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The Duke Energy Indiana
2013 Integrated Resource Plan

November 1, 2013

Volume 2:
Summary Document and Stakeholder Meetings

TABLE OF CONTENTS:

SECTION: **PAGE:**

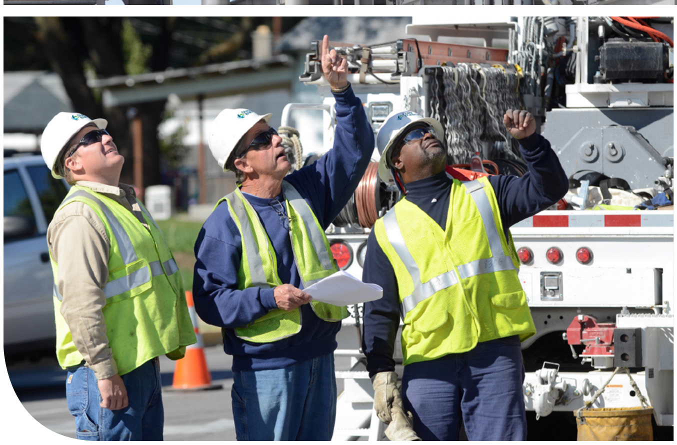
2013 Duke Energy Indiana

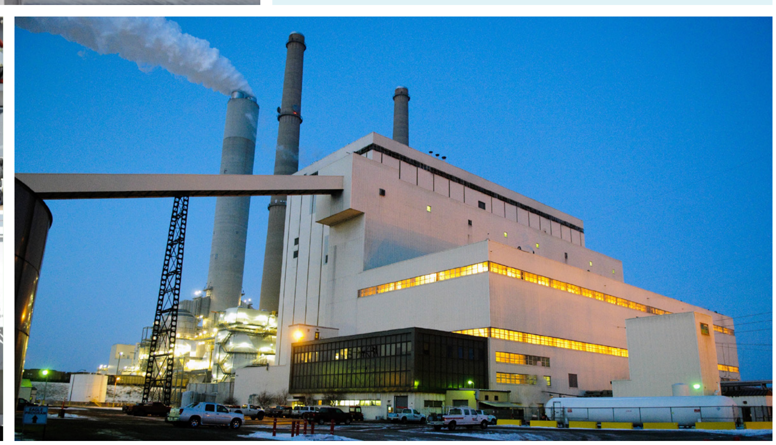
Integrated Resource Plan

11.1.2013

What's Inside

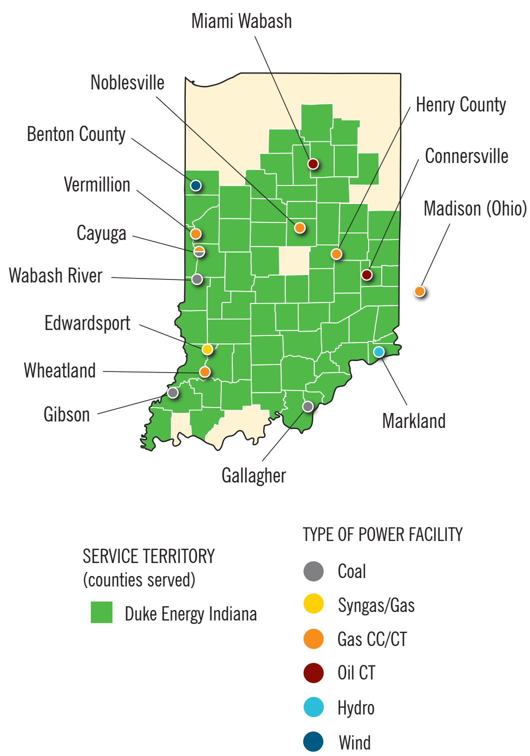
- Duke Energy Indiana, an overview
- What is an IRP?
- Our public advisory process
- Forecasting future energy demand
- Energy supply portfolio and capacity
- Great strides in energy efficiency
- Environmental stewardship
- Partnering to deliver energy





DUKE ENERGY

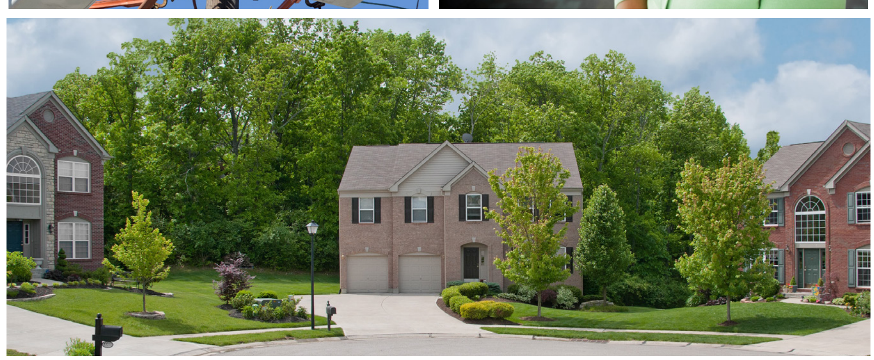
Duke Energy Indiana: an overview



As the state's largest electric utility, Duke Energy Indiana provides affordable, reliable and cleaner energy to approximately 790,0000 residential, commercial and industrial electric customers.

- Serving customers in 69 of Indiana's 92 counties
- Service area spans 22,000 square miles across north central, central and southern Indiana
- Supporting cities such as Bloomington, Terre Haute and Lafayette
- Also serving suburban areas near Indianapolis, Indiana, Louisville, Kentucky and Cincinnati, Ohio
- Generating facilities capable of producing 7,494 megawatts of electricity
- Bringing power to our customers through 2,768 miles of transmission lines

Duke Energy Indiana is dedicated to strengthening the communities we serve. We work hard to develop clean and efficient energy sources and to help create jobs that bolster the local economy – helping to make this state a great place to live, work and play.



What is an IRP?

An IRP summary document, such as this one, helps our customers understand how we supply and deliver energy today – and also how we will continue to enhance our service in the future.

Duke Energy Indiana's Integrated Resource Plan is a comprehensive planning document used to forecast customer demand for electricity and our response to those needs. Our goal is to provide affordable, reliable and cleaner energy for our customers today and in the future. The IRP is updated and filed every two years with the Indiana Utility Regulatory Commission (IURC), and it outlines the processes, methods and forecasting models used to create the 20-year plan.

With each IRP, we use current information to keep our long-term plan updated. When it is time to make a near-term decision, we gather the best available information to analyze for that specific decision in detail. This two-level approach enables us to make the best decisions today and prepare for meeting customers' needs in the future.

Our public advisory process

Engagement process overview

- Third-party, unbiased facilitator
- Involving stakeholders from the beginning of the IRP development
- Five stakeholder workshops
- Informative presentations and interactive workshop exercises
- Summaries on public IRP website at duke-energy.com/indiana/in-irp.asp

As part of the public advisory process with our customers, Duke Energy Indiana conducted five stakeholder meetings to gather feedback and discuss the IRP process with interested parties. The five meetings and related activities are summarized below:

Stakeholder Meetings:

Dec. 5, 2012

- Background on stakeholder process
- Discussion of driving forces in order to develop scenarios

Jan. 30, 2013

- Discussion of energy efficiency and renewable energy
- Stakeholder exercise to develop scenarios

April 24, 2013

- Discussion of load forecasting and market fundamentals
- Discussion of modeling assumptions

July 19, 2013

- Stakeholder feedback and response discussion
- Scenario review, modeling methodology and portfolios discussion

Oct. 9, 2013

- Scenario and portfolios review
- Decision and risk management discussion
- Presentation of preferred portfolio and short-term implementation plan

Materials covered and meeting summaries are posted on the company's website at duke-energy.com/indiana/in-irp.asp.

Forecasting future energy demand

To address future uncertainty, Duke Energy Indiana develops a comprehensive plan that includes analysis of three different future scenarios. At the same time, the company must be flexible to adjust to evolving regulatory, economic, environmental and operating circumstances.

We used scenario analysis as part of this year's IRP planning process. Once we identified some key driving forces, including carbon pricing, environmental regulations and fuel prices, we discussed those pressures in our stakeholder meetings. The feedback gathered helped us develop three separate scenarios:

The first scenario is the "Low Regulation Scenario," assuming:

- No tax/price on carbon
- Moderate levels of environmental legislation or regulation
- A low federal- or state-level renewable energy standard
- Slower achievement of the state energy efficiency mandate
- Higher gas and coal prices due to the greater demand for fuels

The second scenario is the "Reference Scenario," which reflects the company's view, assuming:

- A moderate tax on carbon
- Increased levels of environmental legislation or regulation
- A moderate federal- or state-level renewable energy standard
- Meeting the state energy efficiency mandate
- Moderate gas and coal prices based on the demand for fuels

The third scenario is the "Environmental Focus Scenario," assuming:

- A higher tax carbon
- Higher levels of environmental legislation or regulation
- A high federal- or state-level renewable energy standard
- Meeting and going beyond the state energy efficiency mandate
- Lower gas and coal prices based on the lower demand for fuels

Energy supply and capacity

Energy planning

We carefully consider which types of generating options we use because each source has its own set of advantages and disadvantages, ranging from costs and environmental attributes to reliability. Since customers demand different amounts of energy depending on time of day and season, our generation portfolio requires a mix of resources that provides the flexibility needed to meet varying loads. These options include:

- Natural gas
- Renewable energy
- Hydroelectric power
- Biomass energy
- Nuclear
- Energy efficiency
- Demand-based service
- Customer-generated power

Ultimately, our energy portfolio includes a diverse mix of options to provide the most reliable, affordable and clean energy available to our customers.

Once the modeling assumptions for each scenario were specified, capacity expansion models were used to create a portfolio for that scenario. The Traditional Portfolio was developed based on the assumptions of the Low Regulation Scenario. This portfolio features the retirement of a number of older coal and oil-fired units. To replace these units and to serve new load growth, new natural gas units and a small amount of renewable generation would be added.

The Blended Approach Portfolio was developed based on the assumptions of the Reference Scenario. This portfolio features retiring the same units in the Traditional Portfolio as well as the addition of new natural gas generation. Furthermore, the Blended Approach Portfolio includes more renewable generation and a 25-percent-ownership share of a nuclear unit primarily due to the presence of the carbon tax.

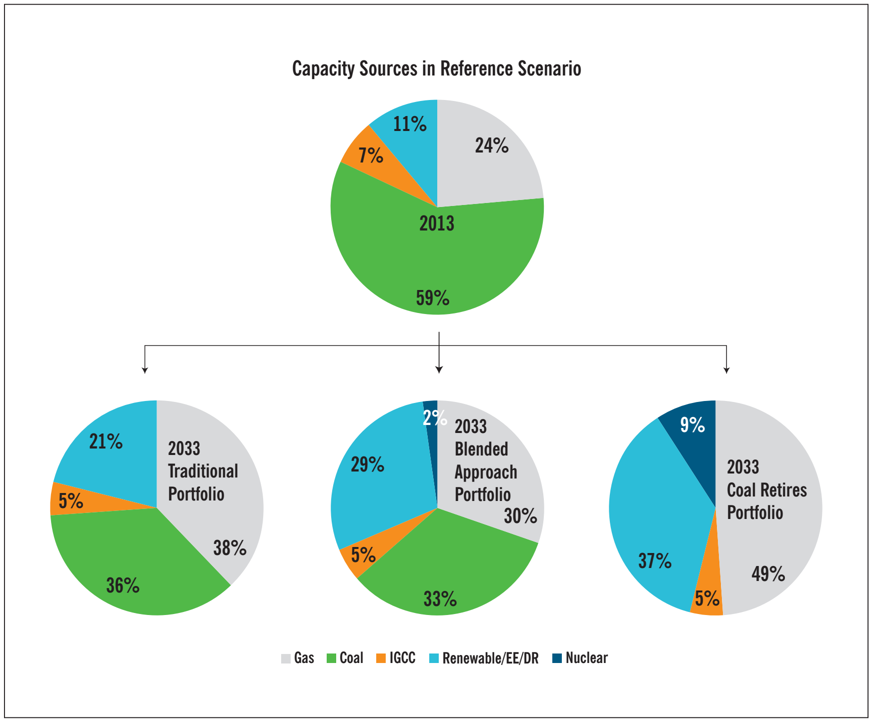
Lastly, the Coal Retires Portfolio was developed based on the assumptions of the Environmental Focus Scenario. This portfolio assumes the retirement of all of the pulverized coal units by the end of the planning period. We would then replace the retired units and meet load growth with a significant amount of natrual gas generation, greater renewable generation and a full nuclear unit. Renewable generation and nuclear generation are more competitive in this scenario due to the presence of the carbon tax.

The short-term action plan for each portfolio is very similar. Over the next five years, we expect to:

- Retire several older coal and oil-fired units
- Potentially convert Wabash River 6 to natural gas
- Evaluate renewable generation
- Evaluate new natural gas generation
- Implement energy efficiency programs

New environmental regulations will likely cause the retirement of some coal units. This capacity will be replaced with the most cost-effective option. Depending on the time and scenario, that could be gas, renewables, nuclear or greater application of energy efficiency methods.

After comparing the expected cost of each portfolio under a variety of scenario assumptions, we selected the Blended Approach Portfolio for the 2013 IRP. This portfolio benefits from a diverse generation mix as well as the ability to respond to emerging regulations.



Great strides in energy efficiency

At Duke Energy Indiana, we think of energy efficiency as the "fifth fuel," joining coal, natural gas, nuclear and renewables as a critical resource needed to serve the growing energy needs of the communities we serve. We are committed to working with Indiana regulators to develop energy efficiency programs that save our customers money and improve our environment. We offer residential and business customers many tools, programs and incentives to help save money and energy including:

- Personalized Energy Report®
- Smart $aver®
- Power Manager®
- Appliance recycling

These are only a few of the programs our customers can participate in throughout the Duke Energy Indiana service territory. To learn more about how to earn rebates to help increase energy efficiency in your home or business, visit duke-energy.com.

We are proud to be part of **Energizing Indiana** – a united effort by participating utilities and residents to promote energy efficiency and bring savings to communities across the state. Energizing Indiana programs are funded by utility rates and there are no separate fees to participate. For more information, visit energizingindiana.com.

Environmental stewardship


Duke Energy as a company continues to move toward a lower-carbon future through an aggressive power plant modernization program. By retiring old coal plants, deploying clean energy technologies and improving energy efficiency, the company is reducing the amount of carbon emitted per unit of electricity generated – a measure known as "carbon intensity."

With the latest developments in renewable energy, such as wind and solar power, and our use of new, advanced-technology coal and natural gas plants, Duke Energy is delivering on its promise to provide cleaner energy from a diverse mix of fuel sources.

Partnering to deliver energy

Duke Energy Indiana is a member of the Midcontinent Independent System Operators (MISO) network, along with electric utilities across 12 U.S. states and the Canadian province of Manitoba. As a member, Duke Energy Indiana is able to supplement its existing energy resources with short-term purchases of energy from the markets operated by MISO.

Duke Energy Indiana participates in MISO's transmission planning processes and is subject to MISO's overview and coordination requirements. Duke Energy Indiana performs internal and MISO-coordinated analyses of the transmission system to determine whether new or upgraded facilities are needed to maintain near- and long-term system reliability. This process has identified several projects that are planned for completion over the next few years.

2013 Integrated Resource Plan

Stakeholder Workshop #1

December 5, 2012
Plainfield, IN

Doug Esamann, President, Duke Energy Indiana

Welcome

Welcome

- Safety message
- Why are we here today?
- Objectives for stakeholder process
- Introduce the facilitator

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Why are we here today?

- Duke Energy Indiana starting to develop 2013 Integrated Resource Plan (IRP)
- Proactively complying with proposed Commission IRP rule
- Today is the first of four stakeholder workshops over the next 10 months

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Objectives for Stakeholder Process

- **Listen:** Understand concerns and objectives.
- **Inform:** Increase stakeholders' understanding of the IRP process, key assumptions, and challenges we face.
- **Consider:** Provide a forum for productive stakeholder feedback at key points in the IRP process to inform Duke Energy Indiana's decision-making.
- **Comply:** Comply with the proposed Commission IRP rule.

The Facilitator

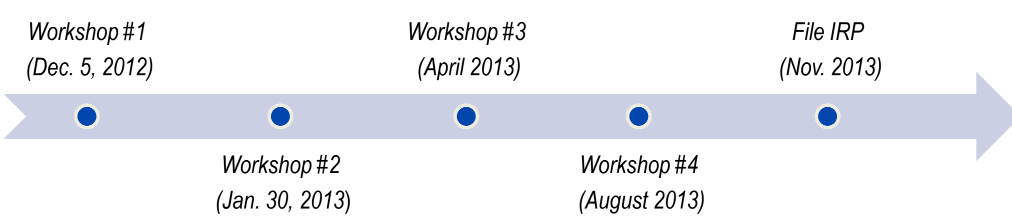
- Duke Energy Indiana hired Dr. Marty Rozelle of The Rozelle Group and her colleagues to:
  - Help us develop the IRP stakeholder engagement process
  - Facilitate and document stakeholder workshops

Marty Rozelle, President, The Rozelle Group

Agenda & Engagement Process Overview

Engagement Process Overview

- Third party, unbiased facilitator
- Involving stakeholders from the beginning of the IRP development
- Four stakeholder workshops
- Informative presentations and interactive workshop exercises
- Summaries on IRP website (www.duke-energy.com/in-irp)



Agenda

10:00	Welcome
10:15	Agenda & Process Overview
10:30	Introductions & Key Interests
10:45	Overview of the IRP Process & 2011 IRP
12:00	*Lunch*
12:45	Scenario Development & Analysis
1:15	Workshop Exercise
3:15	Wrap Up and Next Steps

Ground rules

- All agree to act in good faith with open minds
- Start on time and stay on schedule
- Raise your hand to be recognized by the facilitator
- Be concise and stick to the topics on the meeting agenda
- Respect others and do not interrupt
- Turn off phones

Introductions

- Participants
- Duke Energy

Duke Energy

Robert McMurry, Director, Midwest IRP

2011 IRP

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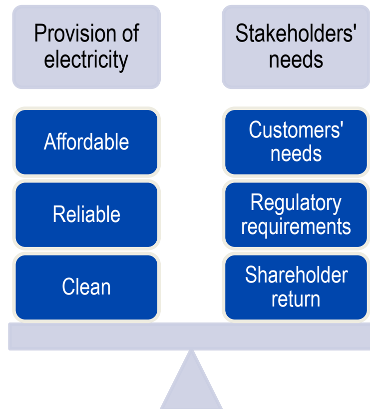
What is an Integrated Resource Plan (IRP)?

- Regulatory document detailing long-term strategy for meeting customers’ future electricity needs
- Balancing needs of different stakeholders
- Focused on providing affordable, reliable, and increasingly clean electricity



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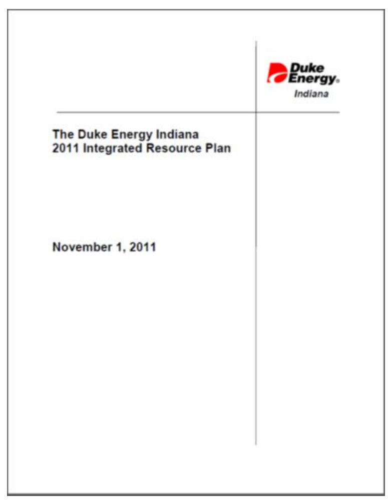
2011 IRP

- Filed last IRP Nov. 1, 2011
- Square miles: 22,000
- Customers: 782,000
- Portions of 69 counties including cities such as Bloomington, Terre Haute, and Lafayette, and parts of the suburban areas near Indianapolis, Louisville, and Cincinnati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The Duke Energy Indiana 2011 Integrated Resource Plan

November 1, 2011

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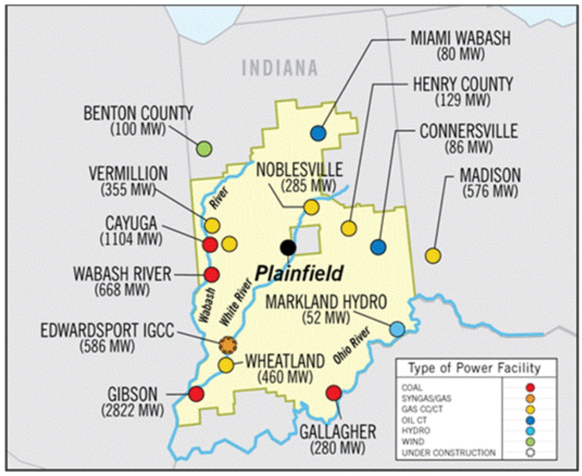
2011 IRP existing generation resources

- Coal
  - Gibson 1-5
  - Cayuga 1 & 2
  - Gallagher 1-4
  - Wabash River 2-6
- Combustion turbine
  - Cayuga 4
  - Connersville 1 & 2
  - Madison 1-8
  - Wheatland 1-4
  - Miami-Wabash 1-3, 5, 6
  - Henry County 1-3
- Combined cycle
  - Noblesville 2-5
- Run of river hydro
  - Markland
- Wind (PPA)
  - Benton County



Key assumptions

- Compliance with new EPA regulations
  - Air, water & by-products
- Energy efficiency
  - Commission Order – Approximately 9% reduction in retail energy use by 2021
- Fuel prices
  - Natural gas price approximately 25% lower than in 2009
- Load forecast
  - Lower due to recession
- Carbon constrained future
  - CO_2 Cap and Trade – $12/ton in 2016 increasing to $42/ton in 2031
- Renewables
  - State or federal requirement of 10% retail energy use by 2025
- Reserve margin
  - 14.2 % - Set by MISO

Resource retirements & additions since 2009 IRP

- Retirements
  - Coal - Retire Gallagher Unit 1 & 3 (280 MWs)
  - CT - Miami Wabash Unit 4 due to condition (17 MWs)
- Additions
  - CT – Vermillion (353.5 MWs)

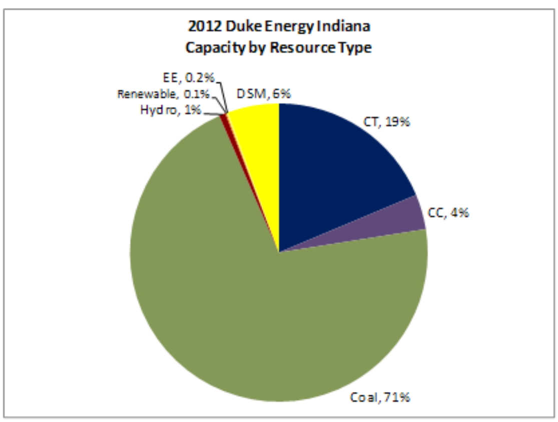
Overview of quantitative analysis: short term

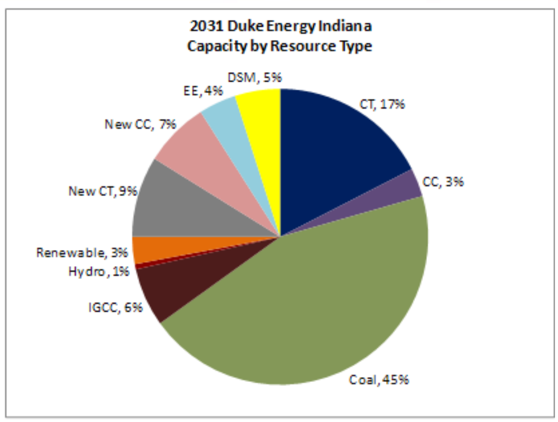
- Retirement of Wabash River 2-6
- First capacity need in 2015 due to Wabash River retirement
  - Plan shows best met with 325 MW Combined Cycle
    - Evaluating multiple options to meet need including purchase power, purchase existing generation, conversion of a coal unit to natural gas and company-owned generation
- Identified additional environmental controls at Gibson, Cayuga and Gallagher

Overview of quantitative analysis: long term

- Retirement of Miami Wabash and Connersville CTs in 2021 (placeholder)
- Full implementation of EE requirements in 2021
- Capacity needs met with CTs, CCs & renewables
- Nuclear may be an economic option post 2025 with more certainty around carbon

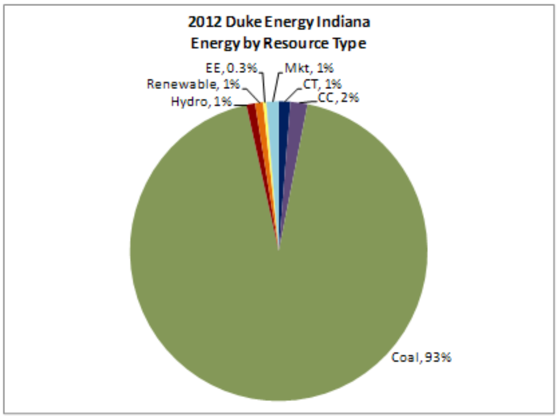
Changes in generation mix: capacity

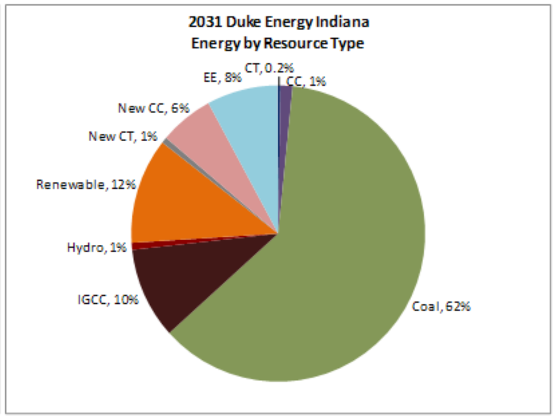




- Coal decrease (71% to 51%)
- Gas increase (23% to 36%)
- Renewables increase (1.1% to 4%)
- DSM & EE increase (6.2% to 9%)

Changes in generation mix: energy





- Coal decrease (93% to 72%)
- Gas increase (3% to 8.2%)
- Renewables increase (2% to 13%)
- DSM & EE increase (0.3% to 8%)

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Janice Hager, VP Integrated Resource Planning & Analytics

IRP Overview

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How does the IRP process work?

