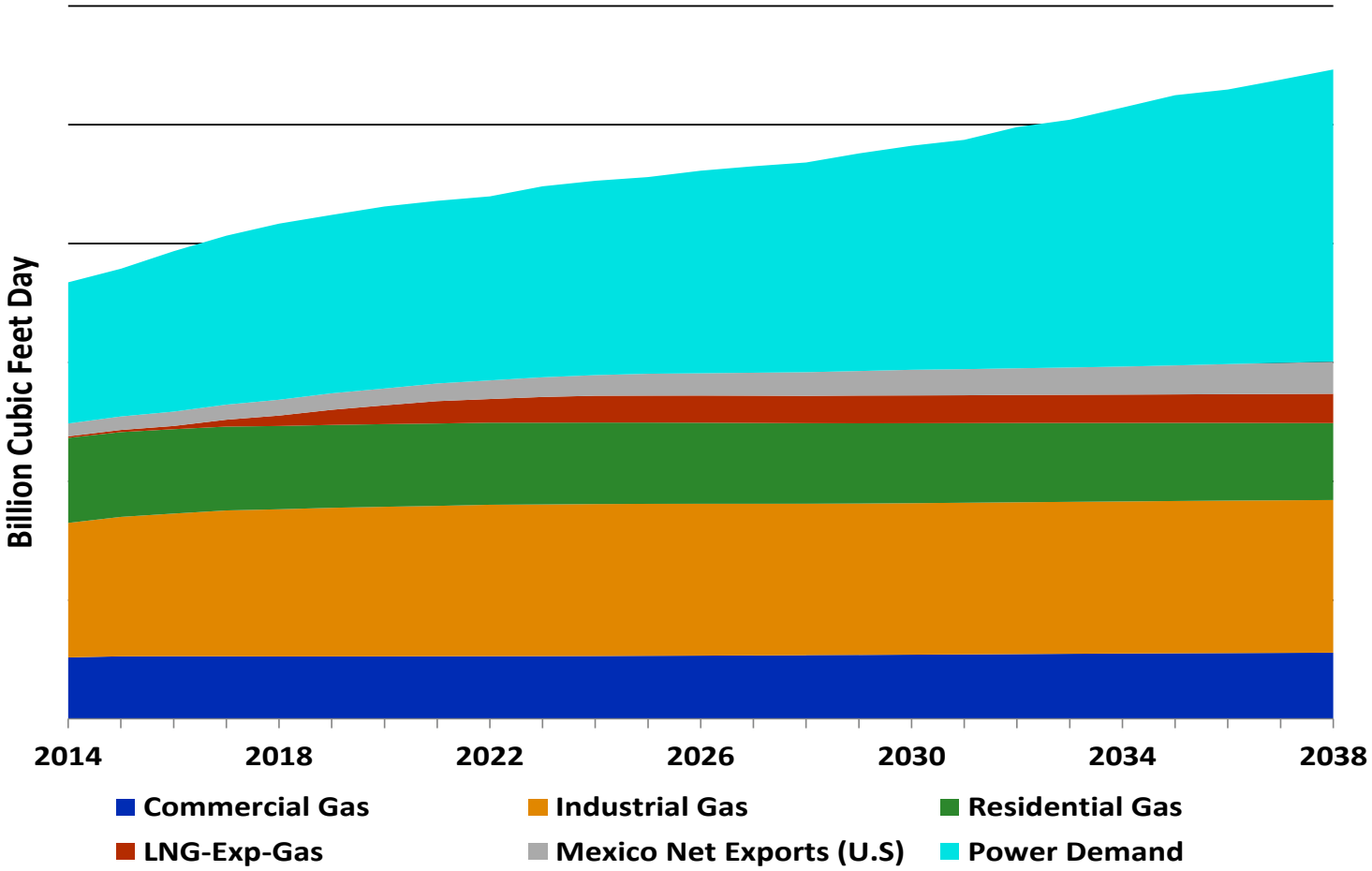
Reference Case Supply Side Technology Options

	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

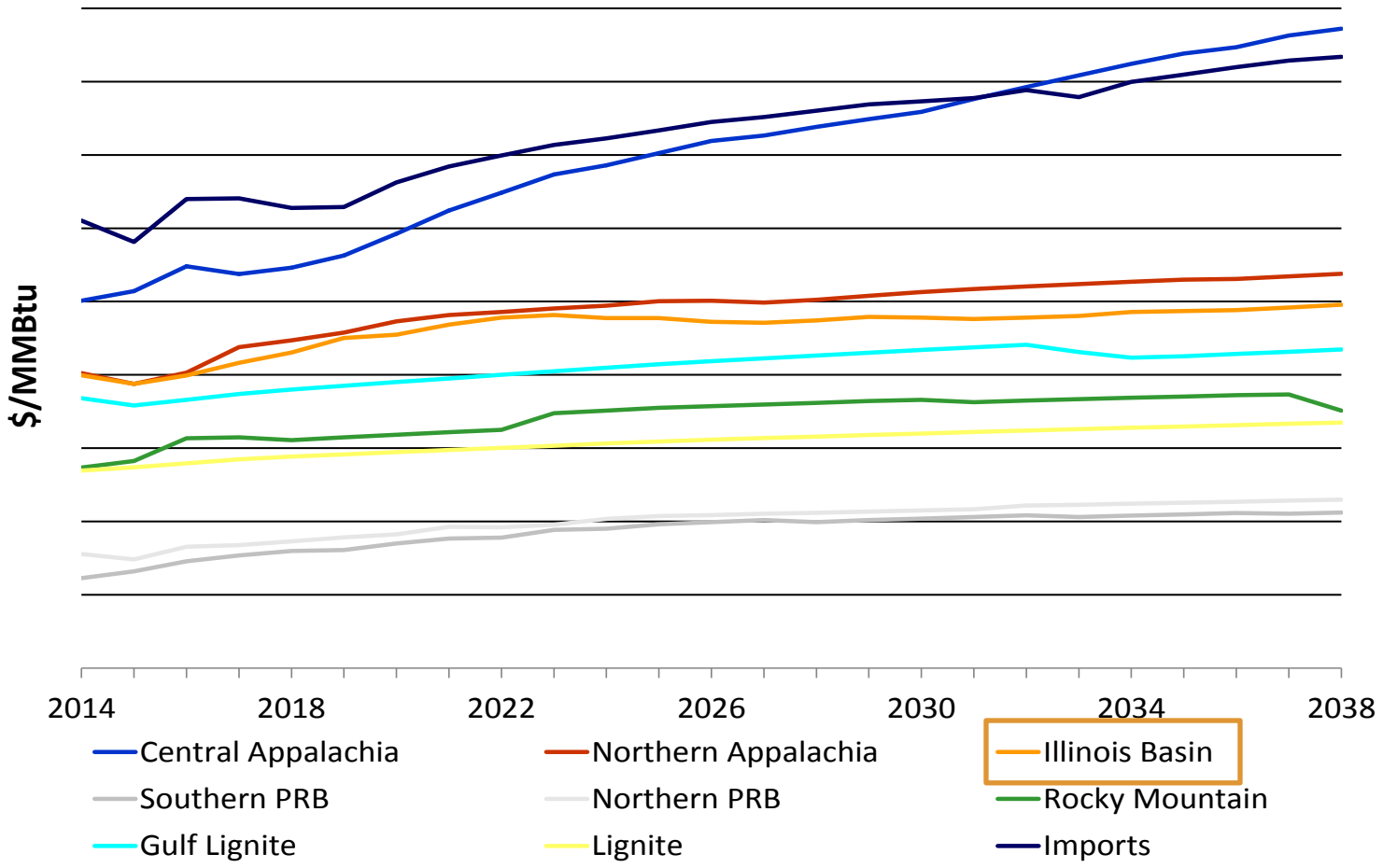
North America Gas Supply Forecast (Bcfd)