- Complex process involving input from many internal and external groups
- Some components mandated (e.g. MISO reserve margin requirement)
- Requires extensive modeling and analysis

Step 1: Gather data, develop input assumptions, screen technology & create scenarios → Step 2: Develop portfolios → Step 3: Analyze portfolios under various scenarios & identify preferred portfolio → Step 4: Create IRP report

Step 1: Data, assumptions, tech. screening & scenarios

Step 1 › Step 2 › Step 3 › Step 4

Stakeholder feedback (Dec. & January mtgs)

Gather data	Develop input assumptions	Screen technologies	Create scenarios
• Gather data such as: • Operational characteristics of existing generation • Anticipated retirement dates • Environmental regulations • Energy efficiency potential and costs	• Develop input assumptions including: • Fundamentals (commodity prices) • Load forecast • Capital costs • Environmental compliance costs	• Screen technologies to determine • Feasibility in service area • Technical limitations • Commercial availability	• Identify range of driving forces and input assumptions • Create & refine scenarios to use in Steps 2 & 3

Step 2: Develop portfolios

Step 1 | **Step 2** | Step 3 | Step 4

Stakeholder feedback
(April workshop)

Review scenarios
- Review scenarios and impact on fuel costs, energy and capacity markets, and load growth
- Determine range of sensitivities to consider

Use screening model
- Use optimization model to develop resource portfolio optimized for base case assumptions for each scenario

Analyze sensitivities
- Use optimization model to develop optimal portfolios under a range of sensitivities such as:
  - Fuel costs
  - Price of carbon
  - Load growth
  - Etc.

Review portfolios
- Review portfolios to develop several unique portfolios to analyze in detailed analysis phase (Step 3)

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Step 3: Analyze portfolios & identify preferred portfolio

Step 1 | Step 2 | **Step 3** | Step 4

Stakeholder feedback
(August workshop)

Analyze selected portfolios
- Use detailed production cost model to analyze robustness of portfolios under different scenarios and sensitivities

Qualitative analysis
- Consider qualitative factors such as:
  - Fuel and generation diversity (risk)
  - Environmental footprint

Identify preferred portfolio
- Identify the portfolio that performs best overall

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Step 4: Develop IRP report

Step 1 › Step 2 › Step 3 › **Step 4**

Develop draft report

- Work with internal groups to write sections of report
- Develop tables and appendices

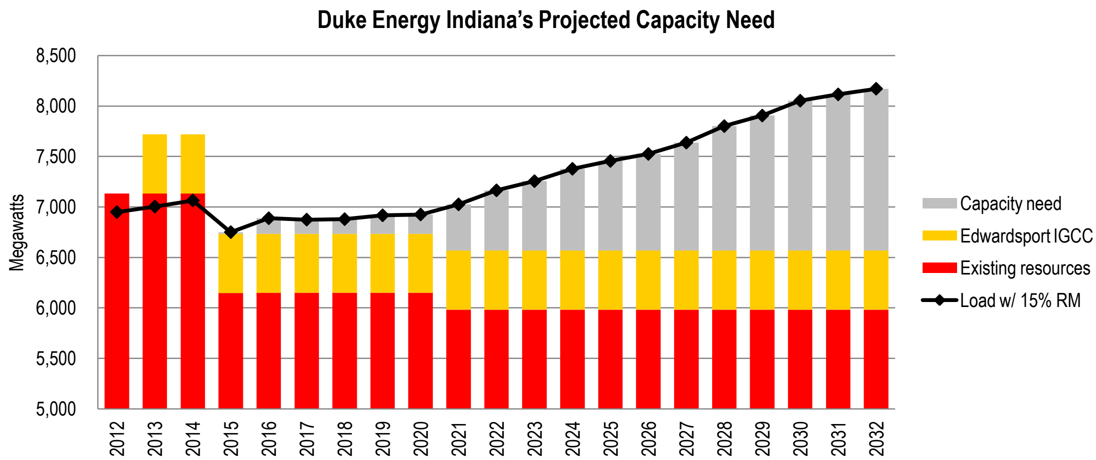
Management approval

- Gain approval and ensure the proposed plan meets all regulatory requirements

File report

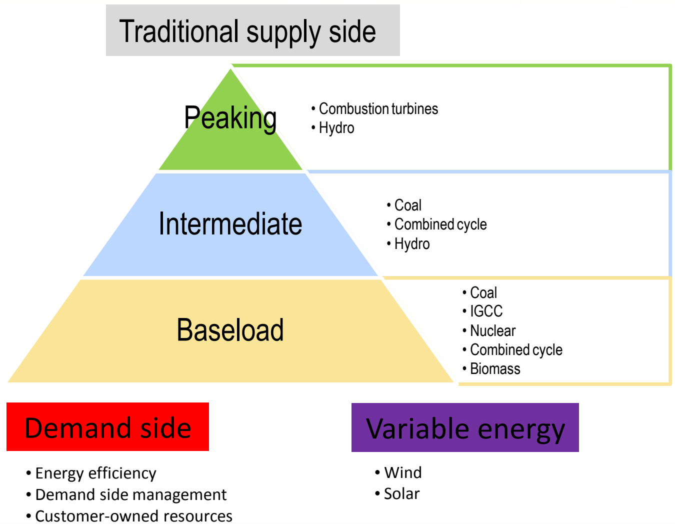
- File 2013 IRP by Nov. 1, 2013

IRP is about "filling the gap"



Many resource options… and many tradeoffs

- Resources categorized into 3 groups based on operational characteristics and ownership status
  - Traditional supply side
  - Demand side
  - Variable energy
- Different capital costs, ongoing fuel and maintenance costs, environmental footprints, operational characteristics and asset lives



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Robert McMurry, Director, Midwest IRP

Scenario Development & Analysis

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What are scenarios and why do we use them?

- Future is uncertain
- Scenarios are realistic views of what the world might look like over the next 20 years
- Scenario planning intended to make decision-making process more robust
- Preferred portfolio performs best overall across the multiple scenarios and sensitivities

How are scenarios used in the IRP process?

- Objective is to use scenarios to develop a robust preferred portfolio that serves as the foundation of the IRP

Step 1: Create scenarios

- Develop three to four scenarios that reflect realistic futures

Step 2: Develop optimal portfolio for each scenario

- For each scenario, develop an "optimal" portfolio of resources

Step 3: Analyze "optimal" portfolios & sensitivities for each scenario

- Analyze how the "optimal" portfolios compare between scenarios and the impact of sensitivities (fuel costs, load growth, impact of carbon, etc.)

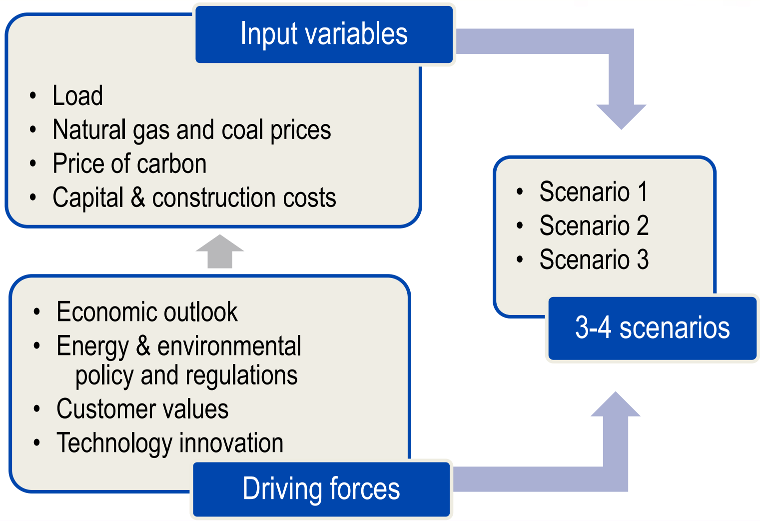
Step 4: Analyze results & identify preferred portfolio

- Use quantitative and qualitative analysis to determine which portfolio performs best overall across the scenarios (preferred portfolio)

Step 1: Create scenarios

Step 1 ➡ Step 2 ➡ Step 3 ➡ Step 4

- Identify driving forces and the resulting realistic range of input variables
- Develop 3-4 scenarios



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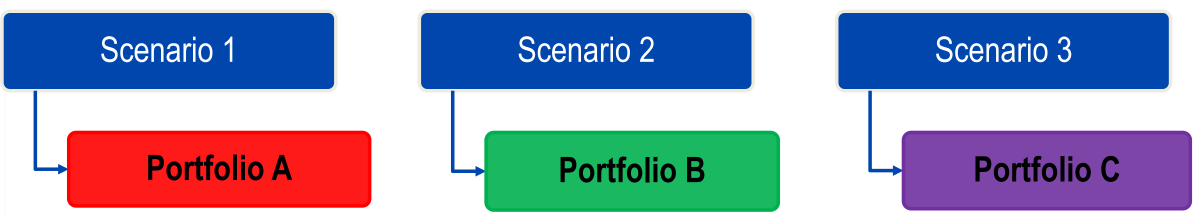
Step 2: Develop optimal portfolio for each scenario

Step 1 ➡ Step 2 ➡ Step 3 ➡ Step 4

- Use Capacity Expansion models (System Optimizer) to determine the lowest cost portfolio for each scenario



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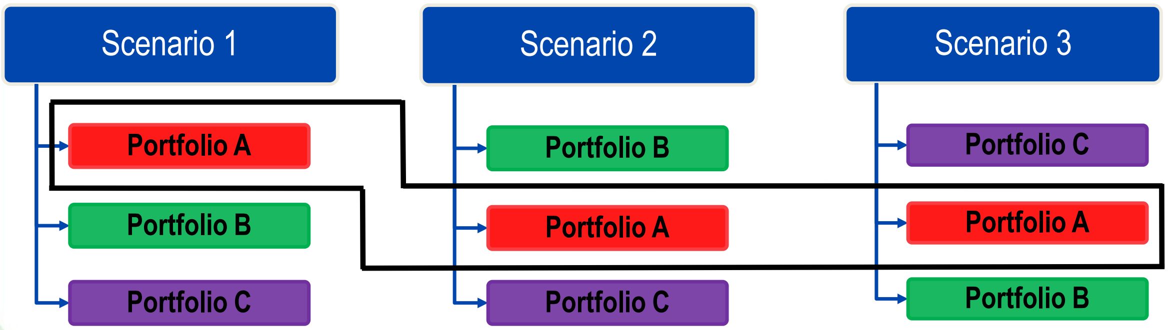
Step 3: Analyze optimal portfolios & sensitivities

Step 1 ➡ Step 2 ➡ **Step 3** ➡ Step 4



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Step 4: Analyze results & identify preferred portfolio

Step 1 ➡ Step 2 ➡ Step 3 ➡ **Step 4**

- Use quantitative and qualitative analysis to determine which portfolio performs best across all scenarios
  - Quantitative
    - Comparison of PVRRs of each portfolio and sensitivities for each scenario
  - Qualitative Factors
    - Environmental - Air, water and by-products throughout the planning horizon
    - Carbon – CO_2 footprint throughout the planning horizon
    - Financial impact considering ratepayers and shareholders

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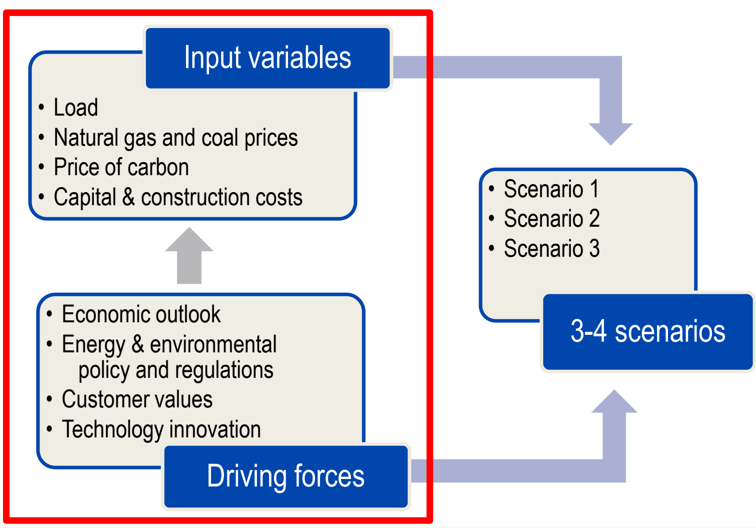
Brandon Snyder, Senior Engineer, IRP & Analytics

Workshop Exercise Background

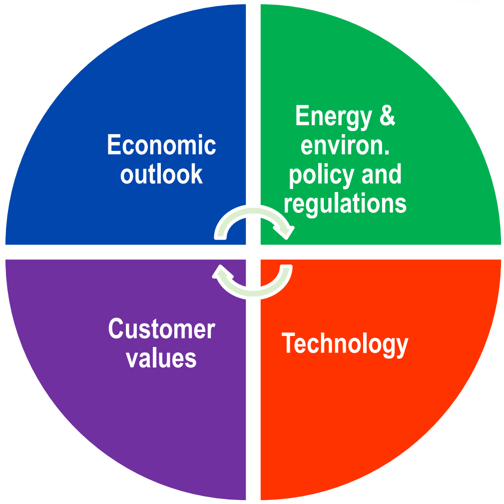
Workshop exercise: your thoughts on driving forces & input variables

- Today will solicit your thoughts on driving forces & input variables
- Will consider your input as develop scenarios over next two months
- Will present draft scenarios for your feedback at Jan. 30 workshop



What are the driving forces that influence the input variables?

Economic outlook
- Fiscal policies
- Economic growth
- Interest rates
- International trade policies



Energy & environmental policy and regulations
- Renewable energy
- Energy efficiency
- Air emissions
- Water & waste
- Nuclear

Customer values
- % income spent on electricity
- Usage per customer
- Environmental, health, and safety concerns
- Use of customer-owned resources

Technology
- Capital & construction costs
- Efficiency of existing technologies
- New technology development

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What are the key input variables represented in scenarios?

- Key input variables drive outcomes of models and quantitative analysis of portfolios
- In the workshop exercise, you will define a range of reasonable potential driving forces and resulting input variables, which will be considered when Duke Energy Indiana creates the draft scenarios

Key model input variables

Load growth | Coal prices | Natural gas prices | Price of carbon | Capital & construction costs

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Example

Driving forces

- Economic outlook: 2-3% annual economic growth based on moderate recovery
- Energy & environmental policy and regulations: GHG regulations passed in 2020; EPA continues trend of stricter regulations for fossil generation; Policy encouraging greater adoption of EE & renewables
- Customer values: Primary focus on cost through 2020; 2021+ increasing focus on environment and health concerns leads to greater adoption of customer-owned resources
- Capital and construction costs: Price spike in gas turbine industry; Renewable innovations drive costs lower throughout planning horizon

+

Impact on input variables

- Load: Grows at 1.0% annually
- Natural gas prices: Remain stable due to shale reserves ($5-6/MMBtu) in near term
- Coal prices: Flat near-term due to low gas prices, long-term dependent on exports
- Price on carbon: Cap & Trade or $15/ton growing at 8% 2020-2050 or Clean Energy Standard (i.e. 30% clean energy by 2030)
- Capital & construction costs: Cost increase in near term for gas turbine technologies; Cost decrease 10-20% over planning horizon for renewable technologies

→

Scenario

- The economy recovers moderately. Energy and environmental policies and regulations continue to slowly support cleaner sources of energy. Customers continue to focus on cost with a slight trend towards a greater focus on health and environmental concerns. Limited new capacity is needed in the short term due to EE requirements and low load growth.

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Marty Rozelle, President, The Rozelle Group

Workshop Exercise

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Driving forces exercise: groups

In your group:

- Select notetaker/spokesperson
- For each driving force discuss:
  1. Does it make sense?
  2. Are any missing?
  3. What are the range of realistic futures for each over the next 20 years (2012-2032)?

Input variables exercise: individual

Individually complete both sides of the worksheet.

1. What do you think are the most realistic states for the driving forces over the next 20 years (2012-2032)?
2. What is a realistic range of input variables resulting from the driving forces in 2032?

Next Steps

- Next workshop Jan. 30
  - Topics you'd like to learn more about?
  - Suggestions/comments on workshop structure?
- Meeting summary and presentations will be posted on website (www.duke-energy.com/in-irp)
- Please complete comment cards or send to Alanya by Dec. 15 at: alanya.schofield@duke-energy.com
  (Use email subject line "2013 IRP STAKEHOLDER")

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2013 Integrated Resource Plan

Stakeholder Workshop #1

December 5, 2012
Plainfield, IN

Appendix

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“Demand side” resources

- “Behind-the-meter”
- Reduce Duke Energy Indiana’s load

Energy Efficiency

- Reduces peak load and overall energy demand
- Low capital and operating costs
- Dependent on customer adoption
- Program costs vary

Customer-owned resources

- Depending on technology, reduces peak load and overall energy demand
- Potential grid interconnection concerns
- Can’t be controlled or “dispatched” by utility

Demand side management

- Used to reduce peak load
- Relatively inexpensive but need to balance cost and customer reliability preferences
- Costs escalate with increased use

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Baseload resources

- Provide 24x7 power
- Efficient, but limited operational flexibility

Integrated gasification combined cycle (IGCC)

- Baseload resource
- Abundant fuel source in Indiana (coal)
- Lower emissions than other coal tech.
- Technology currently being scaled
- Ability to capture carbon (with additional equipment additions)

Coal

- Baseload and intermediate resource
- Abundant fuel source in Indiana
- Traditionally lowest cost generation
- Higher air emissions and solid waste than other resources
- Option to put environmental controls on existing units to reduce non-CO_2 emissions

Nuclear

- Baseload with highest capacity factor
- No air emissions
- Large water use
- Spent fuel storage issues
- High construction cost
- Very low fuel and energy costs

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Intermediate & peaking resources

- Used when high demand for electricity
- Faster response time

Combustion turbine

- Primarily used for peak capacity needs
- Low capital cost but less efficient than CC
- Natural gas prices historically volatile but recent technology has resulted in abundant supply

Combined cycle

- Versatile - Used for intermediate and increasingly baseload
- Higher capital cost but more efficient than CT
- Natural gas prices historically volatile but recent technology has resulted in abundant supply

Hydro

- High construction costs
- Very inexpensive energy cost
- Depends on flow of river
- Difficult to site and license new facilities

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Variable energy resources

- Variable nature of resources makes it challenging to incorporate into system
- Can't control or "dispatch" resource

Wind
- Variable output and not well aligned with peak demand
- No emissions
- No fuel costs
- Low maintenance costs
- Currently driven by incentives in many markets

Solar
- Variable output, but better aligned with peak than wind
- Relatively high upfront capital cost
- No fuel cost
- Low maintenance costs
- Currently heavily driven by incentives

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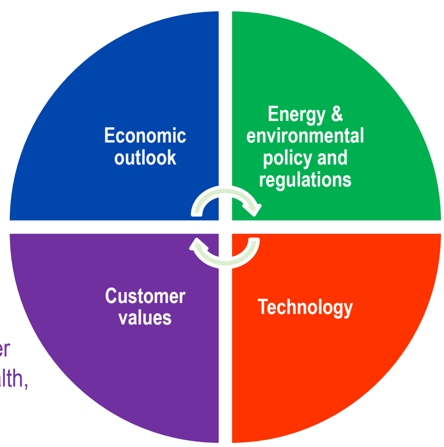
Driving forces exercise: groups

1. Do you understand each driving force?
2. Do they make sense?
3. Are any missing?
4. What are the range of realistic futures for each in 2032?

Economic outlook
•Fiscal policies
•Economic growth
•Interest rates
•International trade policies

Customer values
•% income spent on electricity
•Usage per customer
•Environmental, health, and safety concerns
•Use of customer-owned resources



Energy & enviro. policy and regulations
•Renewable energy
•Energy efficiency
•Air emissions
•Water & waste
•Nuclear

Technology
•Capital & construction costs
•Efficiency of existing technologies
•New technology development

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Input variables exercise: individual

- Individually complete both sides of the worksheet
- What do you think are the most realistic states for the driving forces in 2032?

Key model input variables

Load growth	Coal prices	Natural gas prices	Price of carbon	Capital & construction costs
• 1% growth per year	• $2/MMBtu, growing to $4/MMBtu by 2032	• $3/MMBtu, growing to $10/MMBtu by 2032	• $15/metric ton in 2020, $45/metric ton in 2032	• CC/CT costs increase 10% in near term • Renewable costs decrease 10-20% over planning horizon

Duke Energy

Summary
December 5, 2012

- Agenda

Welcome

Mr. Doug Esamann, President of Duke Energy Indiana, welcomed participants and explained that their ideas and suggestions will be considered in preparing the 2013 Integrated Resource Plan (IRP). He outlined the objectives of the stakeholder outreach program that begins with this workshop and expressed his appreciation to those who attended.

- Slides 1 - 6

Agenda & Process Overview

Dr. Marty Rozelle, the facilitator for the meeting, reviewed the proposed stakeholder engagement process and outlined the agenda and meeting ground rules.

- Slides 7 - 11

Participants and Duke Energy staff were asked to introduce themselves and briefly stated their interest in the IRP process.

Duke Energy staff involved in preparing the 2013 IRP presented a description of the process and major components, as described below.