North America Gas Demand Forecast (Bcfd)



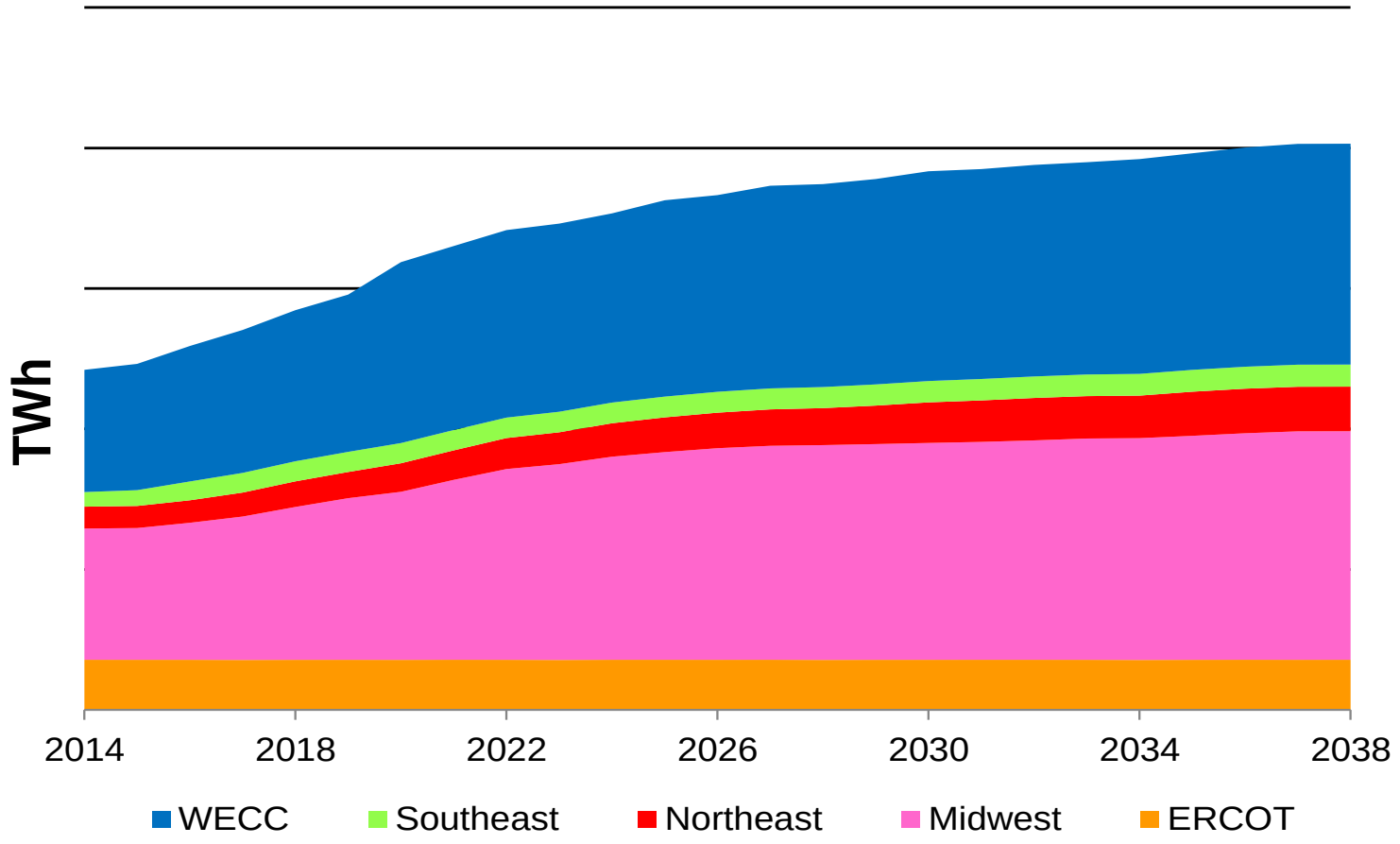
FOB Mine Coal Price Forecast (2013 $/MMBtu)