Overview of 2011 IRP

Robert McMurry - Director, Midwest IRP

- Mr. McMurry reviewed the main features and elements of the most recently filed 2011 IRP and said that the 2013 IRP will be similar in approach and content, but will include the evaluation of multiple scenarios. Shale gas, which dramatically drove down the cost of natural gas from 2009 to the present, will likely continue to be a major driver in future IRPs. Mr. McMurry also stressed that the way in which carbon is regulated or legislated in the future will impact many aspects of the IRP (the 2011 IRP assumed a carbon-constrained future). Also, though the potential of new nuclear generation was not a part of the 2011 IRP, it could have a place in a carbon-constrained future. Duke Energy Indiana also assumes full implementation of energy efficiency goals by 2020.

- Slides 12 - 21

Questions from participants included the following:

Q. In the 2011 IRP, what was the GWh of EE assumed by 2030?

3500 GWh

Q. What is 11.9% energy efficiency in terms of MW?

345 MWs in 2020.

Q. Does wind generation assume a constant capacity factor over 20 years, or build in technological changes?

We use averages throughout the year, same factor every year.

Q. What are you saying about distributed generation and solar storage?

Technology needs to be commercially available to be considered, as well as cost effective; therefore, storage technologies were not considered in 2011.

Q. Will we have an opportunity to review confidential data /model inputs on cost assumptions for this process, to better follow Duke's methodology? We understood that the purpose of this process was to have stakeholders understand and have access to data used as inputs – and allow stakeholders to offer data – so there is a common understanding among all, and reduce possibilities of intervention and contention at the Commission for filings.

Duke Energy Indiana will carefully evaluate how data can be shared and what data can be made available. We most likely will not be able to offer confidential assumptions that are considered trade secrets, but will strive to find comparable and representative publicly-available data to serve as a proxy.

Q. Does Duke understand the new Commission rule to include substantive changes as well as process changes?

Absolutely. This is a learning process for us too.

IRP Overview

Janice Hager – VP Integrated Resource Planning & Analytics

Ms. Hager explained the planning process used in developing an IRP. She noted that the forecasting models are exceptionally complex. In the screening phase, Duke Energy inputs assumptions that result in portfolios. In the analysis phase, portfolios are analyzed under different scenarios to see which performs best overall. Environmental variables and other qualitative factors are also evaluated in making decisions. In this process, Duke Energy must use judgment in evaluating which sensitivities will make a difference.

- Slides 22 – 29

Questions for Ms. Hager included the following:

Q. Will Duke be placing a 2% reduction for energy efficiency (Order 42693) in the IRP? Will it be an input or an output?

We will ensure that the IRP includes, at a minimum, energy efficiency sufficient to meet the Commission's requirements. Additional clarification: It will be an input if the output (what is selected by the models) doesn't meet the Commission's requirements.

Q. If we get to August and the stakeholders don't agree with results, is there time to re-do the analysis?

We wouldn't want to completely redo the analysis, but there will be time for adjustments before the November 1st IRP filing. Interim workshops should help to make sure assumptions are commonly understood.

Q. Is the Midwest Independent Transmission System Operator, Inc (MISO) reserve margin commonly accepted, or do utilities have flexibility?

States can develop their own reserve margins, but as far as we know all states use the MISO reserve margin.

Q. How can stakeholders submit data to Duke for use in creating these scenarios? Is there a process?

That process starts today. You can use your comment sheet for citations, or submit via email or other methods.

Q. What is the distinction between the methodology for the 2011 plan versus the 2013 plan? Will it be different, i.e. more sensitivities/variation?

We won't be doing unlimited sensitivities, but may have more full-blown scenarios with major inputs. Key drivers and inputs are the most important, and we want to make sure we have all the relevant ones.

Q. What is the optimization framework today compared to historic ones? Are assumptions used unique to Duke Energy Indiana, or are they integrated with other utilities and common to the greater market, for example, optimized among Indiana, Ohio, and Kentucky?

We use similar processes across jurisdictions but use inputs relevant to each state. We plan for Indiana using Indiana generation only (not from Ohio, etc.) and using MISO standards.

Q. How does qualitative analysis inform the selection of the final portfolio?

It's more "art" than "science". We will explore this topic more in future workshops.

Q. When does Duke look at macro-economic and socio-political considerations?

In scenario development, starting today and continuing in the January stakeholder meeting.

Comment: On the resource mix graphic, solar should be included in peaking as well as variable energy. We'd like to see peak load demand data, as well as where solar is in the territory to see how it matches up.

Comment: Don't lump solar and wind. They are very different and have different operating characteristics and purposes. Response: they are modeled separately.

Q. What type of biomass fuels do you model for?

Woody biomass and landfill gas with micro-turbines (for baseload). However, sources are limited.

Q. Why not use animal waste? They have anaerobic digesters in Northern Indiana Public Service Company (NIPSCO) territory and will share information with Duke.

Energy from hog waste is part of the Renewable Energy and Energy Efficiency Portfolio Standard in North Carolina, and so such energy is included in Duke Energy Carolinas IRP, but it's not cost-effective.

Q. On the capacity need chart, the implication is that this means "generation."

Not necessarily

Comment: Suggested calling it “demand forecast” rather than “load forecast”. We need more serious consideration of energy efficiency, e.g. Pacific Northwest says 85% of new need can be met by energy efficiency (citation later provided).

Comment: A participant questioned increase in demand after 2020, which hasn’t historically happened after a decrease or flat period.

Answer: The increase seen on the slide appears more significant than it is due to the scale on the slide. We will provide more information on load forecast at future meetings.

Q. What is the basic methodology for quantifying the Combined Heat and Power (CHP) potential?

We will need to discuss this more in future meetings.

Scenario Development and Analysis

Robert McMurry

Mr. McMurry explained the process of creating scenarios, developing an optimal portfolio for each, performing sensitivity analyses, and identifying a preferred portfolio to be included in the IRP. He outlined how driving forces in global and national issues directly affect the assumptions made in developing alternative scenarios, and noted that discussion of these driving forces is the subject of discussion among participants today.

- Slides 30 - 36

Questions and comments on this presentation included the following:

Q. Comment: Look at Tennessee Valley Authority’s IRP. Their approach is “backwards” from Duke’s, in which they developed portfolios and then 8 scenarios that they ran the portfolios through.

Duke Energy will look at this approach to see if it can lead to similar results.

Q. How is Duke going to use macro-factors in scenario development? For example, global warming shouldn't be in the regulatory risk category but should be recognized as a geophysical phenomenon that has real physical and cost impacts to infrastructure, due to such factors as drought, water levels and flows in shallow Indiana rivers. What does it mean in the competition for social capital among utilities? What percent or amount of capital investment should be focused on this issue?

We can discuss stakeholder ideas about how we could measure or evaluate this. New York State was mentioned as an example of possible new regulations that can be researched.

Comment: A suggestion was made to conduct modeling for more severe conditions and disasters (e.g. Hurricane Sandy). This is one more reason to consider distributed generation.

Q. What does "Midwest IRP" mean in Bobby's job title?

It means he's responsible for developing IRPs for Indiana, Kentucky, and Ohio.

Q. Are Duke's IRPs and assumptions consistent across regions?

Yes, increasingly so as we expand to more states, but there are also state- and regional-specific standards where appropriate.

Comment: Owen Smith of Duke was mentioned as a resource (Carolina IRP), as he is a Board member of Solar Electric Power Association (SEPA). Duke should take advantage of their data and resources, since you are members.

Workshop Exercise Background

Brandon Snyder - Senior Engineer, IRP and Analytics

Mr. Snyder described the driving forces and input variables that will be used in developing the IRP and gave definitions and examples of them as background for participants to use in the workshop exercise.

- Slides 37 - 41

Workshop Exercise

Dr. Marty Rozelle instructed participants to answer the following questions about each driving force in their small group discussions.

- Do they make sense?
- Are any missing?
- What is the range of realistic futures for each over the next 20 years?

A spokesperson for each table reported to the entire group. The comments are summarized below. Participants were encouraged to complete individual worksheets on driving forces and input variables as well as a comment form that will help improve future meetings.

Closing comments from Mr. Esamann

Mr. Esamann thanked participants for coming. He assured them that Duke Energy Indiana wants to hear their opinions, whether consistent or not with the company's. This is the first step of a four-step process. Please let us know your comments and ideas on the process. Put January 30th on your calendar for the next workshop. This has been very valuable to Duke Energy Indiana, and we hope it was for you as well.

Driving Forces

Detailed Table Reports taken from flip charts and verbal presentations

Group 1

Economic Outlook:

- Entitlement spending up, tax burden up, lower disposable income
- Rising labor productivity + strong intellectual property rights = manufacturing retention and attraction increases
- Reduced private capital pool causes more government-financed projects = demand growth
- Higher interest rates affect capital costs

Energy and Environmental Factors:

- Continuity of already-promulgated regulations
- Coal will be regulated as a solid waste, not hazardous waste.
- Federal renewable incentives
- Solid waste and coal ash regulations
- Incentives for CHP

Customer Values:

- Customers will "push back" on electricity/gas/petroleum if costs reach 12% of disposable income
- Greater interest in customer self-generation, including solar and wind
- Energy consumption per capita = flat to slightly higher

Technology (most important driver, impacts policy and IRP most):

- Renewable energy capital cost will decrease faster than traditional technology costs due to global demand.
- Whether renewable or coal, cost decreases due to:
    - Lower fuel component costs
    - Higher labor productivity = lower labor costs
    - Cost of private capital goes down faster than traditional

- Smart grid technology costs will decrease.
- Storage technology helps solar
- Use of more gasification technology at landfills.
- Traditional central station vs. distributed generation (DG) paradigm

Group 2

Economic Outlook:

- Near term = flat growth, little spike in GDP in short term, but overall economy stays relatively flat (or bumpy) for plan period
- Could have a spike, but overall less than 2% growth through 2032
- Interest rates and access to capital
  - Stay low in short term
  - Credit-worthy entities will be OK, have access to capital
  - Interest rates long-term go up after about 5 years
  - Some spikes in inflation after that

Energy and Environmental Factors:

- New coal plants highly unlikely - continued decline of coal, either with or without a CO2 tax.
- Low gas cost
- Government incentives or mandates will push more energy efficiency
- Increased regulation and cost of carbon (at federal level) but not in Indiana.
- Compliance costs associated with air, water and waste will affect new generation choices.

Customer Values:

- Young people are more exposed to energy efficiency, new technology, environmental awareness – but they won't want to give up their gadgets.
- Customer-owned generation will go up as financing is made available and/or costs go down.

Technology:

- Demand-related
  - Smart grid
  - Building efficient technologies (renewable)
  - LED lighting & cooling
- Supply-related
  - Storage as a complement to renewable

- Biomass from waste (water)
- Environmental controls keep existing units running

Table 3

Economic Outlook:

- Competition and deregulation
- Desire for modular, smaller increments
- Distributed generation
- Uncertainty and cyclicality
- International trade and manufacturing
- Global geo-political events can pop up
- Distinguish between GDP growth and load growth

Energy and Environmental Factors:

- Increased competition and deregulation in energy policy.
- Future of carbon regulations - Carbon constraint is very important.
- Natural gas prices are very important.
- More use of natural gas to generate electricity – by customers to save money
- Political conflict and gridlock in short term creates uncertainty in environmental policy.

Customer Values:

- Desire for personal energy independence
- Want more choices and competition to control costs
- Increased interest in environmental issues/savings among some (e.g. Google wants "green energy" to locate facilities), and others just wanting cheapest electricity.

Technology:

- Storage technology will be game-changer.
- Micro-grid movement
- DC over AC
- Solar photovoltaic to reduce peak load - pricing for solar PV (e.g. fee-in tariffs)

Group 4

- Suggested that climate change should be included as a driving force (availability of water).
- Prioritized the driving forces as follows:

Technology:

- Centralized vs. decentralized resources

- Micro-grid possibilities
- Photovoltaic
- Compressed air
- Battery storage
- Electric vehicles as resource
- Expansion of smart grid

Economic Outlook:

- 1% on low end
- 3.5% on high end

Energy and Environmental Factors:

- Need to consider politics at national level
- Greenhouse gas (GHG) regulation in next 10-15 years
- No Renewable Portfolio Standard (RPS) in foreseeable future
- Some incremental federal legislation

Customer Values:

- Don't believe this is easily quantified; however, customer adoption will drive all other drivers.
- Increased interest in environmental issues/savings among some, and others just wanting cheapest electricity.

(Group 3 notes on Input Variables)

Load Growth:

- -3 to +3%
- Decoupling of GDP and energy growth

Coal Price:

- Rise of middle class in China = export coal to China

Natural gas price:

- Volatile, but increases over 20-year period
- Depends on viability of syn-gas from coal

Price of carbon:

- Implied price of carbon
- Active carbon market in Europe
- OFA influence in next four years vs. how much of Koch brothers' influence

Capital & Construction Costs:

- Retirement of old coal plants
- What Deutsche Bank says about appetite for financial risk
- Smaller units with shorter lead times to bring online
- “Fiscal cliff” debate and resolution of U.S. debt

Notes prepared by: Debra Duerr, The Rozelle Group Ltd.

2013 Integrated Resource Plan

Stakeholder Workshop #2

January 30, 2013
Plainfield, IN

Janice Hager, Vice President- IRP & Analytics, Duke Energy

Welcome

Welcome

- Safety message
- Why are we here today?
- Objectives for stakeholder process
- Introduce the facilitator

Duke Energy

Why are we here today?

- Duke Energy Indiana developing 2013 Integrated Resource Plan (IRP)
- Proactively complying with proposed Commission IRP rule
- Today is the second of four stakeholder workshops

Duke Energy

Objectives for Stakeholder Process

- **Listen:** Understand concerns and objectives.
- **Inform:** Increase stakeholders' understanding of the IRP process, key assumptions, and challenges we face.
- **Consider:** Provide a forum for productive stakeholder feedback at key points in the IRP process to inform Duke Energy Indiana's decision-making.
- **Comply:** Comply with the proposed Commission IRP rule.

The Facilitator

- Duke Energy Indiana hired Dr. Marty Rozelle of The Rozelle Group and her colleagues to:
  - Help us develop the IRP stakeholder engagement process
  - Facilitate and document stakeholder workshops

Marty Rozelle, President, The Rozelle Group

Agenda & Introductions

Duke Energy.

Engagement Process Overview

- Third party, unbiased facilitator
- Involving stakeholders from the beginning of the IRP development
- Four stakeholder workshops
- Informative presentations and interactive workshop exercises
- Summaries on IRP website (www.duke-energy.com/in-irp)

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Agenda

9:30	Welcome
9:40	Agenda & Introductions
9:55	Workshop #1: Follow Up
10:15	Energy Efficiency & Demand Response
11:00	Renewable Energy
11:45	*Lunch*
12:30	Draft Scenarios
1:45	Workshop Exercise
3:15	Wrap Up and Next Steps

Duke Energy.

Ground rules

- All agree to act in good faith with open minds
- Start on time and stay on schedule
- Raise your hand to be recognized by the facilitator
- Be concise and stick to the topics on the meeting agenda
- Respect others and do not interrupt
- Turn off phones

Duke Energy.

Introductions

- Participants
- Duke Energy

Marty Rozelle, President, The Rozelle Group

Workshop #1 Follow Up

Feedback from Workshop #1

- Received variety of feedback on the process and content
- Working to balance stakeholders' requests and Duke Energy's workload and costs
- Will ask for feedback again at the end of today's workshop

Suggestions for improving the next workshop or the stakeholder engagement process

We heard from you…	Our response
No, I think this meeting went well/met expectations. (2)	Great! This was our goal.
Location. Preferences for both Plainfield & Indy. (4)	Plainfield facility is better suited for these meetings in terms of size, parking, etc., so decided to hold second workshop here.
Send agendas out earlier.	Sent out one week in advance.
Fix sound system.	IT tested it and system fixed. IT person will be on hand at beginning of mtg.
Get copies of presentations or other materials beforehand. (3)	Copies of today's presentation are at the registration table. Other background materials were sent out to registered attendees one week in advance.
Prior to the meeting, be specific about any input you want from stakeholders.	Agenda and draft scenarios were sent out to registered attendees one week in advance.
Provide Wi-Fi and live streaming/video recording.	Sorry for the confusion last time. A Wi-Fi hot spot has been provided. It is very costly to record/live stream, so decided not to. Will include a meeting summary on the website (www.duke-energy.com/in-irp).
Invite other individuals.	Participants are welcome to directly invite other stakeholders.

Advice to Duke Energy Indiana about the stakeholder engagement process

We heard from you…	Our response
Continue communication/information exchange between meetings. Continue to solicit input from stakeholders. (3)	Will share information as feasible. You can provide thoughts or share data with us at 2013INIRP@duke-energy.com.
So far, so good. Very good effort. (2)	Great! This was our goal.
More hypothetical examples. (2)	Will build this into future presentations as applicable.
Make sure to respond to all suggestions and inputs; explain how used and why not used.	To the extent possible, we will respond to some suggestions during the current or subsequent workshops. Other responses will be documented in the IRP.
More information about cost or other data that is considered confidential.	We will not share confidential data that represents trade secrets or would jeopardize our operations or financial position. Will provide publically available proxies for confidential information when possible.
Be more transparent – Don't assume all participants have enough understanding of IRP process to make "exercises" useful.	Specific suggestions on how to do so would be appreciated. We intend to make the exercises applicable to all levels of knowledge and interest while still providing Duke Energy with relevant feedback.

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Specific topics to be addressed and discussed at the January workshop or at subsequent meetings

We heard from you…	Our response
More analysis and consideration about DSM and EE. (4)	Covered today.
Assumptions on renewable energy. Relationship between Regulated Renewables group (Owen Smith) and IRP. (2)	Covered today.
List of variables and input values and assumptions. (2)	Will cover through the workshops as possible. Will provide proxies for confidential data.
A mock-up of some unique portfolios and how Duke applies the "art" of selecting. How use quantitative analysis in selection of portfolio. (2)	April
Impacts of climate change and infrastructure robustness/resilience.	We included these themes in the draft scenarios and can discuss today.
How Combined Heat and Power (CHP) will be quantified/modeled.	We are in the process of considering this and welcome your input.
From other participants. (What is the mechanism for access to any information provided by stakeholders? Will it be available via website?)	If interested, indicate on your comment card or email 2013INIRP@duke-energy.com to let us know that you would like to be on a list serve for participants to share information with each other.

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Michael Goldenberg, General Manager, Customer Planning & Analytics

Energy Efficiency & Demand Response

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What is Energy Efficiency (EE)?

- Using less energy to provide the same or an improved level of service to the energy consumer in an economically efficient way
- Includes elements such as:
  - Upgrades to more efficient air conditioning/HVAC systems
  - Replacing lighting with higher efficiency lights such as compact florescent lights or light emitting diodes
  - Installing programmable home thermostats
  - Insulating buildings

Duke Energy

What is Demand Response (DR)?

- Demand Response is a set of programs that results in a reduction of electrical demand at peak times.

<u>Examples of Demand Response</u>

- A/C and water heater direct control
- Interruptible contracts
- Contracts to run back-up customer generators

What are the regulatory requirements for EE?

- Generic Phase II Order (Dec. 2009)
  - Requires all jurisdictional utilities to offer five Core Energy Efficiency (EE) Programs through a single statewide Third Party Administrator (TPA)
  - Also mandated a target percentage of each utility's kWh sales in energy efficiency impacts
  - Target increases every year from 2010 – 2019 reaching a cumulative total of 11.9%
- To comply with the mandate, Duke Energy Indiana has a bifurcated portfolio of programs
  - Core programs
  - Core Plus programs

What are the Core and Core Plus programs?

- Core Programs are offered by the Third Party Administrator
  - Home Energy Audit
  - Income Qualified Weatherization
  - School Education
  - School Assessment
  - Residential Lighting
  - C&I Rebate
- Core Plus Programs are offered by Duke Energy Indiana
  - Power Manager
  - Residential Smart $aver
  - MyHome Energy Report
  - Appliance Recycling
  - Personalized Energy Report
  - Agency Assistance Portal
  - Tune & Seal
  - Property Manager CFL
  - C&I Smart $aver Prescriptive
  - C&I Smart $aver Custom

Duke Energy.

How are EE programs evaluated?

- Cost-effectiveness is the primary metric
- DSMore™
  - Financial analysis tool used to evaluate the costs, benefits, and risks of energy efficiency programs and measures
  - Forecasts the value of an energy efficiency program at hourly level across distributions of weather and/or energy costs or prices
  - Analyzes cost effectiveness at measure, program and portfolio level
- Use a number of tests to determine cost effectiveness and ensure that EE programs are compared to supply-side resources on a level playing field
  - Participant Test facilitates marketability:
    - Includes bill savings versus incremental customer costs
  - UCT compares utility benefits to utility costs:
    - UCT does not consider other benefits such as participant savings or societal impacts

Duke Energy.

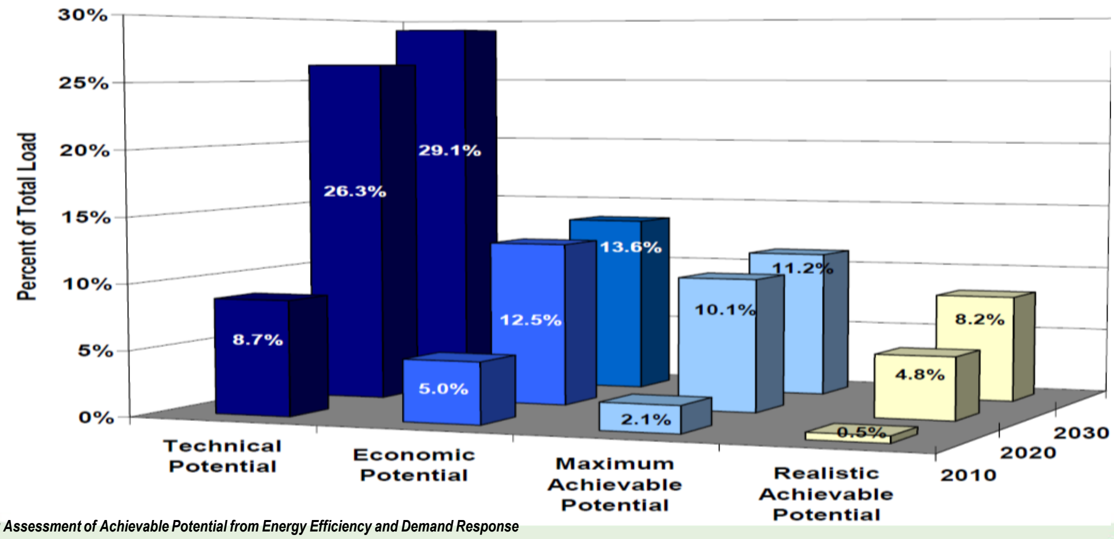
How is EE Evaluated, Measured & Verified (EM&V)?

- An independent third party:
  - Determines energy impact estimates achieved from EE and DR programs
  - Measures program performance
  - Verifies installations
  - Evaluates customer satisfaction
- Core Programs
  - DEI is a member of the DSMCC EMV subcommittee overseeing the state evaluator
- Core Plus Programs
  - DEI contracts an independent third party evaluator

What are the key EE assumptions that will be in the 2013 IRP?

- Will follow the IRP rule requirement by subtracting EE (and DR) from the load forecast
  - There are no planned reserves for EE and DR because it is not treated as a resource.
- Projections for EE assume compliance with the Commission Phase II mandate
- The load forecast also includes an ongoing level of EE embedded in its projections
  - Items such as increases in appliance efficiencies, changes in Federal regulations and naturally occurring energy efficiency on behalf of customers are part of the embedded projections
- To assess the reasonableness of increasing the energy efficiency impacts beyond that level, will rely on a 2010 Electric Power Research Institute (EPRI) study

What are EE potential estimates as a percentage of load?



Source: Assessment of Achievable Potential from Energy Efficiency and Demand Response Programs in the U.S. (2010–2030) Technical Report, January 2009

Duke Energy.

What are the key DR assumptions that will be in the 2013 IRP?

- Demand Response only impacts the peak of the load curve and all reductions are in kW
- Approximately 9.0% of peak load covered by demand response in 2012 and project having 9.6% in 2019
- There are 5 DR programs in the portfolio
- Does not assume any Advanced Metering Infrastructure (AMI)

<u>Residential</u>

- Power Manager

<u>Commercial & Industrial</u>

- PowerShare® Call Option
- PowerShare ® QuoteOption
- Special Contracts
- Market Based Demand Response Rider

Duke Energy.

How are EE and DR modeled in the IRP?

<u>EE</u>

- EE primarily influences energy volumes with less of an impact on peak demand
- Use an hourly profile of EE impacts that is subtracted from hourly load forecast prior to consideration of supply-side resources
- Will evaluate the economics of longer-term EE programs once we have an updated Market Potential Study later this year

<u>DR</u>

- DR primarily influences peak demand with little impact on energy
- Modeling of contractual interruption/strike price imitations to allow IRP models to determine optimal deployment to reduce peak demand/lower cost

Challenges

- Future programs and participation levels are unknown
- The cost of EE in the future is uncertain
  - As current program participation reaches cost effective saturation point, new programs at increasing amount of EE impacts have increasing costs over time
  - This is different from modeling CTs or CCs, which have fairly constant costs
  - Post 2019 EE levels difficult to project and will be dependent on the economic potential, adoption rate, load growth and future carbon policies.

Andrew Ritch, Director, Renewable Strategy & Compliance

Renewable Energy

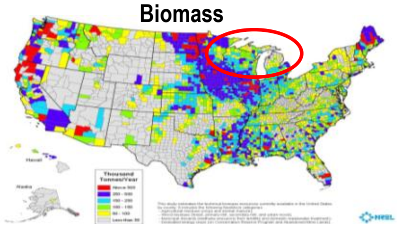
What is renewable energy?

- Electricity that comes from natural, sustainable resources
- Includes technologies such as:
  - Wind
  - Solar (PV and CSP)
  - Hydro
  - Biomass
  - Landfill gas
  - Geothermal
  - Animal waste

Renewable resources vary by region

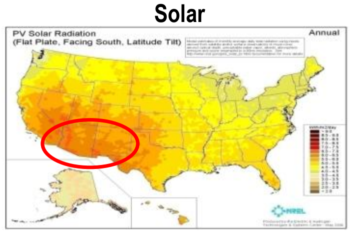
Onshore Wind

Biomass



Offshore Wind

Solar



Source: www.nrel.gov

- Significant impact on feasibility, cost, policy design
- Connecting regions with best resources to regions with highest electricity usage requires significant investments in transmission

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We see a few key trends in renewables

Solar photovoltaic (PV)

Pros: Downward trending on panel prices
Cons: Remains at a premium to other renewables

Woody biomass

Pros: Cost effective with a load profile similar to baseload capacity
Cons: Regulatory challenges

On-shore wind

Pros: Continues to dominate national development
Cons: Growth is slowing - limited by lack of good wind resources or legal constraints

Off-shore wind

Pros: Potential resource for 2020+ on East coast
Cons: Significant cost and risk factors limit near-term consideration

- Duke Energy closely monitors cost and risk profiles for each renewable resource.
- Changes occur continuously.

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Federal/State incentives & policies influence development and deployment of renewables

- **30% Federal Investment Tax Credit (ITC)**
  - Tax credit for investments in eligible renewable technologies placed into service by Dec. 31, 2016
- **Federal Production Tax Credit (PTC)**
  - A per-kilowatt-hour Federal tax credit for qualified energy resources for the first 10 years of production
  - Enacted in 1992 with periodic extensions
  - Extended through Dec. 31, 2013
- **Senate Bill 251/INVCEPS/CHOICE**
  - Created voluntary Clean Energy Portfolio Standard (CPS) for Indiana
  - Incentive of increase in Return of Equity up to 50 basis points for utilities participating in program and meeting specific goal period targets
  - Up to 30% of goal targets can be met with clean coal, nuclear, natural gas replacing coal, and combined heat and power

Renewables are a complex challenge for utilities

- Low to no environmental emissions
- Sustainable energy supply
- Fuel price stabilization
  - Wind & solar use “free” fuel
  - No price variability for solar and wind
- Local economic development
  - Potential for manufacturing and operation
- Part of an overall supply portfolio

- Can be more expensive (e.g. solar tax credit normalization requirement)
- Projects are often small in scale
- Many renewables are available only on an intermittent basis (not “controllable”)
- Resource availability varies geographically
- May require additional transmission investment

Renewables are incorporated into the IRP

- Future Federal or State-level Clean Energy Standards are assumed
- Renewables are evaluated on a range of criteria including:
  - Commercial availability
  - Operational characteristics
  - Coincidence with peak
  - Cost
- Renewables are included in IRP modeling and analysis along with traditional resources

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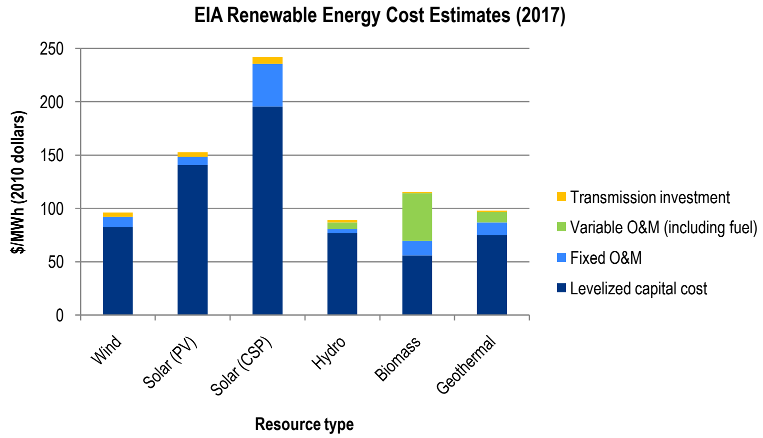
Use a variety of sources to develop cost estimates (U.S. Energy Information Agency is one)



*No estimates were available for landfill gas.
**Hydro costs assume storage, not run-of-river.
Source: Energy Information Administration, "Levelized Cost of New Generation Resources in the Annual Energy Outlook 2012," July 2012. http://www.eia.gov/forecasts/aeo/pdf/electricity_generation.pdf

- Publically available data from a variety of sources
- Proprietary and subscription-based resources
- Current market prices (PPAs)
- Duke Energy Renewables (non-regulated business) costs

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What renewable resources does Duke Energy currently use in Indiana?

- **Benton County Wind Farm (Indiana's first)**
  - 100.5 MW
  - Signed 20-year power purchase agreement (PPA) in 2006
  - Yields approximately 300,000 MWh/year
- **Markland Hydro Facility**
  - 51.3 MW
  - Run-of-river facility owned by Duke Energy Indiana
  - Also yields approximately 300,000 MWh/year
- In total, approximately 2% of our annual output comes from these two sources (comparable to OH RPS of 2% in 2013)

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Renewables in the 2011 IN IRP

- Renewables included in the IRP base case
- Driven by potential for new federal standards or new state standards
- Inclusion of renewables in the IRP is NOT meant to be a plan for SB 251 compliance
- Renewables grow from 1% in 2016 to 10% in 2025
- Resource mix - 75% wind, 20% biomass/biomethane, 5% solar*
  - 75% wind = 880 MW installed by 2025
  - 20% biomass/biomethane = 95 MW installed by 2025
  - 5% solar = 117 MW installed by 2025

*Proposed CES could be met with a larger percentage of wind , but for purposes of the IRP, we want to show a more diversified supply portfolio.

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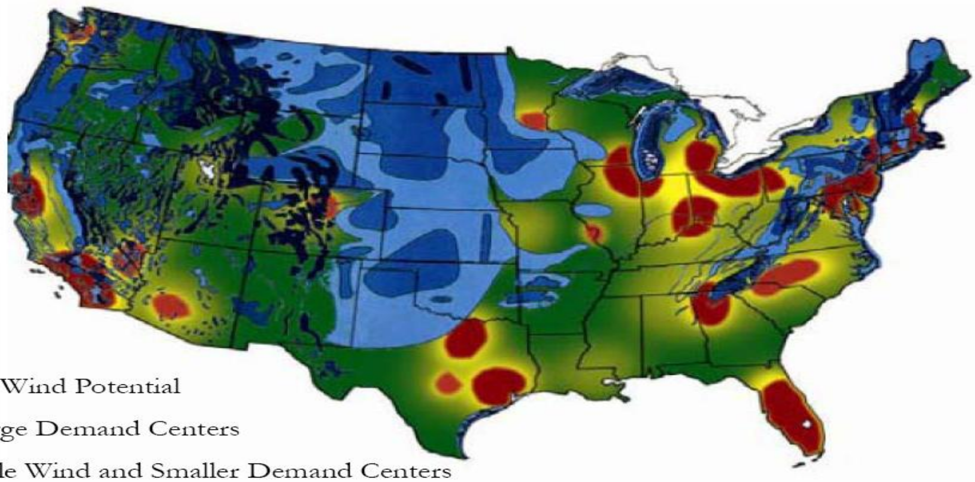
What trends will likely influence the 2013 IRP?

- Solar costs decreased significantly since 2011 IRP
- Likely phase out of Production Tax Credit
- Biomass less likely due to potential future environmental regulation and questions of carbon neutrality

Renewable Energy Appendix

Load centers and wind resources have little overlap



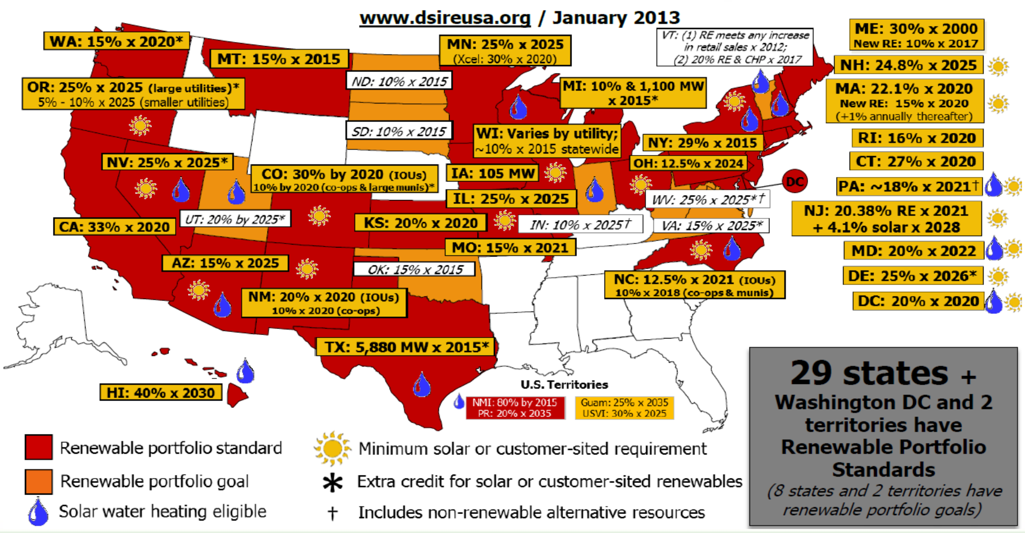
Blue – High Wind Potential

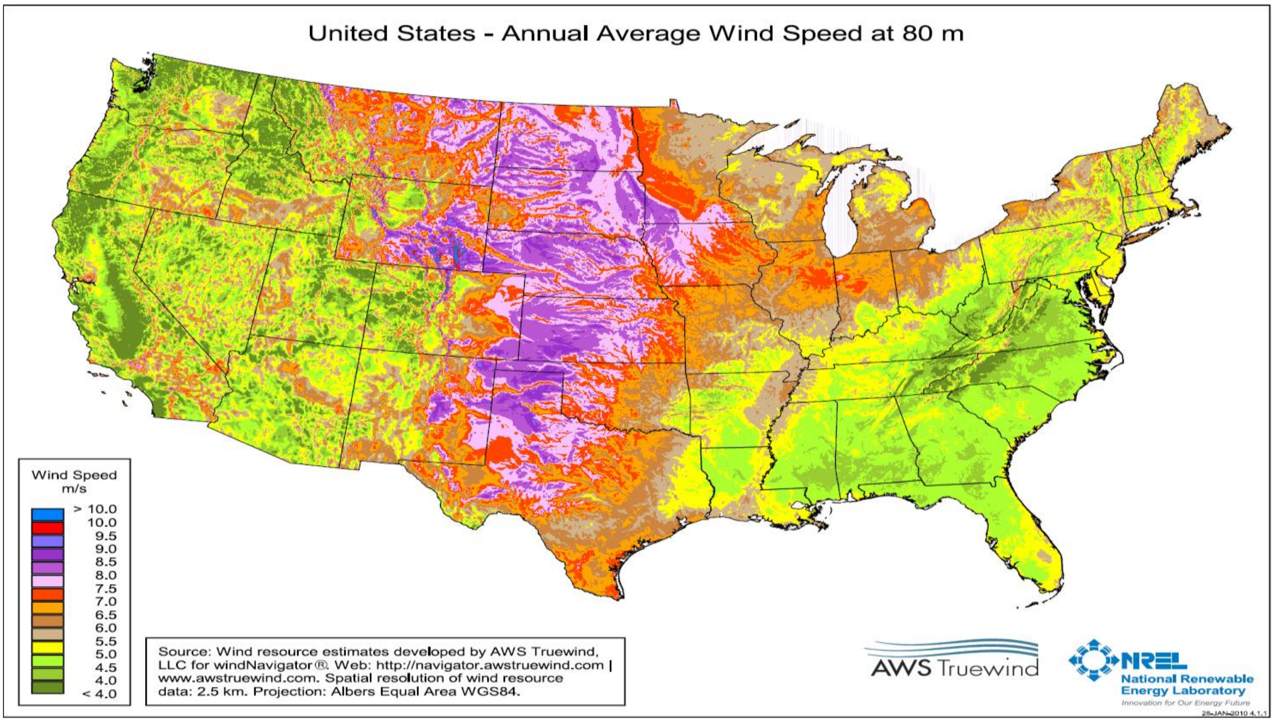
Brown – Large Demand Centers

Green – Little Wind and Smaller Demand Centers

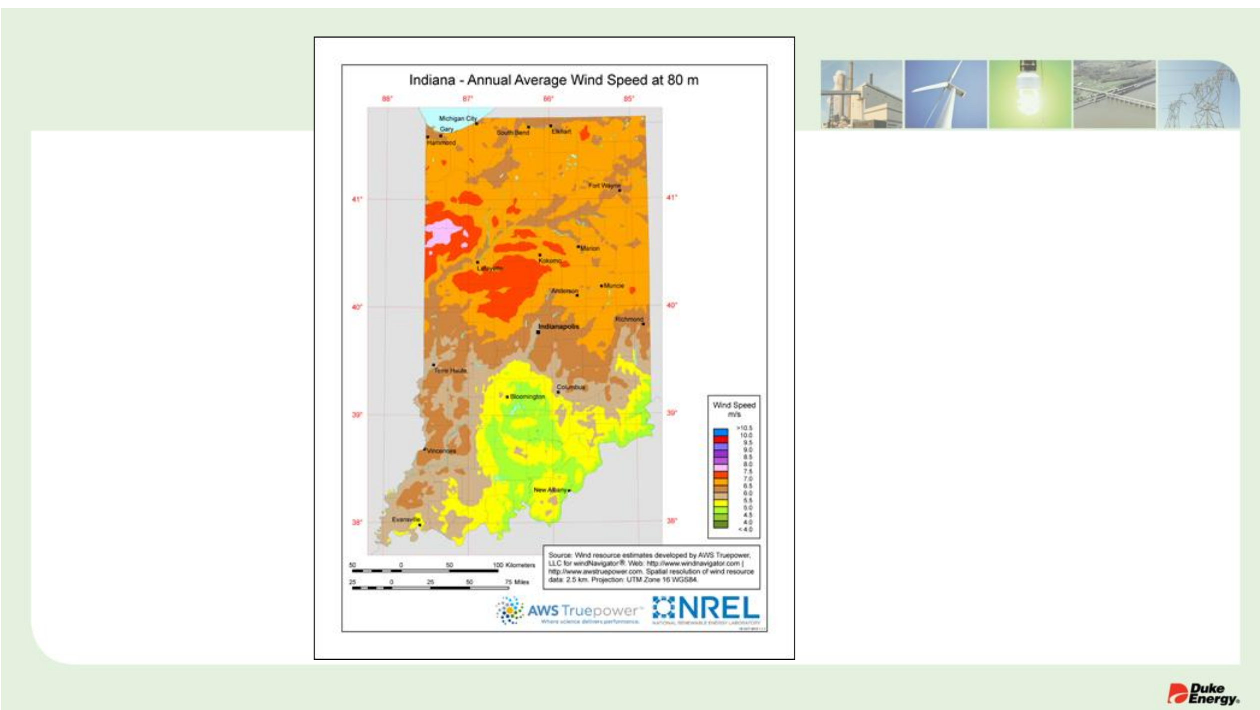
Source: NERC – Report: Accommodating High Levels of Variable Generation

Renewable Portfolio Standards drive the market

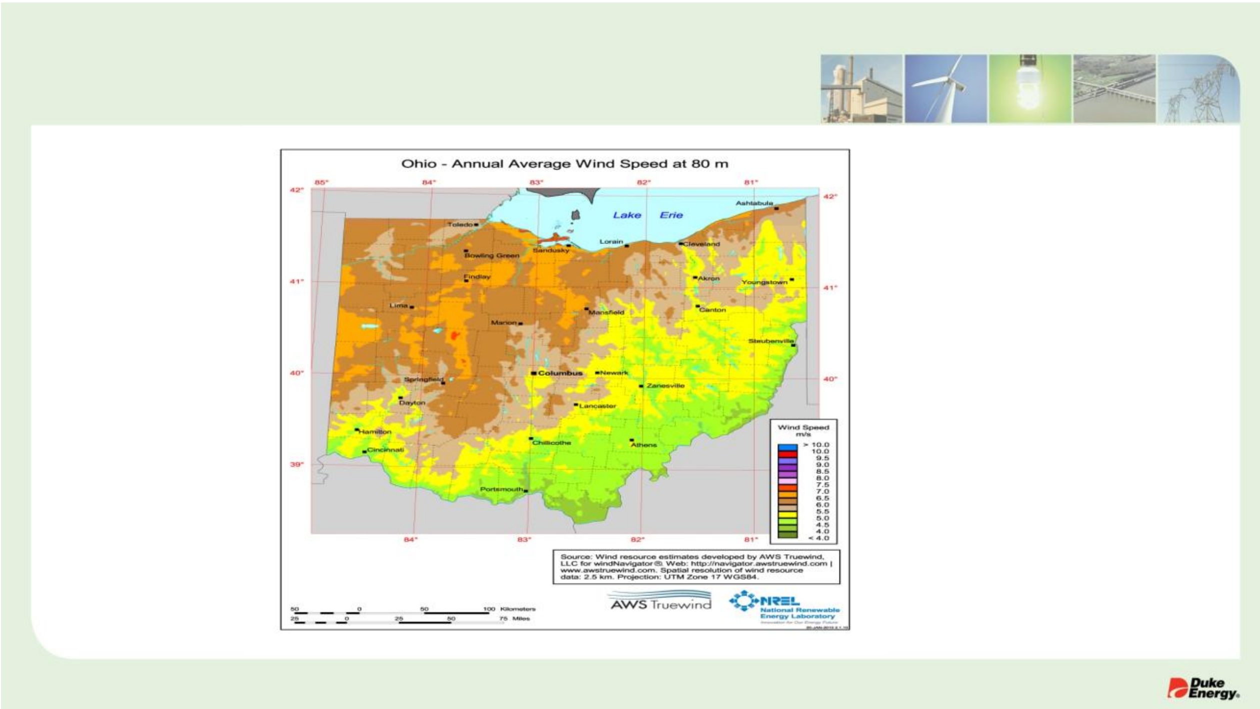




United States - Annual Average Wind Speed at 80 m
Wind Speed m/s
> 10.0
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
< 4.0
Source: Wind resource estimates developed by AWS Truewind, LLC for windNavigator®. Web: http://navigator.awstruewind.com | www.awstruewind.com. Spatial resolution of wind resource data: 2.5 km. Projection: Albers Equal Area WGS84.
AWS Truewind
NREL National Renewable Energy Laboratory
Innovation for Our Energy Future
28-JAN-2010 4.1.1



Indiana - Annual Average Wind Speed at 80 m
88°
87°
86°
85°
41°
40°
39°
38°
Michigan City
Gary
Hammond
South Bend
Elkhart
Fort Wayne
Marion
Kokomo
Lafayette
Muncie
Anderson
Richmond
Indianapolis
Terre Haute
Columbus
Bloomington
Vincennes
New Albany
Evansville
Wind Speed m/s
>10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
< 4.0
Source: Wind resource estimates developed by AWS Truepower, LLC for windNavigator®. Web: http://www.windnavigator.com | http://www.awstruepower.com. Spatial resolution of wind resource data: 2.5 km. Projection: UTM Zone 16 WGS84.
50 0 50 100 Kilometers
25 0 25 50 75 Miles
AWS Truepower
Where science delivers performance.
NREL
NATIONAL RENEWABLE ENERGY LABORATORY
Duke Energy