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)

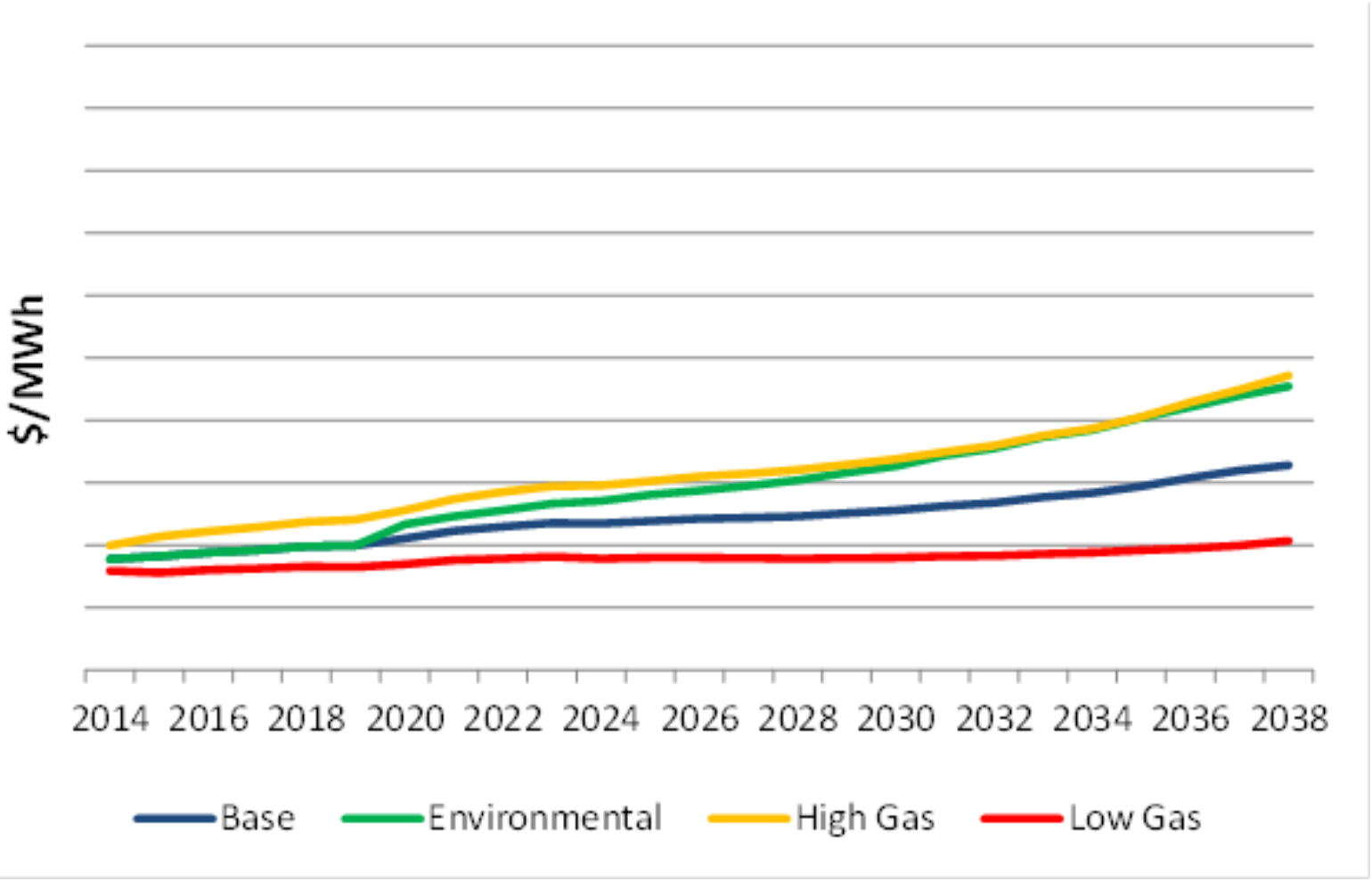
U.S. Renewable Energy Generation Forecast (TWh)



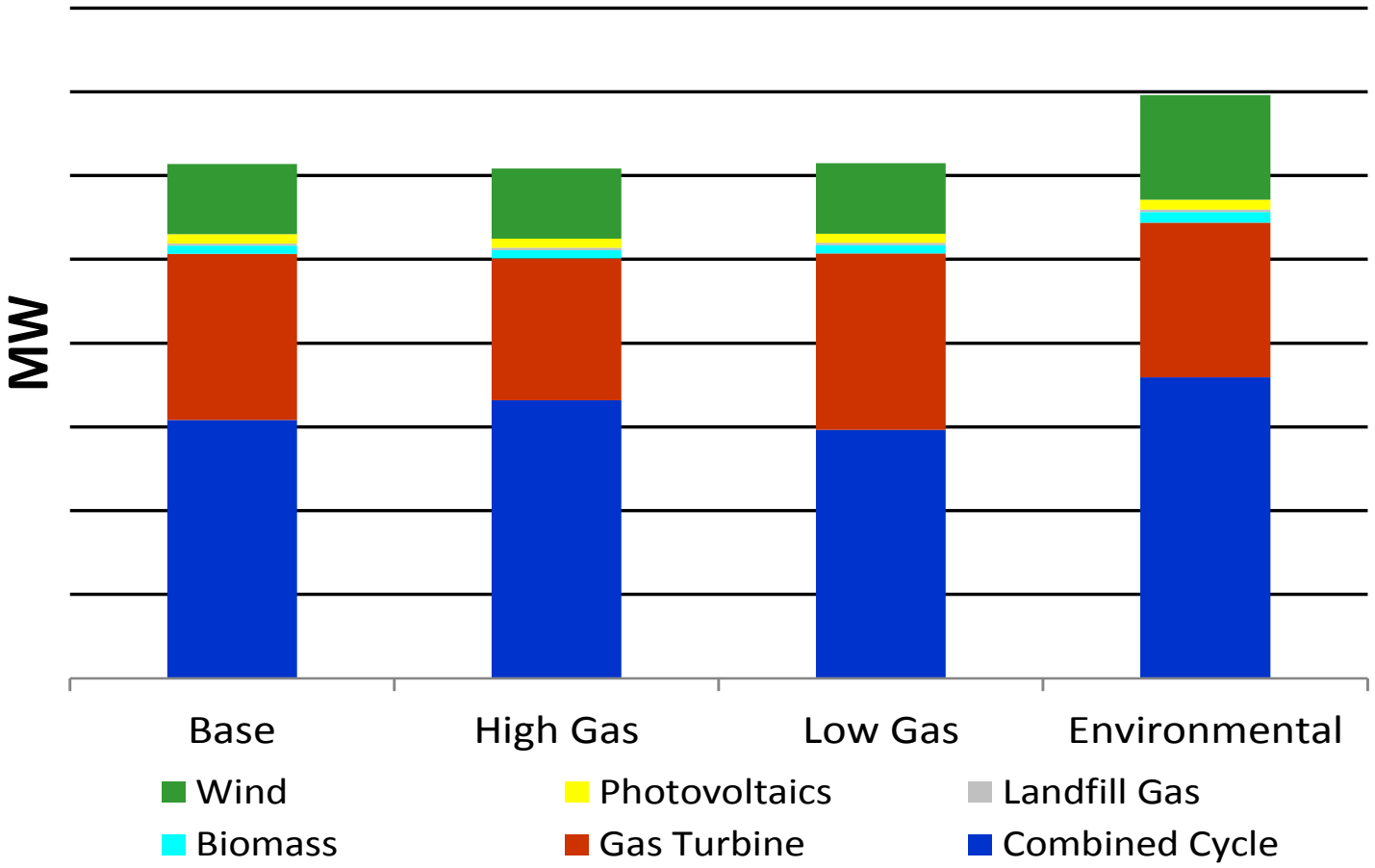
Reference Case Scenario Descriptions

- 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