Ohio - Annual Average Wind Speed at 80 m
Lake Erie
Toledo
Sandusky
Lorain
Cleveland
Ashtabula
Bowling Green
Findlay
Akron
Youngstown
Lima
Mansfield
Canton
Marion
Steubenville
Columbus
Newark
Springfield
Zanesville
Dayton
Lancaster
Hamilton
Chillicothe
Athens
Cincinnati
Portsmouth
Wind Speed m/s
> 10.0
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
< 4.0
Source: Wind resource estimates developed by AWS Truewind, LLC for windNavigator®. Web: http://navigator.awstruewind.com | www.awstruewind.com. Spatial resolution of wind resource data: 2.5 km. Projection: UTM Zone 17 WGS84.
AWS Truewind
NREL National Renewable Energy Laboratory
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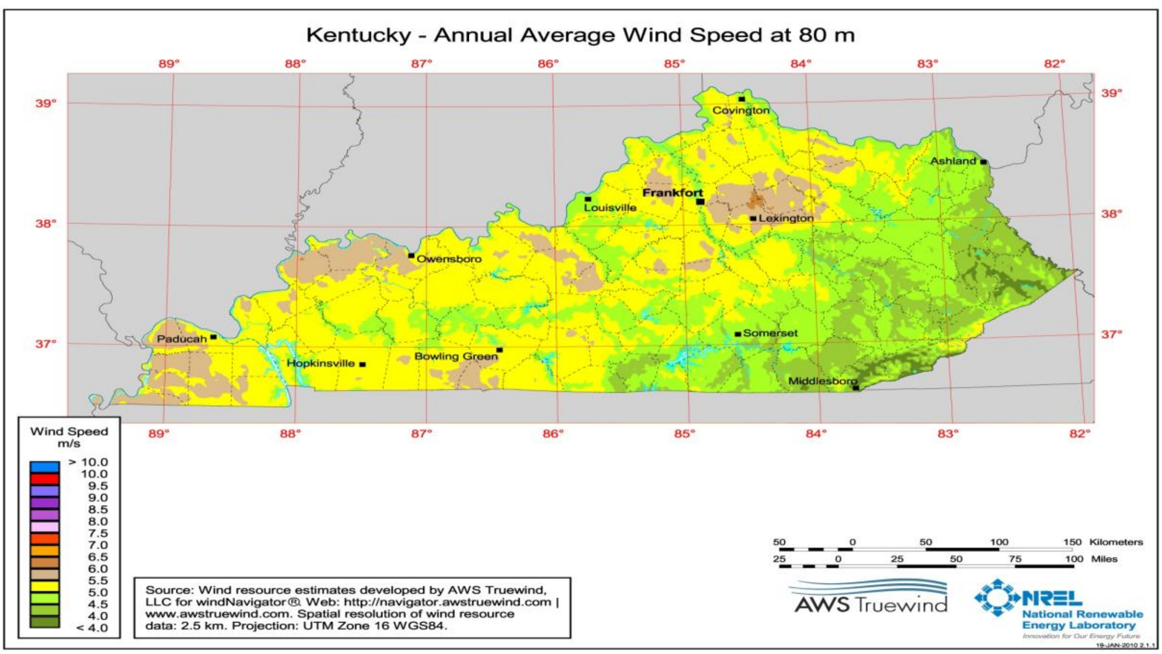
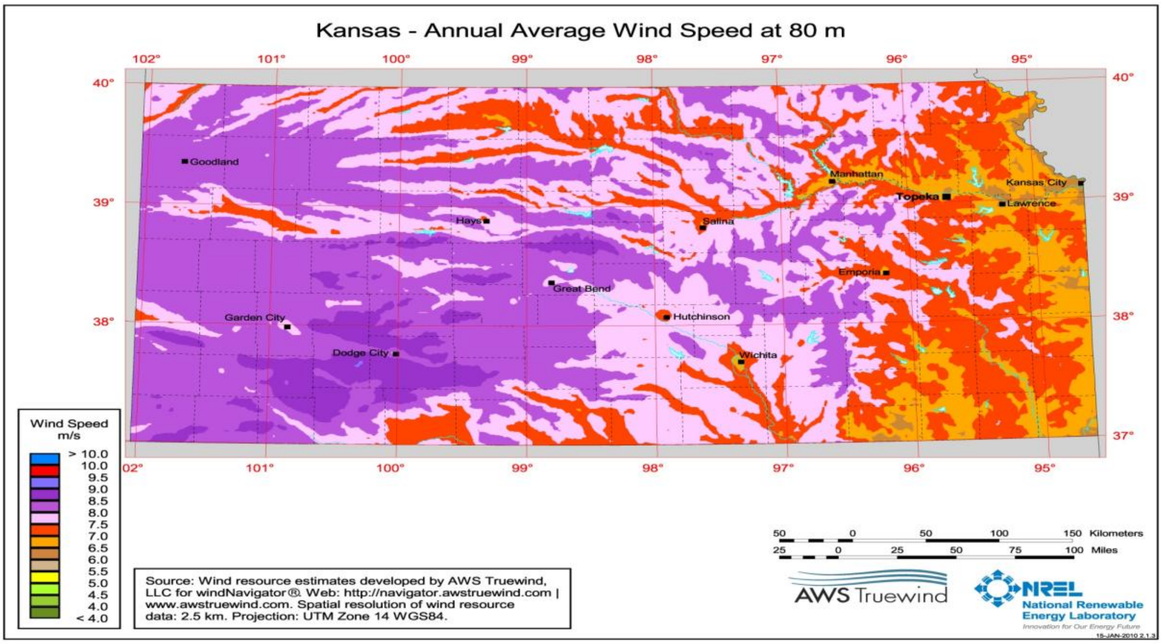
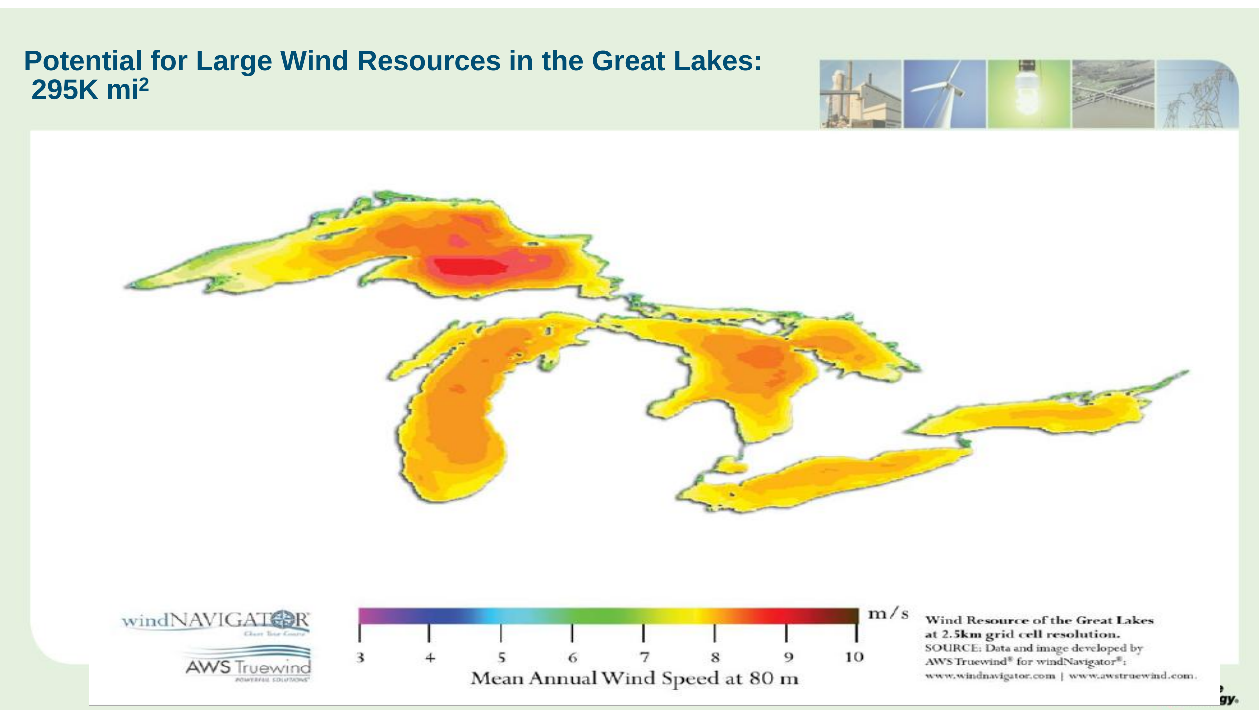
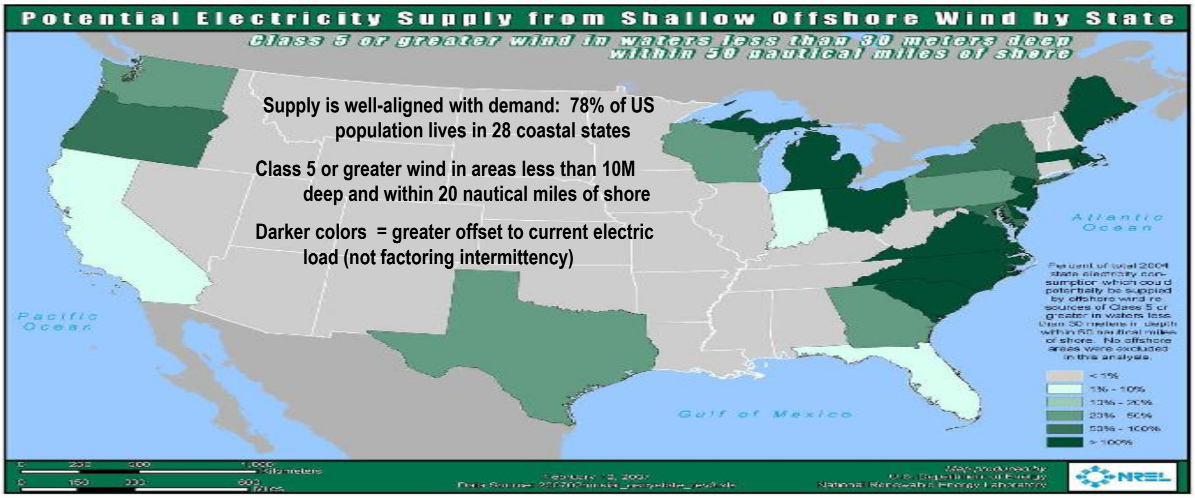
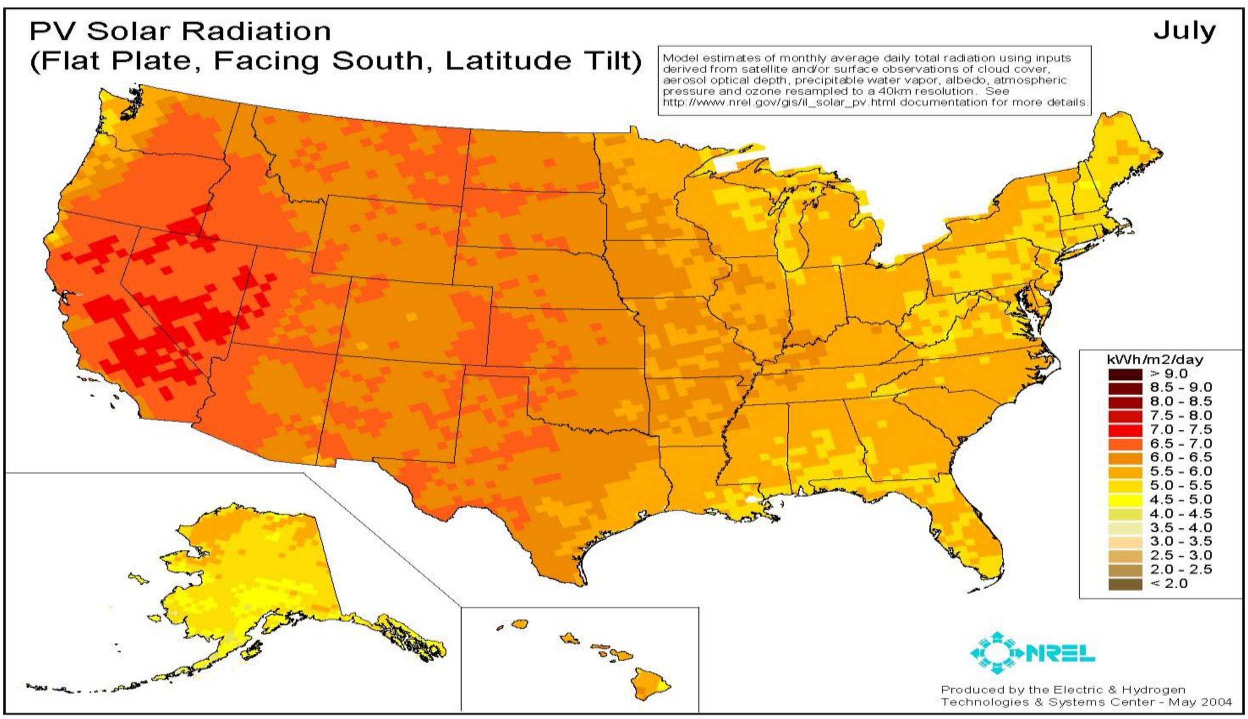

Kentucky - Annual Average Wind Speed at 80 m
89°
88°
87°
86°
85°
84°
83°
82°
39°
38°
37°
Covington
Ashland
Frankfort
Louisville
Lexington
Owensboro
Somerset
Paducah
Hopkinsville
Bowling Green
Middlesboro
Wind Speed m/s
> 10.0
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
< 4.0
Source: Wind resource estimates developed by AWS Truewind, LLC for windNavigator®. Web: http://navigator.awstruewind.com | www.awstruewind.com. Spatial resolution of wind resource data: 2.5 km. Projection: UTM Zone 16 WGS84.
50 0 50 100 150 Kilometers
25 0 25 50 75 100 Miles
AWS Truewind
NREL National Renewable Energy Laboratory
Innovation for Our Energy Future
19-JAN-2010 2.1.1

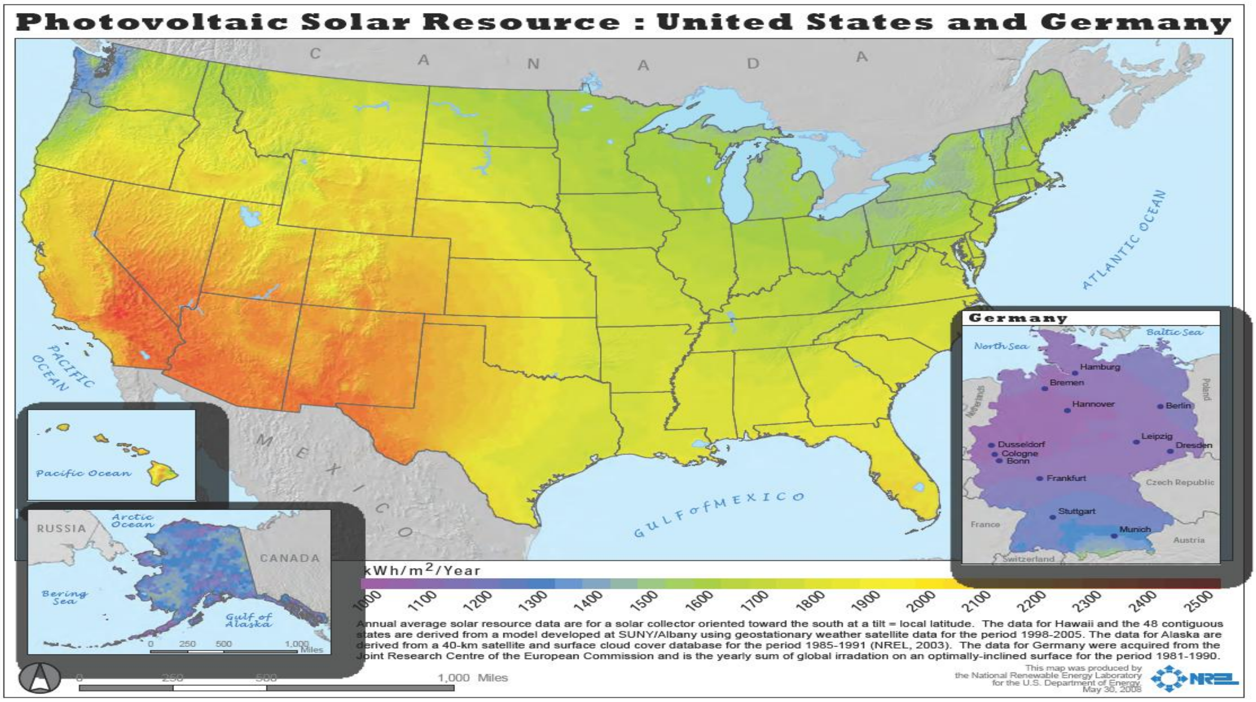

Kansas - Annual Average Wind Speed at 80 m
102°
101°
100°
99°
98°
97°
96°
95°
40°
39°
38°
37°
Goodland
Hays
Salina
Manhattan
Topeka
Kansas City
Lawrence
Emporia
Great Bend
Hutchinson
Garden City
Dodge City
Wichita
Wind Speed m/s
> 10.0
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
< 4.0
Source: Wind resource estimates developed by AWS Truewind, LLC for windNavigator®. Web: http://navigator.awstruewind.com | www.awstruewind.com. Spatial resolution of wind resource data: 2.5 km. Projection: UTM Zone 14 WGS84.
50 0 50 100 150 Kilometers
25 0 25 50 75 100 Miles
AWS Truewind
NREL National Renewable Energy Laboratory
Innovation for Our Energy Future


Potential for Large Wind Resources in the Great Lakes:
295K mi²
windNAVIGATOR
AWS Truewind
3 4 5 6 7 8 9 10
m/s
Mean Annual Wind Speed at 80 m
Wind Resource of the Great Lakes at 2.5km grid cell resolution.
SOURCE: Data and image developed by AWS Truewind® for windNavigator®:
www.windnavigator.com | www.awstruewind.com.

Potential electricity supply from shallow, offshore wind







Limits on renewable energy

- How much is out there?
  - Biomass has fuel supply limitations
  - Landfill gas limited by number of large landfills
  - Wind often faces legislative restrictions
- Where is it?
  - Resources far from load centers face transmission constraints
- When does it generate?
  - Current generation mix and availability of storage may limit off-peak resources
- What does it cost?
  - PUC's less willing to approve expensive renewables given existing rate pressures

Incorporation of large renewable quantities is not straightforward

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Renewable Energy Technology Selection Criteria

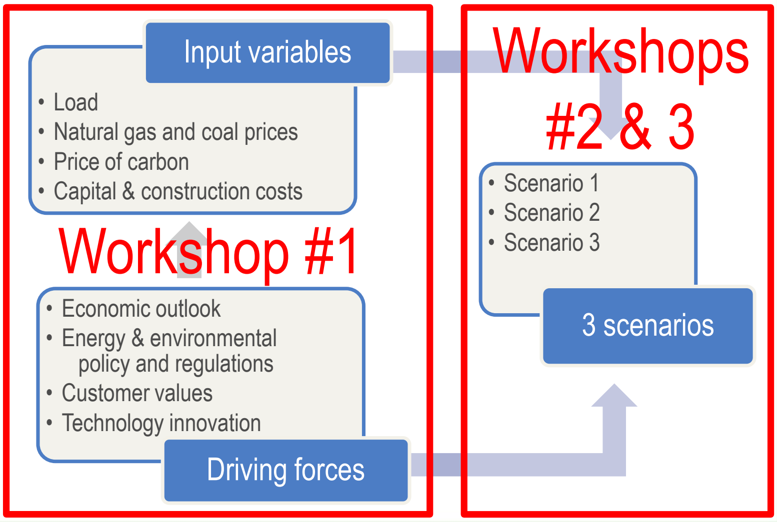
- Integrated resource plan need
- RPS requirements
- Project development risk
- Ongoing operational risk
- Portfolio risk
- Counterparty risk
- Legislative risk
- Actual value of delivery energy relative to cost of renewable energy (benefits vs. costs)
- Resource availability – current and projected
- Cost – current and projected, including potential technology advancements and subsidy changes
- Integration and power delivery considerations

Robert McMurry, Director, Midwest IRP

Draft Scenarios

Overview

- Workshop #1: solicited your thoughts on driving forces & input variables
- Considered your input as developed draft scenarios
- Today getting your feedback on draft scenarios
- At April workshop will share final scenarios



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Recap: What are scenarios?

"Each scenario….tells a logical "story" about the future that includes important trends and events, describes the key players and their actions, and explains the dynamics of the system… The aim is not to predict a precise order of events and outcomes, but rather to enable development of robust strategies that will stand up no matter what happens. Scenarios force us to explicitly identify and question our assumptions about the future." – CERA/IHI

"Scenarios are intended to form a basis for strategic conversation – they are a method for considering potential implications of and possible responses to different events. They provide their users with a common language and concepts for thinking and talking about current events, and a shared basis for exploring future uncertainties and making more successful decisions." – Shell

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Recap: Scenarios should…

- Help us find an “always acceptable” solution across a range of possible futures instead of an “optimal” solution for one potential future
- Force us to consider a robust range of possible futures
- Focus on key drivers and input variables that drive action and change outcomes
- Incorporate quantitative and qualitative data
- Be internally consistent

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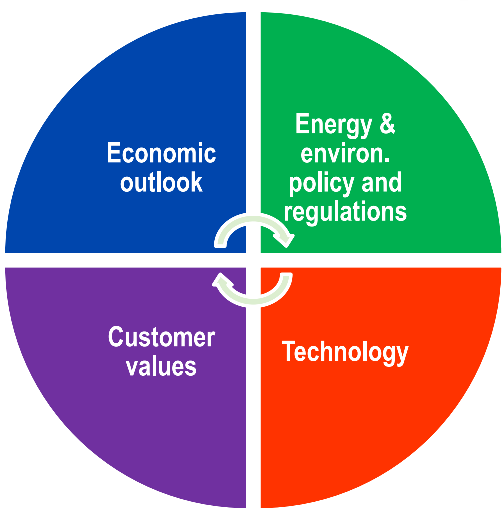
Recap: What are the key driving forces?

Economic outlook
- Fiscal policies
- Economic growth
- Interest rates
- International trade policies

Customer values
- % income spent on electricity
- Usage per customer
- Environmental, health, and safety concerns
- Use of customer-owned resources



Energy & environmental policy and regulations
- Renewable energy
- Energy efficiency
- Air emissions
- Water & waste
- Nuclear

Technology
- Capital & construction costs
- Efficiency of existing technologies
- New technology development

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Recap: What are the key input variables represented in scenarios?

- Key input variables are the variables used in modeling that most significantly influence the resulting "preferred portfolio".
- They can have a range of values.
- Our goal is to develop scenarios that reflect a wide, but reasonable, range of potential values for the input variables.

Key model input variables

Load growth | Coal prices | Natural gas prices | Price of carbon | Capital & construction costs | EE adoption

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Example of how to use scenarios (illustrative only)

Scenario A: Struggling forward

- Driving forces: Tepid economy, little change in environmental regulation, customer preferences, or technology innovation
- Input variables:
  - Load growth: 0.5%
  - Coal prices: hover near $2/MMBtu
  - Natural gas prices: vary between $2.50-4/MMBtu
  - Price of carbon: None
  - Construction & capital costs: Fairly flat; minor increase in near term in
- Resulting portfolio
  - Demand for additional 800 MW over 20 years (10 MW customer-owned)
  - Primarily natural gas, with some EE and DSM, minor amount of wind and solar

Scenario B: An environmentally-focused future

- Driving forces: A robust economy, significant focus on EE and renewables driven by high fuel prices, technology innovation, stricter regulations & customer values.
- Input variables:
  - Load growth: 1.1%
  - Coal prices: exports drive costs to $4-6/MMBtu
  - Natural gas prices: strong demand drives prices to $5-8/MMBtu
  - Price of carbon: $20/ton in 2020 escalating to $60 by 2032
  - Construction & capital costs: Demand for gas turbines increases costs of CTs and CCs by 10% in first 10 years; costs of solar decline by 30% by 2020 and an additional 20% by 2032
- Resulting Portfolio
  - Demand for an additional 1400 MW over 20 years (400 MW customer-owned)
  - A mix of natural gas, EE & DSM, and renewables

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Example of how to use scenarios (illustrative only)

- The Capacity Expansion models (System Optimizer) are used to determine the lowest cost portfolio for each scenario

Portfolio A (800 MW)	Portfolio B (1400 MW)
• 200 MW natural gas CT (2018) • 400 MW natural gas CC (2026) • 150 MW EE & DSM • 40 MW wind • 10 MW customer-owned wind & solar	• 200 MW natural gas CT (2017) • 350 MW natural gas CC (2024) • 300 MW EE & DSM • 130 MW wind • 20 MW solar • 400 MW customer-owned EE, wind, and solar

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Example of how to use scenarios (illustrative only)

- Will analyze the selected portfolios across all scenarios and across the range of sensitivities (load growth, fuel prices, price of carbon, capital costs, etc.)

Scenario A

- Portfolio A
- Portfolio B

Portfolio A = $3.8 B
Portfolio B = $4 B

Scenario B

- Portfolio B
- Portfolio A

Portfolio B = $4 B
Portfolio A = $4.1 B

- Will use quantitative and qualitative analysis to determine what portfolio is most robust across the various scenarios

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Scott Park, Lead Economic Planning Analyst, Integrated Resource Planning

Draft Scenarios

Today's focus: Draft scenarios

- Created one scenario that reflects Duke Energy's forecast for the next 20 years (reference scenario)
- Developed five additional scenarios that reflect and combine key themes we heard at workshop #1 and from internal experts:
  - Technology innovation (especially in renewable, storage, and smart grid technologies)
  - Stricter environmental regulations
  - Greater distributed generation
  - Energy security
  - Infrastructure resilience
  - Prolonged economic malaise
- **Today's objective is to get feedback from participants to help Duke Energy select a pair of scenarios that represent a robust range of possible futures (in combination with the reference scenario) for further refinement and use in IRP analysis**

Overview of 6 Draft Scenarios

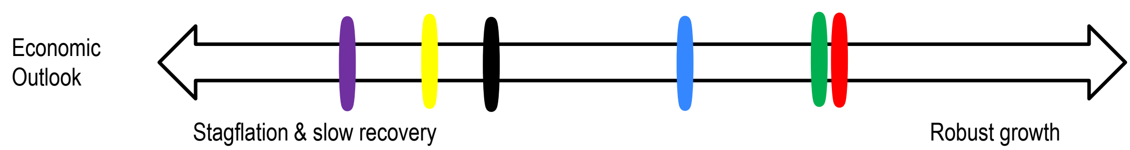
1. Duke Energy Reference
2. A Very Green Future
3. Domestic Focus
4. A Distributed World
5. Climate Crisis is Upon Us
6. Strong Economy & Less Government

Driving Forces & Scenarios

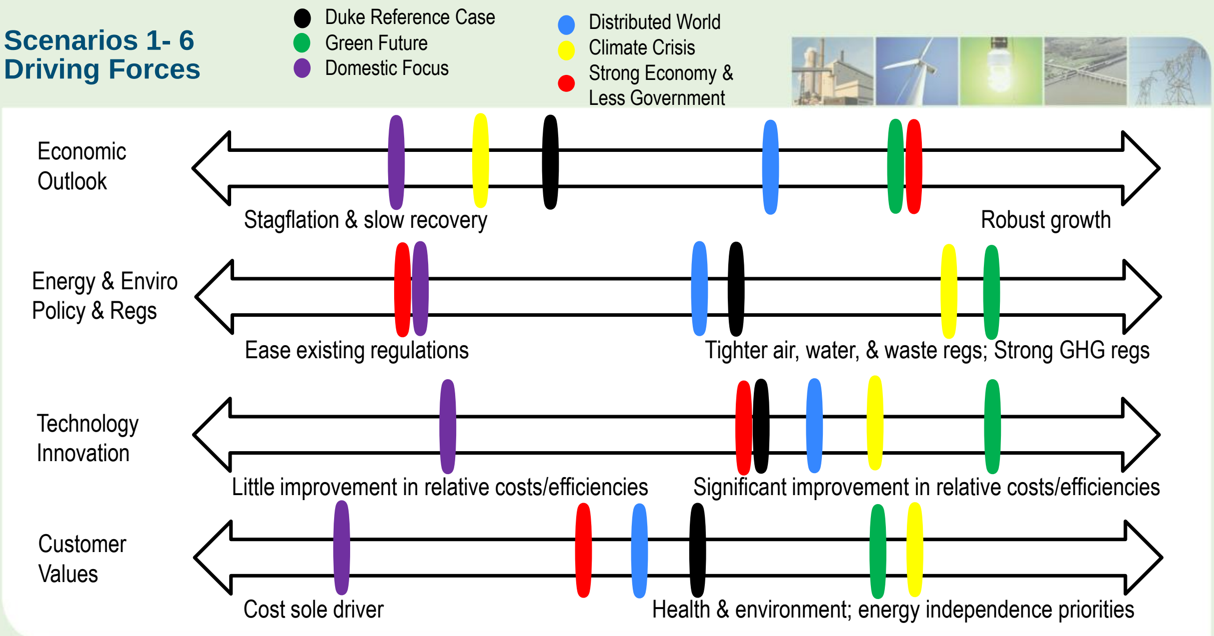
1. **For each of the driving forces**
   - Economic Outlook
   - Energy & Environmental Policy & Regulations
   - Technology Innovations
   - Customer Values

2. **Each scenario**
   - Duke Energy Reference (black)
   - Green Future (green)
   - Domestic Focus (purple)
   - Distributed World (blue)
   - Climate Crisis (yellow)
   - Strong Economy & Less Government (red)

3. **Has been marked on a spectrum that shows each scenario's relative position**



Scenarios 1- 6 Driving Forces



Scenario 1: Duke Energy Reference

Economic Outlook:
- Low to moderate growth

Energy & Environmental Policy & Regs.:
- Carbon legislation in effect by 2020 ($17 in 2020 growing to $46 in 2033)
- State RPS (1% by 2018 and 10% by 2027)
- All existing and proposed regulations are implemented as expected
- Regulations limit new coal, but don't force significant additional retirements

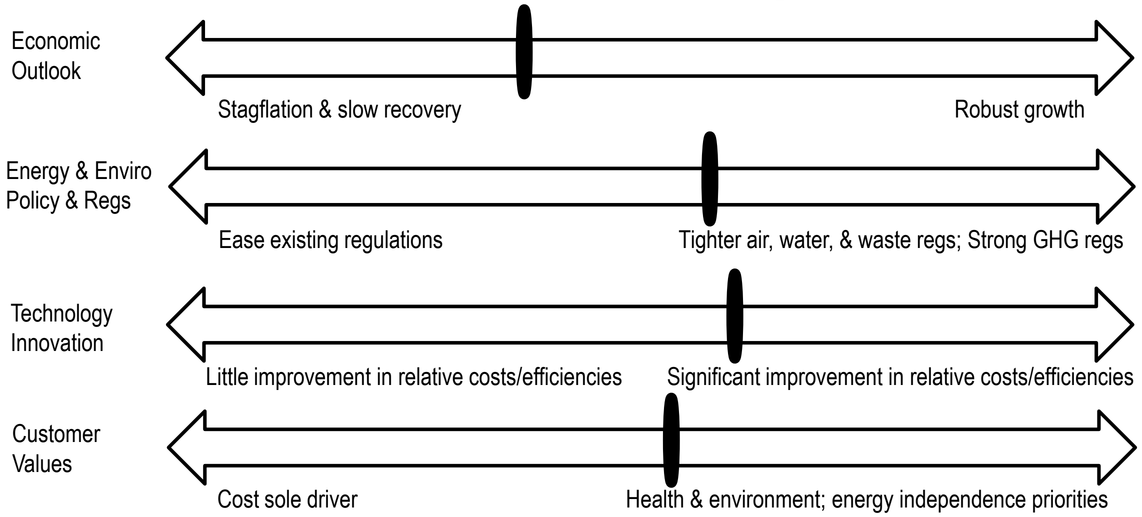
Customer values:
- Focus on cost with slight increase in emphasis on the environment
- EE adoption at Mandate level (11.9% by 2020)
- Customer-owned distributed generation remains limited

Technology:
- Short-term demand for nat. gas turbines leads to small increase in costs through 2023; incremental efficiency improvements
- Solar costs continue to decline across planning period, slowing in later years
- Minimal improvement in smart grid
- No innovation in IGCC and CCS

This scenario represents Duke Energy's expected view of the future based on current information. The economy recovers slowly, picking up longer term. Continued political partisanship results in slow changes in energy policy and environmental regulations. However, the late-2010s sees the passage of GHG regulations that come into effect in 2020. Customers continue to focus primarily on costs, with a slight increase in willingness to pay for cleaner technologies. Limited new capacity is needed in the short term due to relatively flat load growth. Renewable technology costs continue to decrease, but slow slightly from the trends of the past few years.

Scenario 1
Driving Forces

● Duke Reference Case



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Scenario 2: A Very Green Future

Economic Outlook: • Moderate to high growth	**Energy & Environmental Policy & Regs.:** • Stringent carbon legislation enacted • Aggressive state RPS • All existing and proposed regulations are implemented as expected • Regulations limit new coal •Cooling tower requirement
Customer values: • Focus on a greener mix • EE adoption above Mandate level	**Technology:** • Significant innovation in renewables, EE and storage • Solar costs continue to decline across planning period • Minimal improvement in traditional generation • No innovation in IGCC and CCS

A strong economic recovery and environmental mindset drive aggressive policies and regulations promoting low carbon resources. Targeted DOE initiatives result in rapid technology innovation and cost reduction for renewables and nuclear over the course of the planning period. High levels of energy efficiency reduce overall load growth in the long term. Customers are able and willing to pay more for "cleaner" resources.

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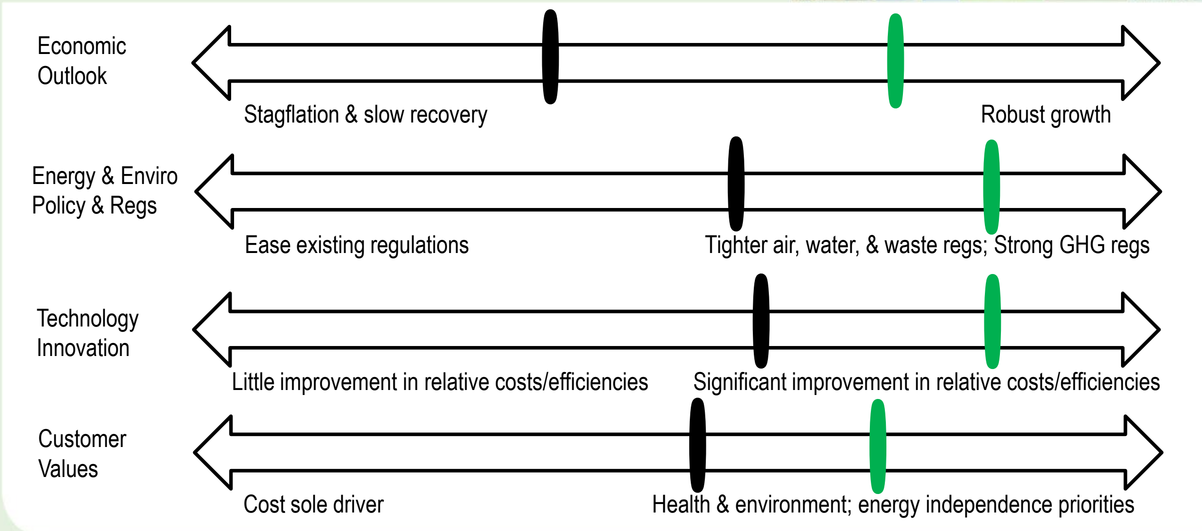
Scenarios 1 & 2 Driving Forces



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Scenario 3: Domestic Focus

Economic Outlook:
- Flat to low growth

Energy & Environmental Policy & Regs.:
- Few changes to existing regulations
- No carbon legislation

Customer values:
- Focus on low cost
- Increased energy independence a priority

Technology:
- Low to moderate innovation in renewables
- Little advancement in other technologies

International turmoil and volatile global oil markets lead to the decision that America must be truly energy independent. Policy and regulations encourage an all-of-the-above-as-long-as-it's-American energy strategy. Government incentives focus on regional strategies that use the resources most abundant to a given region, including utilizing America's rich reserves of coal and natural gas along with the abundant renewable resources. Weak economic growth, resulting in part from global volatility, limits customers' ability to pay significantly higher prices. There are few changes to existing environmental regulations.

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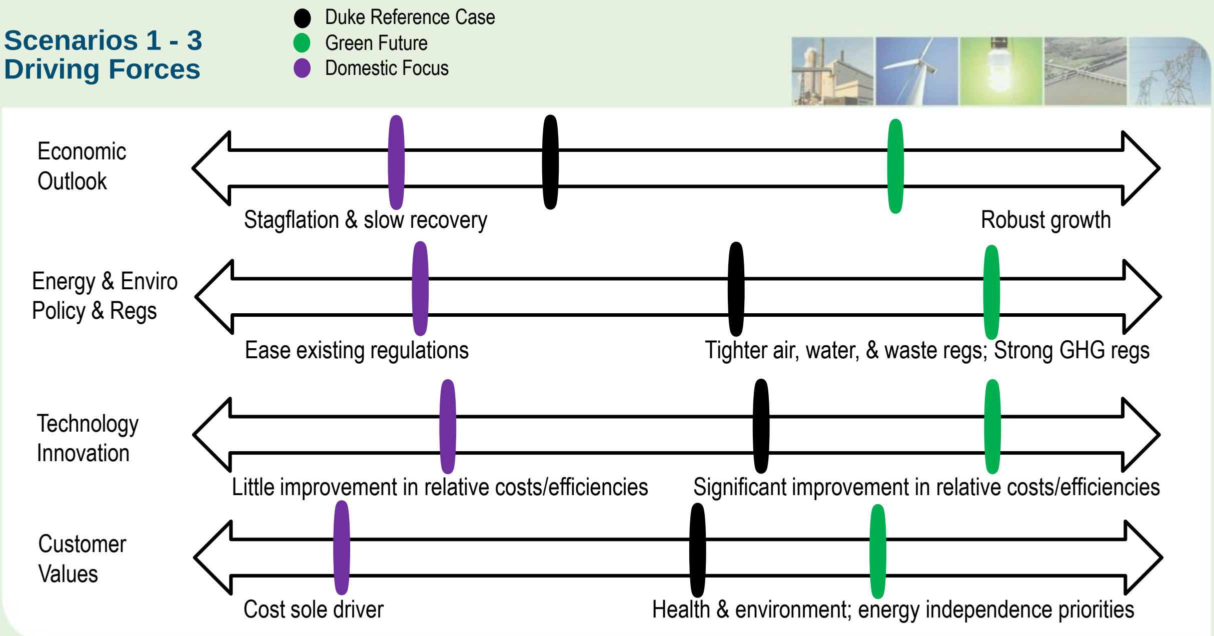
Scenarios 1 - 3 Driving Forces



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Scenario 4: Distributed World

Economic Outlook:
- Moderate growth

Energy & Environmental Policy & Regs.:
- Carbon legislation in effect by 2020 ($17 in 2020 growing to $46 in 2033)
- State RPS
- All existing and proposed regulations are implemented as expected
- Regulations limit new coal
- Incentives encourage distributed gen

Customer values:
- Desire for personal energy independence
- Increased in interest in environmental issues

Technology:
- Moderate innovation in renewables and storage

A desire for individual-level energy independence combined with new financing models, incentives for distributed generation, and an increasing interest in the environment, results in significant levels of customer-owned distributed resources and energy efficiency by 2033. Energy and environmental policies and regulations see limited change. The majority of change that does occur is focused on making it easier for individuals to own DG and manage their own energy consumption.

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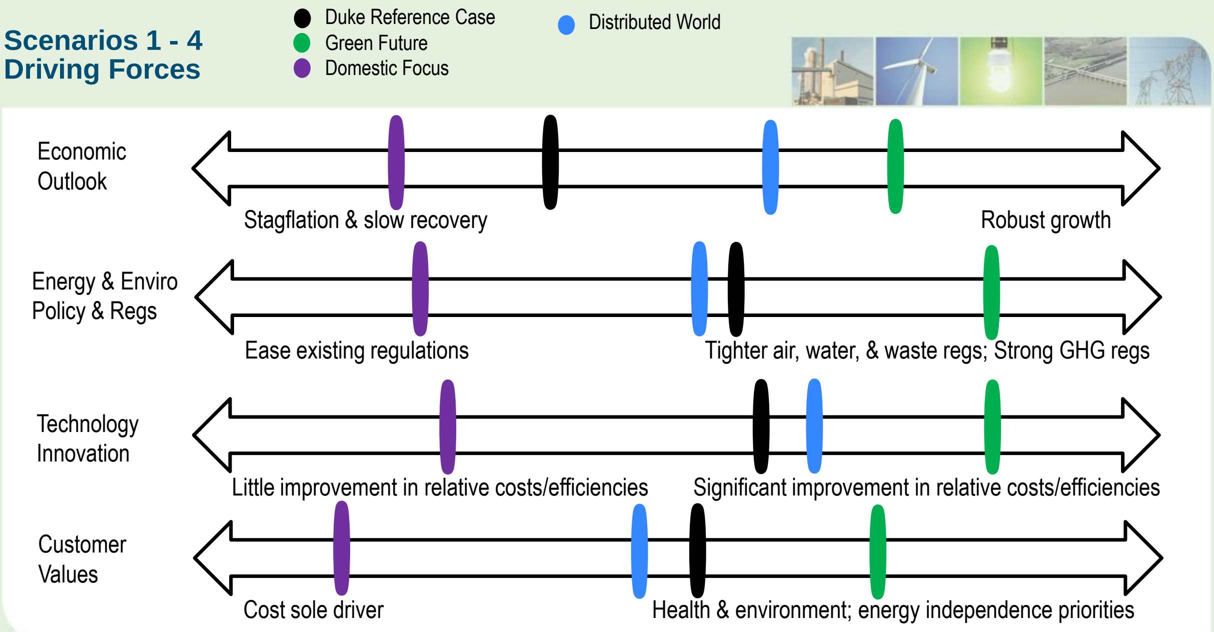
Scenarios 1 - 4 Driving Forces



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Scenario 5: Climate Crisis

Economic Outlook:

- Low growth

Energy & Environmental Policy & Regs.:

- Strict regulations focused on climate change mitigation
- Stringent carbon legislation
- Strict water regulations
- Grid resilience a priority

Customer values:

- Public belief that mitigating climate change through low carbon energy sources combined with increased infrastructure robustness are priorities
- Customer willingness to pay for low carbon generation and infrastructure robustness

Technology:

- Innovation primarily focused on resilience
- Moderate innovation in renewables and nuclear driven by low carbon focus

A series of natural disasters coupled with climatic shifts (hotter summers, colder winters, droughts, etc.) drive a focus on mitigating and adapting to climate change through infrastructure robustness and a low carbon economy. The public is willing to invest in these priorities and accept near term costs because it believes this approach will minimize overall long-term costs to society. Regionally, droughts and water shortages are a major concern, driving stringent water regulations.

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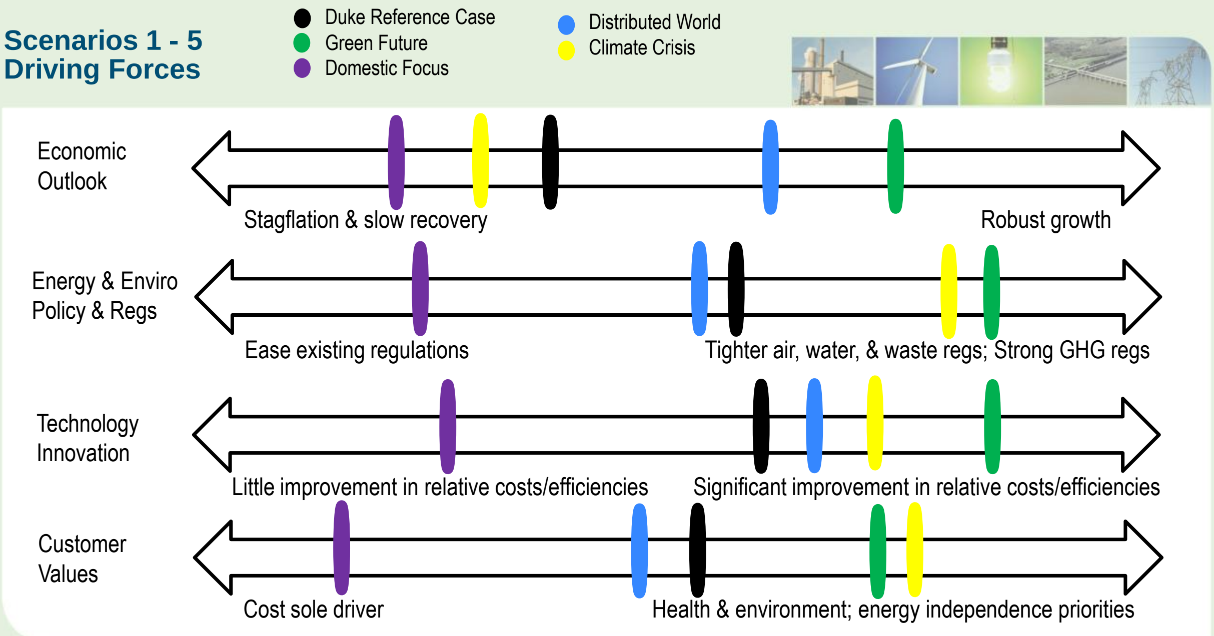
Scenarios 1 - 5 Driving Forces



Scenario 6: Strong Economy & Less Government

Economic Outlook:
- Moderate to high growth

Energy & Environmental Policy & Regs.:
- Few changes to existing regulations
- No REPS
- No carbon legislation

Customer values:
- Energy really not on customer's minds. Cost and environment both somewhat important, with cost being more of a driver, but not a major concern.
- Cost primary focus with some emphasis on "green"

Technology:
- Short-term demand for nat. gas turbines leads to small increase in costs through 2023; incremental efficiency improvements
- Solar costs continue to decline across planning period, slowing in later years
- Minimal improvement in smart grid
- No innovation in IGCC and CCS

Spurred by lower domestic energy prices, the economy and utility load growth return to long term historic levels. With the focus on economic growth there is no movement on existing environmental regs (no carbon tax). Technology continues on a path of small but steady gains. Energy costs become less of a focus but are still customers top priority among energy related issues.

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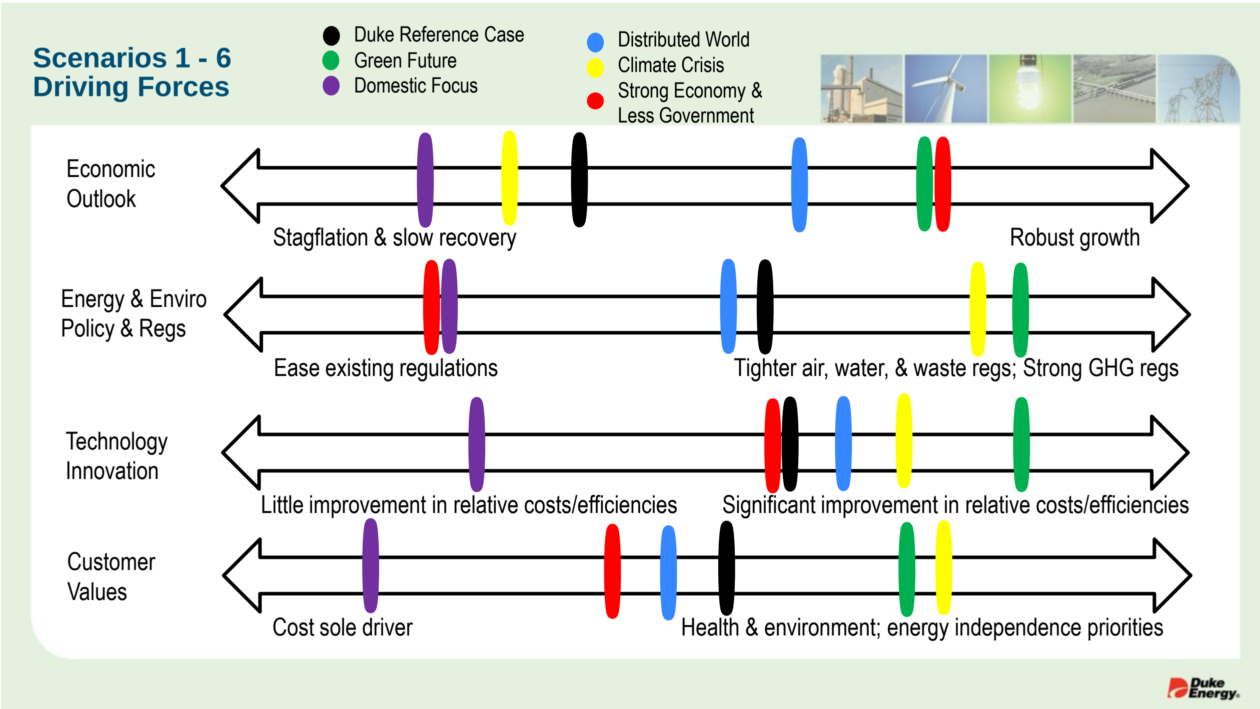

Marty Rozelle

Scenario Exercise

Duke Energy.