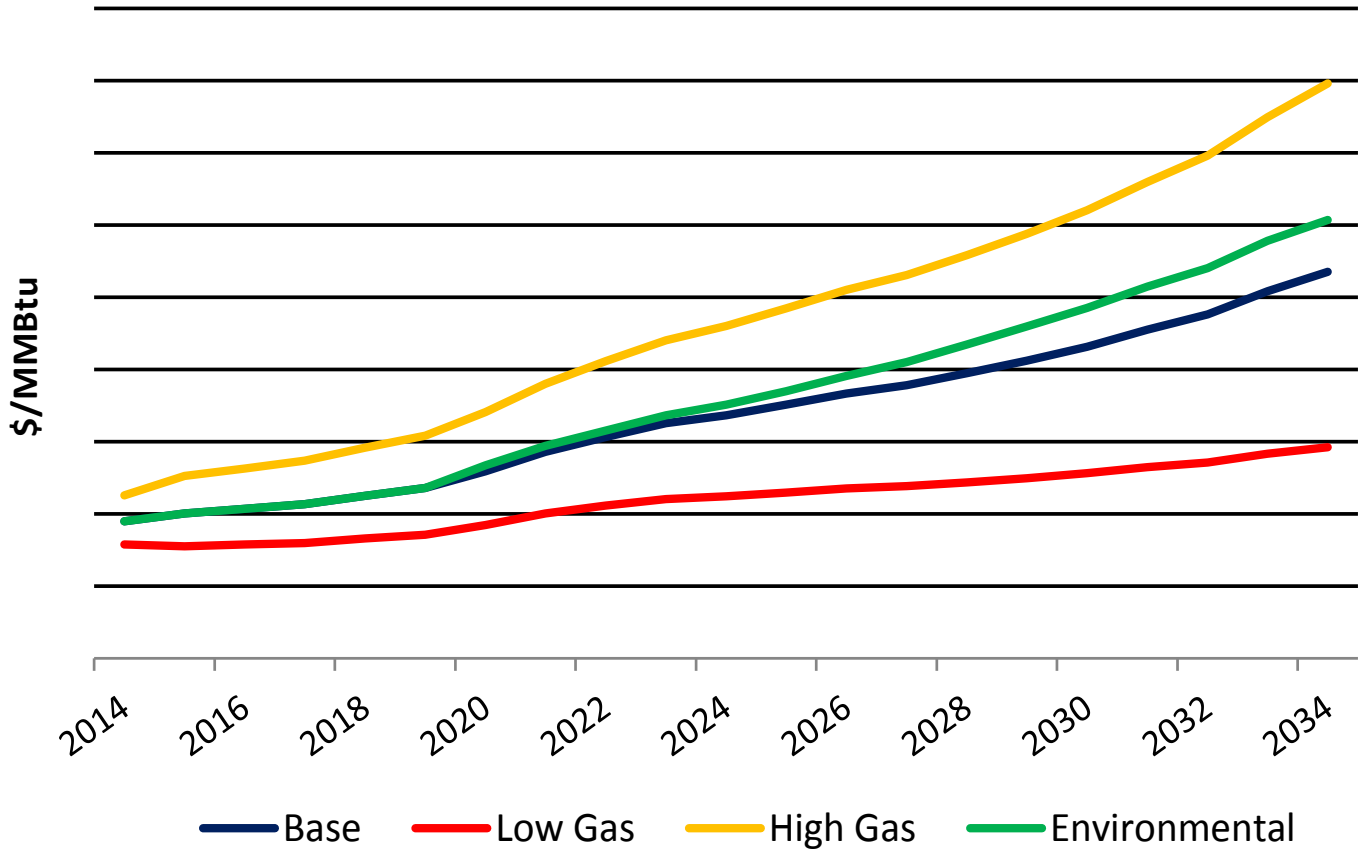


Proposed IPL Modeling Assumptions

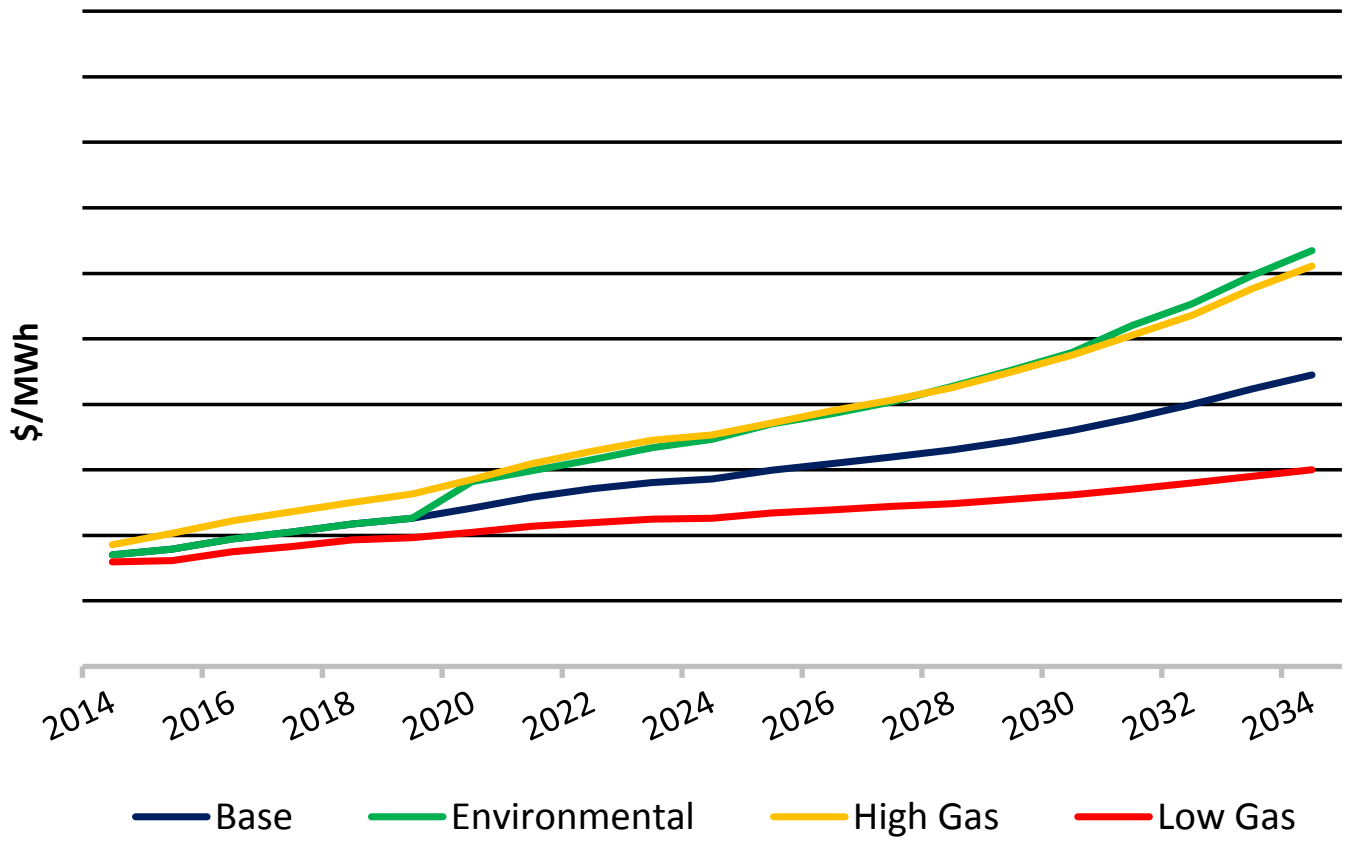
Strategic Planning *powered by Midas Gold®*

- 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)