Workshop Objectives

- Understand scenarios and planning process
- Appreciate various perspectives
- Work toward agreement on two scenarios, + reference case

Duke Energy.

Scenario Exercise

Table Discussion

- Individually select 2 of 5 scenarios
- Table spokesperson summarizes

Full group discussion

- Individually name preferred pair of scenarios and tell why

Duke Energy.

Appendix

Workshop #1 Driving Force Feedback: Economic Outlook

- Entitlement spending up, tax burden up, lower disposable income
- Rising labor productivity + strong intellectual property rights = manufacturing retention and attraction increases
- Reduced private capital pool causes more government-financed projects = demand growth
- Higher interest rates affect capital costs
- Near term = flat growth, little spike in GDP in short term, but overall economy stays relatively flat (or bumpy) for plan period
- Could have a spike, but overall less than 2% growth through 2032
- Interest rates and access to capital
  - Stay low in short term
  - Credit-worthy entities will be OK, have access to capital
  - Interest rates long-term go up after about 5 years
  - Some spikes in inflation after that
- Competition and deregulation
- Desire for modular, smaller increments
- Distributed generation
- Uncertainty and cyclicality
- International trade and manufacturing
- Global geo-political events can pop up
- Distinguish between GDP growth and load growth
- 1% on low end
- 3.5% on high end
- Disposable personal income and tax rates moving down in future
- Challenges raising necessary capital
- Competition, technology innovation, distributed generation, national security
- Economy weak for the next two to three years, then pick up toward the end of the decade. Will flatten out in the 2020s. Overall, GDP growth will be below 2.5 percent over the next 20 years.

Workshop #1 Driving Force Feedback: Energy & Environmental Policy and Regulations

- Continuity of already-promulgated regulations
- Coal will be regulated as a solid waste, not hazardous waste.
- Federal renewable incentives
- Solid waste and coal ash regulations
- Incentives of CHP
- New coal plants highly unlikely - continued decline of coal, either with or without a CO_2 tax.
- Low gas cost
- Government incentives or mandates will push more energy efficiency
- Increased regulation and cost of carbon (at federal level) but not in Indiana.
- Compliance costs associated with air, water and waste will affect new generation choices.
- Increased competition and deregulation in energy policy.
- Future of carbon regulations - Carbon constraint is very important.
- Natural gas prices are very important.
- More use of natural gas to generate electricity – by customers to save money
- Political conflict and gridlock in short term creates uncertainty in environmental policy.
- Need to consider politics at national level
- GHG regulation in next 10-15 years
- No RPS in foreseeable future
- Some incremental federal legislation
- Most EPA regulations in place on expected time with the lowest restriction options
- Carbon regulation in 20 years
- Competition/deregulation
- Restrictions on coal and carbon emissions will slowly increase over the next two decades. Regulations on fracking will increase, although probably not at the federal level and Indiana will continue to trail trends in more environmentally friendly states.

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Workshop #1 Driving Force Feedback: Customer Values

- Customers will "push back" on electricity/gas/petroleum if costs reach 12% of disposable income
- Greater interest in customer self-generation, including solar and wind
- Energy consumption per capita = flat to slightly higher
- Young people are more exposed to energy efficiency, new technology, environmental awareness – but they won't want to give up their gadgets.
- Customer-owned generation will go up as financing is made available and/or costs go down
- Desire for personal energy independence
- Want more choices and competition to control costs
- Increased interest in environmental issues/savings among some (e.g. Google wants "green energy" to locate facilities), and others just wanting cheapest electricity
- Don't believe this is easily quantified; however, customer adoption will drive all other drivers
- Increased interest in environmental issues/savings among some, and others just wanting cheapest electricity
- Electricity use will be flat because of more EE but more devices
- Want energy choice and competition, independence
- Customers will gradually become more concerned about climate change as impacts such as summer heat waves, floods and droughts, and stronger storms become more frequent and extreme. As a result, in the 2020s people will embrace a less materialistic lifestyle.

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Workshop #1 Driving Force Feedback: Technology Innovation

- Renewable energy capital cost will decrease faster than traditional technology costs due to global demand.
- Whether renewable or coal, cost decreases due to:
  - Lower fuel component costs
  - Higher labor productivity = lower labor costs
  - Cost of private capital goes down faster than traditional
- Smart grid technology costs will decrease.
- Storage technology helps solar
- Use of more gasification technology at landfills.
- Traditional central station vs. distributed generation (DG) paradigm
- Demand-related
  - Smart grid
  - Building efficient technologies (renewable)
  - LED lighting & cooling
- Supply-related
  - Storage as a compliment to renewable
  - Biomass from waste (water)
  - Environmental controls keep existing units running
- Storage technology will be game-changer.
- Micro-grid movement
- DC over AC
- Solar photovoltaic to reduce peak load - pricing for solar PV (e.g. fee-in tariffs)
- Centralized vs. decentralized resources
- Micro-grid possibilities
- Photovoltaic
- Compressed air
- Battery storage
- Electric vehicles as resource
- Expansion of smart grid
- Cost of technology and renewables to go down
- Move to smaller scale wind turbines
- Need to look at gasifiers as emission technology instead of FGDs
- Distributed generation, solar to reduce peak loads, energy storage, micrograds, DC movement, technology lead time
- Energy efficiency technology will continue to improve significantly over the planning period, with net-zero buildings becoming common and appliance standards further reducing household electricity demand.

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Workshop #1 Driving Force Feedback: Load Growth

- 3 to +3%
- 1.3%
- 0.8 to 0.6 percent per year over the 20 year period
- Decoupling of GDP and energy growth
- Manufacturers shift away from self-production because of environmental controls. Utilities pick up more manufacturing need. Residential load grows faster than the economy.

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Workshop #1 Driving Force Feedback: Coal prices

- Rise of middle class in China = export coal to China
- To $3.5/MMBtu
- Remain flat
- $2-4/MMBtu by 2032

Workshop #1 Driving Force Feedback: Natural gas prices

- Volatile, but increases over 20-year period
- Depends on viability of syn-gas from coal
- To $8/MMBtu
- Increase dramatically $6-8/MMBtu
- $3.50-7/MMBtu by 2032

Workshop #1 Driving Force Feedback: Price of carbon emissions

- Implied price of carbon Active carbon market in Europe
- OFA influence in next four years vs. how much of Koch brothers' influence
- To $45/metric ton
- $17/metric ton in 2020; $30/metric ton 2032

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Workshop #1 Driving Force Feedback: Capital and Construction Costs

- Retirement of old coal plants
- What Deutsche Bank says about appetite for financial risk
- Smaller units with shorter lead times to bring online
- "Fiscal cliff" debate and resolution of U.S. debt
- Costs increase by 10%, renewables decrease by 15%

Duke Energy.

Prioritizing driving forces

- Prioritizing:
  - Energy & environmental policy
  - Technology
  - Customer value
  - Economy
- Add geopolitics as a driving force

Other comments

- **I based my answers for load growth and fuel prices on the AEO 2013 early forecast. I believe its higher load growth prediction (0.9%) doesn't sufficiently account for progress in energy efficiency and demand-side management. I allow for higher end-of-period prices for coal and natural gas. The carbon price comes from a 2012 Synapse report (**http://www.synapse-energy.com/Downloads/SynapseReport.2012-10.0.2012CO2-Forecast.A0035.pdf**) converted to metric tons.**

Duke Energy Indiana Stakeholder Workshop #2

January 30, 2013

NOTES

Welcome (slides 1-6)
Janice Hager

Ms. Hager described safety measures for the facility and room. She welcomed participants and asked who had attended the last workshop and who is attending for the first time; this was about an even split. She mentioned that we have set up Wi-Fi capability for this meeting, as requested by some last time. She gave a special thank-you to Alanya Schofield, who has been instrumental in developing the stakeholder outreach program and is now moving on to a different assignment.

Agenda Review (slides 7-11)
Marty Rozelle

Dr. Rozelle noted that the next workshop will be held on April 24. She reviewed the agenda for today, and briefly described the afternoon workshop exercise dealing with scenarios. The meeting ground rules were reviewed. The 19 participants introduced themselves, as did the Duke Energy staff representatives.

Workshop 1 Follow up (slides 12-16)
Marty Rozelle

Marty reviewed what we heard from participants at the last workshop, including both general comments and specific suggestions, and described how the comments were used.

Energy Efficiency & Demand Side Management (slides 17-28)
Michael Goldenberg & Robert McMurry

Mr. Goldenberg provided the working definitions of energy efficiency (EE) and demand response (DR). He described the regulatory framework including the Commission's Generic Phase II Order that requires all jurisdictions to offer five Core Energy Efficiency Programs supplemented by individual utility programs, and described mandated targets for EE over time. He described how these programs are evaluated for cost-effectiveness. Mr. Goldenberg noted the key EE assumptions that will be used in the 2013 IRP, as well as the key DR assumptions.

Mr. McMurry outlined how EE and DR are modeled in the IRP, noting that it's difficult to make predictions when the customer adoption rate or cost is unknown. High power costs make energy efficiency more cost-effective, but lower rates make it more challenging. He noted that the incremental cost of achieving higher EE over time increases significantly, as savings become harder to implement.

Q: Does Duke also consider the TRC (total resource cost) as well the UCT (utility cost test)?
A: Yes

Q: The slide is confusing in that incremental energy efficiency should be considered as a "resource" according to Commission's rule, i.e. as a way of meeting demand.
A: Duke follows the IRP rule requirement by assessing alternative methods for meeting demand with demand-side resources including demand response and conservation programs. These programs are believed to be firm resources that are not subject to the Duke Energy Indiana's required reserve requirements. These reserve requirements are determined based upon a probabilistic assessment of reserve margin needs per MISO zone.

Q: Will there be a portfolio that includes expanded EE?
A: Yes

Q: What are the penalties if utilities don't comply and meet the targets?
A: Penalties are not specified.

Q: A participant questioned the data shown on slide 25 from the 2009 EPRI study, as to growth factors by decade. Are these data similar to other studies for the Midwest? One participant said they are quite different from ACEEE studies.

A: The last study by Duke was done before ESA (Energy Security Act) and is outdated, so we are undertaking a new Market Potential Study specifically for Duke Energy Indiana; however, we need to use the best available information until that's completed.

Q: If this study won't be done until the end of the year, how can you put it into the IRP?
A: We'll use 11.9% as a proxy, which can be adjusted later.

Q: Why is Indiana's target adoption rate so low compared to other states, e.g. Arizona?
A: We don't know why other states have what they have, but we need to consider what will be most effective in our areas of operation. Our customer adoption rate is low, for example, in some programs that have been around for a long time like the free energy audit. We think 11.9% is relatively aggressive.

Q: How is the cost of EE programs calculated, e.g. avoided cost, future cost, and incremental efficiency?
A: We look at projected avoided energy cost, not the all-in rate.

Q: A participant requested a list of EE requirements in all Duke states, for distribution to the group.
A: We'll provide that.

Q: Will combined heat and power (CHP) be covered?
A: IT is not expected that CHP will not be covered in the Market Potential Study.

Q: As part of EE and DR, do you take into account redesigning the rate structure? The participant noted that in Florida there is a progressive rate structure, e.g. the more you use the more you pay. The point is that adoption and effectiveness of EE and DR depend on the cost of energy, so if it's expensive you try to save more – in Indiana it's cheap, so you don't.
A: None of us here can answer that question. We haven't considered revising Duke's rate structure for the IRP effort.

Q: How much are codes and standards are embedded into load forecasts? Can you break out EE from the load forecast? (no answer)
A: The estimated impact of present and future codes and standards is included in the load forecast; this is accomplished by including model variables that capture assumptions for appliance saturations and efficiencies. The data comes from the EIA and industry accepted data providers.

In a subsequent stakeholder meeting we will discuss load forecasting including naturally occurring and utility sponsored energy efficiency.

Renewable Energy (slides 29-53)
Andrew Ritch

Mr. Ritch outlined the technologies that are considered “renewable,” and showed maps of renewable resources by geographic region. Sometimes, areas of primary load aren’t located close to the generation resources, so transmission is needed. He noted a few key trends in renewables, and showed current government incentives for development. Duke Energy Indiana has about 2% total renewable generation now, which is comparable to other states, and includes Benton County Wind Farm and Markland Hydro Facility. He noted that the future voluntary targets include at least 4% for 2013 to 2018 increasing to 7% for the following six years. Trends that may influence the 2013 IRP include decreasing solar costs, phase-out of the Production Tax Credit, and environmental concerns about biomass.
The future targets mentioned refer to the goals established within Indiana’s recently adopted voluntary clean energy standard, otherwise known as the Comprehensive Hoosier Options to Incentivize Clean Energy (CHOICE), as follows:

- Goal period I: For the six (6) calendar years beginning January 1, 2013, and ending December 31, 2018, an average of at least four percent (4%) of the total electricity obtained by the participating electricity supplier to meet the energy requirements of its Indiana retail electric customers during the base year.
- Goal period II: For the six (6) calendar years beginning January 1, 2019, and ending December 31, 2024, an average of at least seven percent (7%) of the total electricity obtained by the participating electricity supplier to meet the energy requirements of its Indiana retail electric customers during the base year.
- Goal period III: In the calendar year ending December 31, 2025, at least ten percent (10%) of the total electricity obtained by the participating electricity supplier to meet the energy requirements of its Indiana retail electric customers during the base year

Comments: There was a discussion of creative opportunities for using baseload technologies like gas to support/enhance renewable generation, emergence of new financing models, whether the traditional utility business model encourages renewables, and possible timing on major changes in philosophy and investment shifts.

C: one person noted that he put a 4 KW solar system on his house, and for 11 months is energy net-zero.

Q: Is Duke a member of AWEA (American Wind Energy Association)?
A: Yes

Q: What do “basis points” mean in one of the slides?
A: It represents a fraction, e.g. 50 basis points is .5%.

Q: What is the rough range of capacity factor of Benton County Wind Farm?
A: 30-35%

C: There are additional costs and penalties sometimes associated with using renewable energy if congestion is an issue.
Yes – the comment refers to additional costs which are assessed in order provide an economic incentive to alleviate transmission line congestion during periods of high use.

Q: Duke has a storage project in Texas, so are you talking to them about lessons learned?
A: Yes

Q: What’s the timeline you’re assuming for long-range forecasts?
A: We assumed no new implementation for the first five years, with an increase of 1% per year to 2025. We also included carbon cost from 2020 to 2032. The 4% - 7% figures mentioned are the goals established within the state’s VOLUNTARY clean energy standard, not specific benchmarks that we have set as a company. The inclusion of renewable energy within the IRP is not meant to be a plan for meeting these voluntary targets.

Q: Can you translate this to $/watt (on slide 36)?
A: It’s about $1 to $1.50 per watt, but this will be updated.

The cost to install utility-scale projects has fallen dramatically and roughly coincides with the numbers that were mentioned, depending upon the technology. For smaller, residential-sized projects (approximately 5kw), these costs are somewhere in the neighborhood of $2.60-$2.80/watt to install.

Q: Are you looking at run-of-river micro-hydro?
A: We’re not sure, it’s very expensive, and there has been public opposition in places. It could be considered as a small part of a larger portfolio.

Q: Duke also owned another 5MW hydro facility that DNR now owns. Could you take it over again?
A: not likely

Q: Are you considering biomass? What else besides wood chips? (concern about animal waste)
A: Not specifically.

C: A participant noted that NIPSCO (Northern Indiana Public Service Co.) tariff incentives are now being used to develop biomass facilities in Indiana

Q: Will Duke Energy Indiana look at third-party sales?
A: We can't really do it under the current regulatory framework.

Q: How much of Duke Energy Indiana's load is residential v. commercial/industrial? Is one of those sectors growing more than others?
A: Roughly 30-35% is residential, on an energy basis. We will have more information at the April meeting.

LUNCH break

Scenario Recap (slides 54-62)
Robert McMurry

Mr. McMurry reviewed some of the key components of what we discussed at the first workshop in December. Today we'll focus on how we developed multiple scenarios and ask for your input on those. He noted that the criterion used for assessing scenarios is to find an "always-acceptable solution across a range of possible futures". Scenarios should force us to consider a robust range of possible futures. Their development is based on four driving forces as defined at the last workshop, and they are modeled using a range of key input variables. Energy portfolios are then developed that optimize the scenarios. When models show that the costs of various portfolios are very close, Duke may do a qualitative analysis looking at considerations like carbon footprint, water consumption, etc.

C: It was noted that there should be additional driving forces, including climate change and demography as it impacts competition for natural resources.

Q: A participant suggested that Duke policy, if proactive, can be a driving force for change. Right now, the impression is that Duke is in the middle but could be more active in promoting change, e.g. new technologies.
A: These are meant to be external drivers, whereas Duke policies could be considered internal drivers. We can talk about this more at the next workshop.

Q: Will you run models on all six scenarios? The TVA process was mentioned as an example of one that used more. This participant is concerned about too few scenarios not giving us a broad enough picture.
A: We would like to limit the number of scenarios that are modeled, since it takes about 100 runs per scenario. Sensitivities run on scenarios may be able to address this concern. Ms. Hager noted that she has researched the TVA process, at the suggestion of some at the last workshop, and thinks this approach will get us to a similar place; if not, we will adjust it later.

C: Aggregating trends into scenarios may skew the range of futures, e.g. some factors like climate change need to be included in every scenario.

Draft Scenarios (slides 63-79)
Scott Park

Mr. Park explained that the scenarios developed include a Duke “reference case” and five alternatives that reflect input from the previous workshop and internal Duke experts. He described each scenario and showed graphically where they fall on a spectrum of the range of driving forces.

Q: Do you think that climate change is adequately accounted for in all these scenarios/driving forces?
A: There is an implicit expectation about climate change in all scenarios, and one scenario explicitly focuses on it. The assumption is that past trends continue into future.

C: Key planning factors in Duke Energy Indiana service territory include ambient temperature, seasonal precipitation changes, events like the tornado warning last night in Columbus, etc. This participant doesn’t see this reflected in the scenarios, nor are factors like demographic change and the resultant competition for social capital. There should be more driving forces including climate change and demographics.

C: A participant described Monroe County efforts at energy education and conservation, and noted that the most ardent supporters are older people with a view to future generations.

Q: Empirically, when was the last time that oil and gas prices remained out of market sync with other energy resources?
A: If there is disparity, demand will adjust to equalize it. Duke’s view is that even if there is additional environmental regulation on natural gas extraction, this would be a small part of the overall price and not a driver to increase costs significantly.

Q: How do driving forces, inputs, and scenarios work together? Is there a prioritization?
A: We’ll talk about this more at the April meeting. In general, assumptions about the driving forces help us derive scenarios. Input variables to the driving forces help to derive energy portfolios.

Q: Can we take these worksheets back to our groups to discuss them, and then provide feedback and suggestions to Duke Energy Indiana?
A: Yes. We’d appreciate getting comments back by February 6. You can email them to *2013INIRP@duke-energy.com*

Q: How does this modeling compare to what the State Utility Forecasting Group (Dr. Gotham) does?
A: The State is one step back from this; they don't go into the IRP process of determining where the needs and resources come from.

C: One participant compared the scenario development process to trying to pack a suitcase for a trip, without knowing exactly what the weather will be like or what you'll be doing. This analogy was appreciated by the group.

Workshop Exercise Discussion & Results

Initial Tally of Preferences

Scenario Pairs	# of Preferences
G/DF	4
G/DW	5
G/CC	2
G/SELG	1
DF/DW	1
DF/CC	--
DF/SELG	--
DW/CC	3
DW/SELG	1
CC/SELG	2

Discussion on Pros & Cons of Scenarios / Pairs
(in order of preference)

G/DW (5)

A Very Green Future:

- Becoming more environmentally-focused as a society because of greener values & increased instability in weather
- More entrepreneurs going into clean energy sector
- Personal health problems (asthma etc., stress from reduced water quality)
- Most optimistic – robust growth, people not solely focused on cost = happier
- Bookends other futures = breadth of alternatives
- Should be placed more toward the middle of the spectrum – is unnecessarily negative based on recent improvement in the field

A Distributed World:

- Increased personal responsibility for consumption and generation
- Energy independence
- Fits with long-term trend of "disintermediation" (people getting closer to the source, e.g. removal of intermediaries, reduced layers of management, e.g. power = generation on the roof)
- More people giving up on government solutions in exchange for self empowerment
- New novel financing options historically have been encouraged by govt. subsidies
- Improved efficiency as compared to historical grid

Pairing:

- They're symbiotic: distributed generation fits with renewable resources + efficiencies due to reduced transmission losses
- Wider range of sensitivities than some other pairs (Does this impact the validity of the pairing? This could be looked at as a good thing in creating a wide range of futures.)
- Provide a range of alternatives relative to the Base Case

G/DF (4)

Domestic Focus:

- Perception of increasing geopolitical instability, so we want to retrench
- Farther out on the extremes, so we get a wider range of options

DW/CC (3)

Climate Crisis is Upon Us:

- There have been so many dramatic climate events in recent years
- High insurance payouts will cause political pressures
- Regional focus that aligns to what's happening in transmission
- I believe in science
- Scientific evidence of polar ice cap melting becoming more accepted politically
- Water accessibility, e.g. dryer summers/wetter winters, utilities are big water users
- Fear among the public – tend to act when driven by fear
- As climate change increases, there will either be a movement towards greater regulation, or less (everyone for himself)

Pairing: Both appear accurate

G/CC (2)

Pairing:

- Based on conversations with their constituency, people said they're interested in renewables because of climate change.
- Does "green" just mean big wind farms? This is not appropriate distributed generation.
- This pair is very close on all drivers except economic outlook, so don't represent a good range.
- While Duke doesn't control a lot of the driving forces, nobody controls the climate. The green scenario suggests a bit more ability to control the outcomes.

CC/SELG (2)

Strong Economy & Less Government:

- This is a dominant political reality in Indiana = strong component of future, realistically

Pairing:

- Two opposite ways of looking at what's happening
- Climate change predicts a lot of things that are uncomfortable, whereas SELG included "climate-change deniers" – so wide range of alternatives

G/SELG (1)

Pairing:

- SELG represents such a bleak future that nobody would want to live in it, while green is more optimistic
- Climate change addressed through private sector initiatives

DF/DW (1)

Pairing:

- Reliance on domestic fossil fuels is a reality, whether we agree with it or not – it's an economic driver for applicable regions

DW/SELG (1)

- Makes sense to have a very wide range of possibilities

DF/CC (0)

DF/SELG (0)

Final Thoughts

- Some participants think that having only 2 scenarios puts too many constraints on the analysis. Duke hopes that using a robust range of sensitivities can address this to some extent.
- At the next workshop, participants would like a better explanation about how these choices affect the modeling process, e.g. is it "what do we want?" or "what do we need to reflect a reasonable range"?
- If you don't submit comments on the scenarios today, please submit them by February 6.
- To allow participants to share information among them, Duke will create a list serve. Anyone who'd like to be included should email your address to Bobby McMurry at *2013INIRP@duke-energy.com*
- Thanks to everyone for taking the time to attend and provide your ideas and thoughts. The next workshop will be held on April 24.

Notes submitted by Debra Duerr, The Rozelle Group Ltd.

2013 Integrated Resource Plan

Stakeholder Workshop #3

April 24, 2013
Plainfield, IN

Doug Esamann, State President- Indiana, Duke Energy

Welcome

2

Welcome

- Safety message
- Why are we here today?
- Objectives for stakeholder process
- Introduce the facilitator

DUKE ENERGY.

Why are we here today?