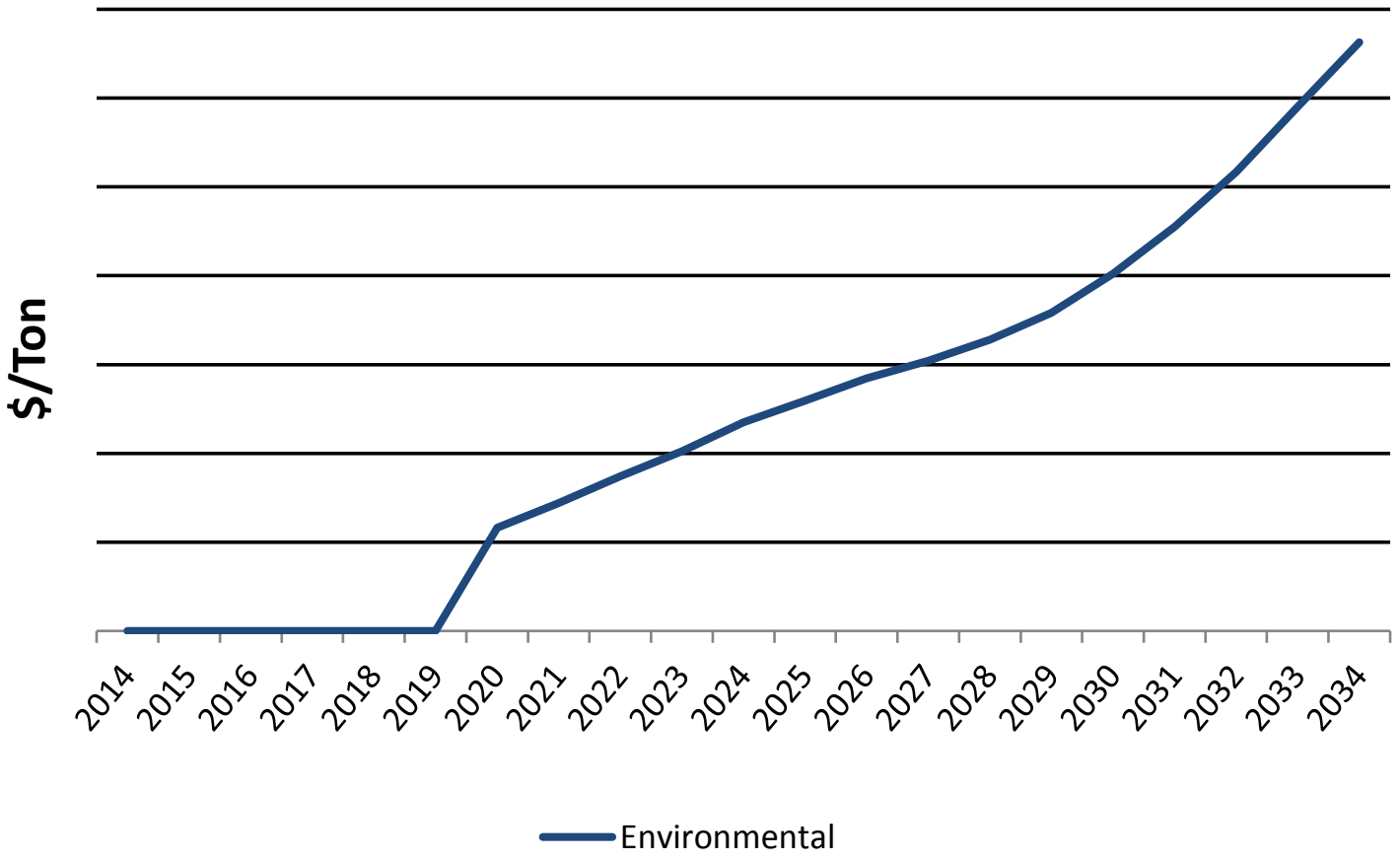
Proposed Annual MISO-Indiana Market Prices (7x24)(Fall 2013 Reference Case $/MWh)



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 2014	IRP Public Advisory Meeting #2
September 2014	IRP Public Advisory Meeting #3
Oct 31, 2014	Submit IRP Document to the IURC

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

Thank You!