- Duke Energy Indiana developing 2013 Integrated Resource Plan (IRP)
- Proactively complying with proposed Commission IRP rule
- Today is the third stakeholder workshops

DUKE ENERGY.

Objectives for Stakeholder Process

- **Listen:** Understand concerns and objectives.
- **Inform:** Increase stakeholders' understanding of the IRP process, key assumptions, and challenges we face.
- **Consider:** Provide a forum for productive stakeholder feedback at key points in the IRP process to inform Duke Energy Indiana's decision-making.
- **Comply:** Comply with the proposed Commission IRP rule.

5 DUKE ENERGY.

The Facilitator

- Duke Energy Indiana hired Dr. Marty Rozelle of The Rozelle Group and her colleagues to:
  - Help us develop the IRP stakeholder engagement process
  - Facilitate and document stakeholder workshops

6 DUKE ENERGY.

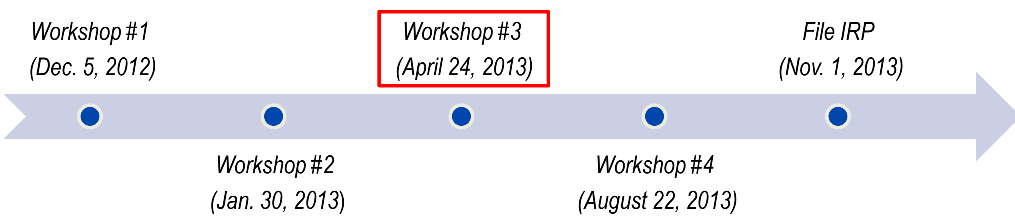
Marty Rozelle, President, The Rozelle Group

Agenda & Introductions

DUKE ENERGY

Engagement Process Overview

- Third party, unbiased facilitator
- Involving stakeholders from the beginning of the IRP development
- Four stakeholder workshops
- Informative presentations and interactive workshop exercises
- Summaries on IRP website (www.duke-energy.com/in-irp)



DUKE ENERGY

Agenda

9:00	Registration & Continental Breakfast
9:30	Welcome from Doug Esamann
9:40	Agenda Review and Introductions
9:55	Review of Workshops 1 & 2
10:15	Load Forecasting: Jose Merino- Director, Load Forecasting & Fundamentals
11:00	Market Fundamentals: Kevin Delehanty, Director, Market Fundamentals
11:45	Lunch
12:30	Review of Scenarios: Scott Park, Lead Economic Planning Analyst, IRP
1:00	Portfolio Discussion
1:30	Assumptions Discussion & Exercise: Robert Mc Murry, Director, Midwest IRP
3:15	Wrap up and next steps

Ground rules

- All agree to act in good faith with open minds
- Start on time and stay on schedule
- Raise your hand to be recognized by the facilitator
- Be concise and stick to the topics on the meeting agenda
- Respect others and do not interrupt
- Turn off phones

Introductions

- Participants
- Duke Energy

11

DUKE ENERGY

Marty Rozelle, President, The Rozelle Group

Review of Workshops 1 & 2

12

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Review Workshop 1 & 2

Workshop 1

- Background on IRP process
- Discussion of Driving Forces in order to develop Scenarios

Workshop 2

- Discussion of Energy Efficiency & Renewable Energy
- Scenario development exercise

13

Feedback from January 30th Workshop

- Received variety of feedback on the process and content
- Will ask for feedback again at the end of today's workshop

14

Questions & Comments from January Workshop

We heard from you…

Provide explanation of drivers/scenarios/portfolio interrelationships in analytical process

Provide range of key variables

More complete explanation of modeling process and how stakeholders input will be used

Flow chart on decision making

Discuss outputs of modeling process and how this information will be analyzed

Amend net metering tariff; incentivizing renewables; customer choice and deregulation

15

Questions & Comments from January Workshop

We heard from you…

Monte Carlo Simulation should be used; discuss how to make up for not using MCS

Add avoided cost to IRP discussion

Review voluntary RPS

Show EE assumptions in all Duke states

16

Jose Merino, Director, Load Forecasting & Fundamentals

Load Forecasting

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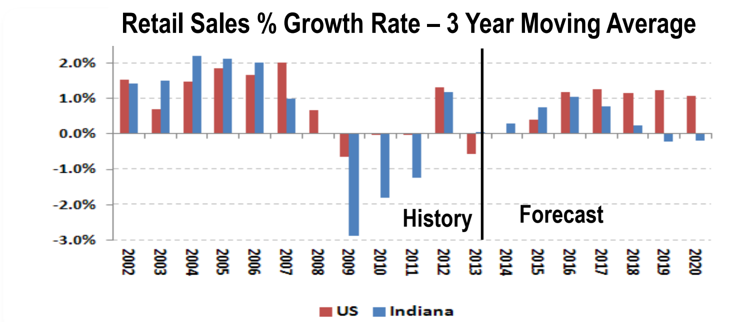
I. Sales Growth Trends Duke Energy Indiana vs. US: History and Projection



Last 10 years:

Boom and bust cycle (residential, industrial)
Higher credit availability
Higher customer expenditures
Higher energy use per customer
Businesses became more productive

Next 10 years:

Don't expect another severe recession
Credit limited to a smaller share of population
Customer deleveraging
Lower projected energy use per customer
Business productivity continues

The historical US electric sales were taken from EIA's table 8.9 "Electricity End Use 1949-2011", the forecast is based on EIA's 2013 AEO early release
The Duke Energy Indiana retail sales are weather normalized and reflect the estimated impacts of Core and Core Plus energy efficiency programs

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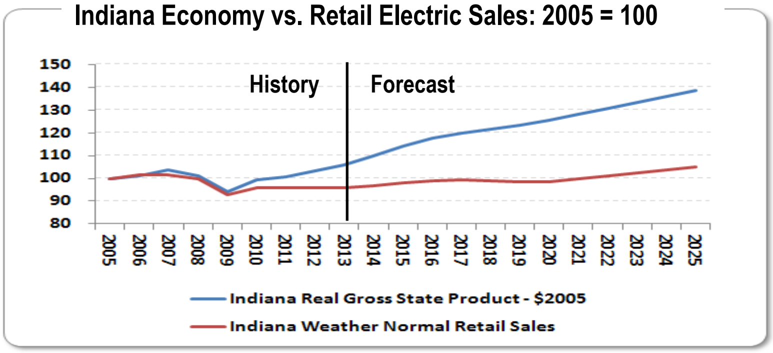
II. Relationship Between Duke Energy Indiana Electric Sales & Indiana Economic Activity



- Electric sales forecast includes projected impact of Energy Efficiency, Codes & Standards, Retail Rates in addition to population and economic growth

The Duke Energy Indiana retail sales are weather normalized and reflect the estimated impacts of Core and Core Plus energy efficiency programs

19

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III. Forecast Methodology: Energy Sales Forecast Drivers

Retail Load

System Load

Residential
- Population
- Income
- Rates
- Appliance Saturations & Efficiencies
- Weather

Commercial
- Employment
- Retail Sales
- Income
- Rates
- Weather

Industrial
- Manufacturing GDP
- Rates
- Price of Alternative Fuels
- USD exchange rate vs. fx index

Government
- Employment
- Rates
- Weather

Wholesale
- Contract by Contract
- Retail Growth

- Duke Indiana load forecast is based on a bottom-up approach (projections by customer class)
- Duke Energy uses economic, price, weather and efficiency variables to project energy sales
- The relationship between the sales drivers and energy sales is constantly being updated

20

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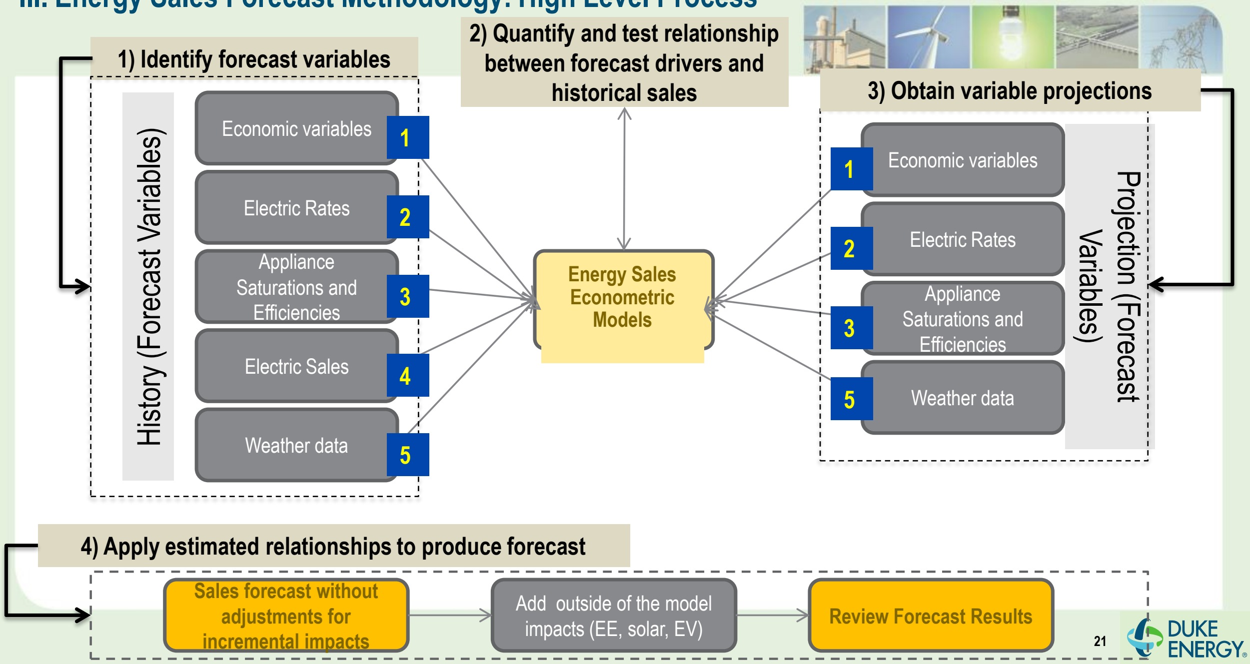
III. Energy Sales Forecast Methodology: High Level Process



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III. Energy Sales Forecast Methodology:

Forecast Drivers	Specifically Modeled	Implicitly Modeled
Economic variables	X	
Price variables (retail rates, gas prices)	X	
Weather	X	
End-use efficiencies and saturations	X	
Energy Efficiency – Utility Sponsored	X	
Electric vehicles, net-metering solar	X	
Energy Efficiency – Naturally Occurring		X
Manufacturing and service productivity trends		X
Customer behavior		X

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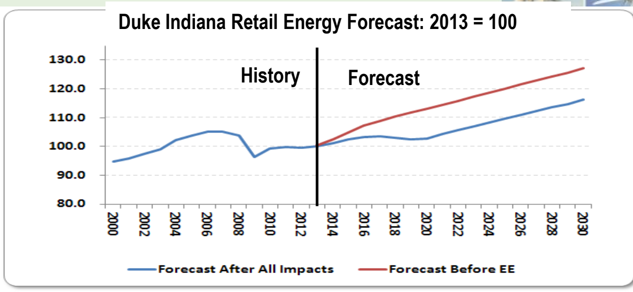
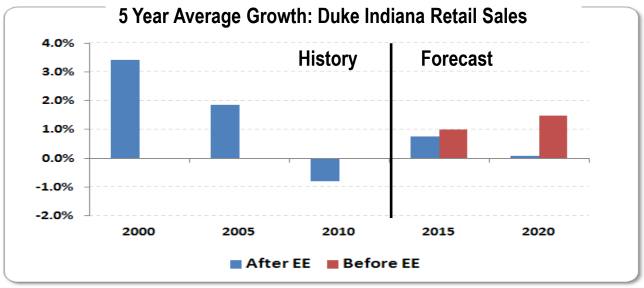
IV. Emerging Trends: Energy Efficiency





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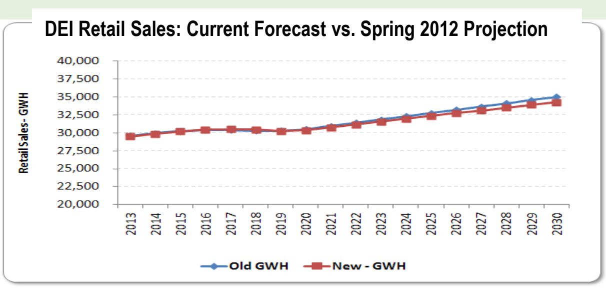
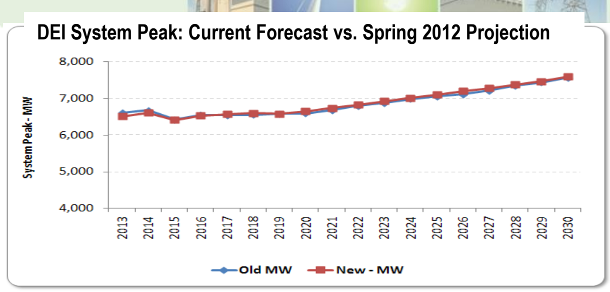
V. Duke Energy Indiana Current Forecasts vs. Spring 2012 Projections





Main drivers for slight difference between current forecast vs. Spring 12 Projection

- Updated economic projections
- Updated customer growth assumptions

Duke Energy Indiana's retail sales are weather normalized and reflect the estimated impacts of Core and Core Plus EE programs; data shows reflects at generation level
Duke Energy Indiana 's system peak load represents peak demands which include the impact of Core and Core Plus EE programs but excludes demand response

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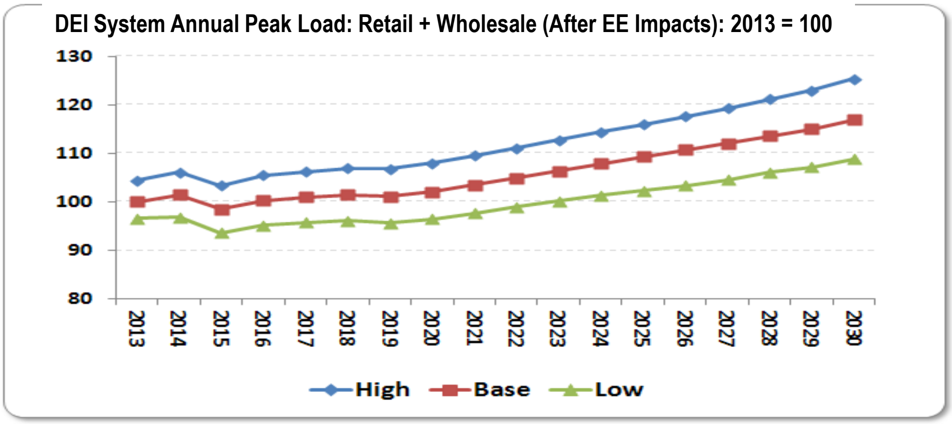
VI. Duke Energy Indiana System Peak Forecast Range



- There is a 95% probability that the expected system peak value is between the high and low lines, given current economic, retail rates, efficiency and customer growth assumptions
- The projected 2014-2030 average growth rate is 0.4%, 0.5%, 0.6% for low, base, high, respectively

Duke Energy Indiana 's system peak load represents peak demands which include the impact of Core and Core Plus EE programs but excludes demand response

25

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Kevin Delehanty, Director, Market Fundamentals

Market Fundamentals

26

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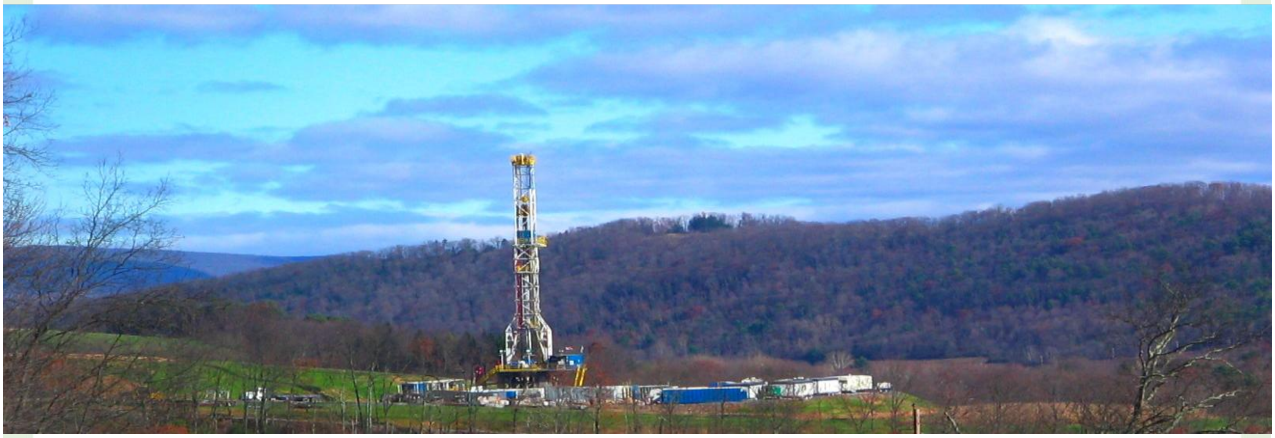
Indiana IRP Stakeholders Meeting



2013 Duke Fundamental Commodity Price Forecast

April 24th 2013

So what exactly is the "Duke Fundamental Commodity Price Outlook?"

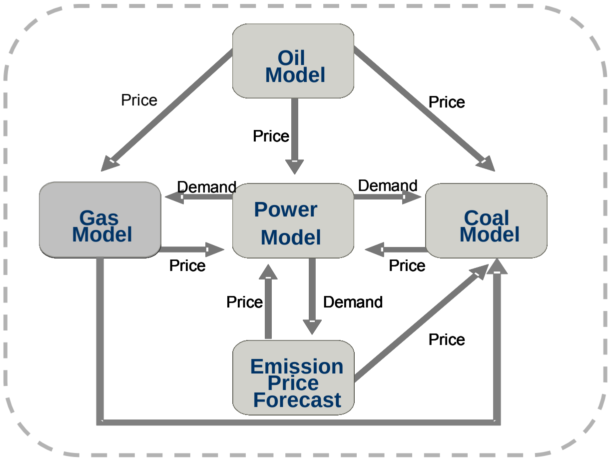
- A comprehensive, internally consistent, forecast of supply, demand and future market prices for coal, natural gas, oil, power, and emissions allowances
- Duke contracts with leading energy consultants to perform the modeling and provide certain data
  - Past providers: (EVA, CERA, ICF, Global Energy, Ventyx and Wood Mackenzie)
- Process relies on internal subject matter experts to recommend input assumptions and validate the results
- Inform senior management and build a consensus view
- Market awareness and accountability:
  - Forecasts are built upon a wide array of assumptions
  - Important to understand the "critical" assumptions that drive the results
  - Develop major scenarios and sensitivities ranges around key inputs
  - Check alignment of corporate strategic initiatives
  - Make timely adjustments as conditions change

Typical Process Used to Develop the Long Term Commodity Price Inputs to Duke's IRP Planning Models

Process Steps

- Starts with consultant's reference case
- Duke reviews reference case and suggests changes to assumption set
- Consultant then re-runs the modeling process with the Duke assumptions
- Duke validates the results with internal subject matter experts
- Management review and formal sign off prior to inclusion in the IRP
- Fundamental prices are merged with current forward market and plant specific data (fuel, transportation contracts)

Diagram of Typical Fundamental Modeling Process



Duke IRP Model Inputs: (delivered fuel costs, wholesale energy prices, capacity prices)

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Natural Gas

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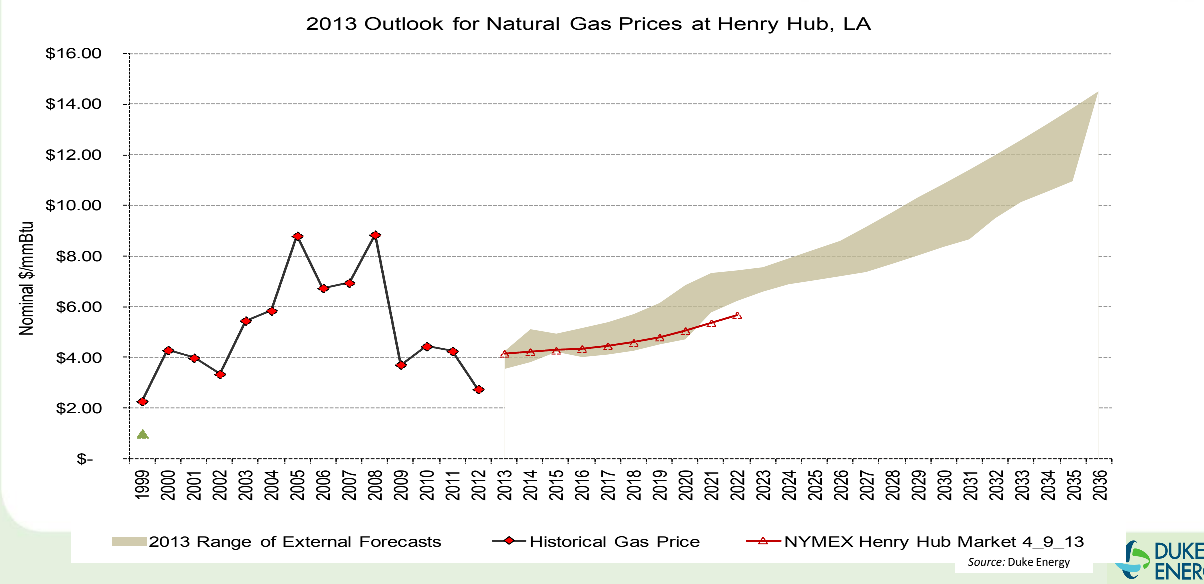
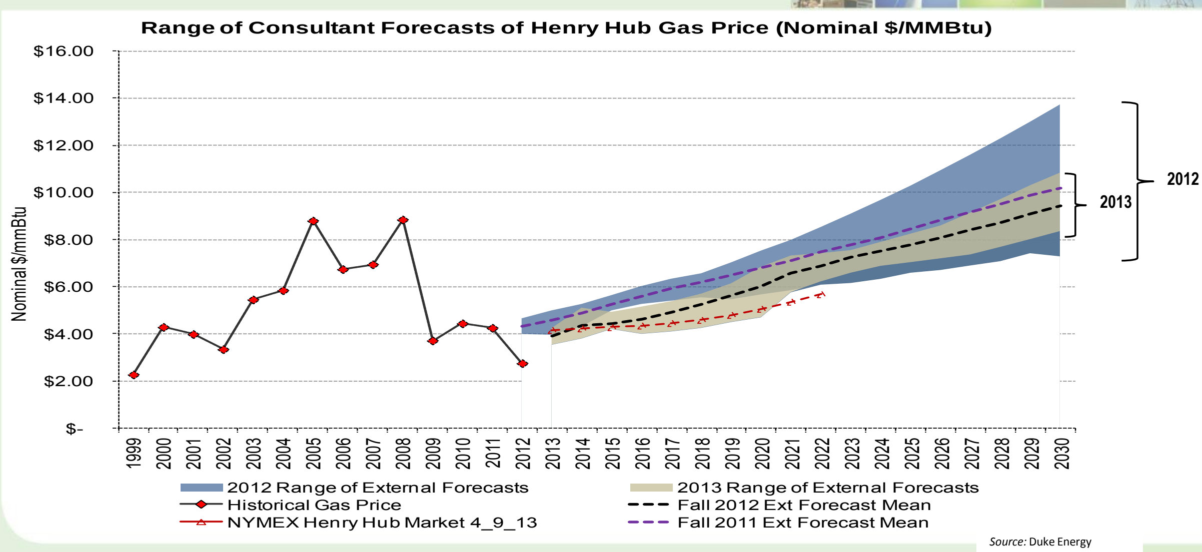
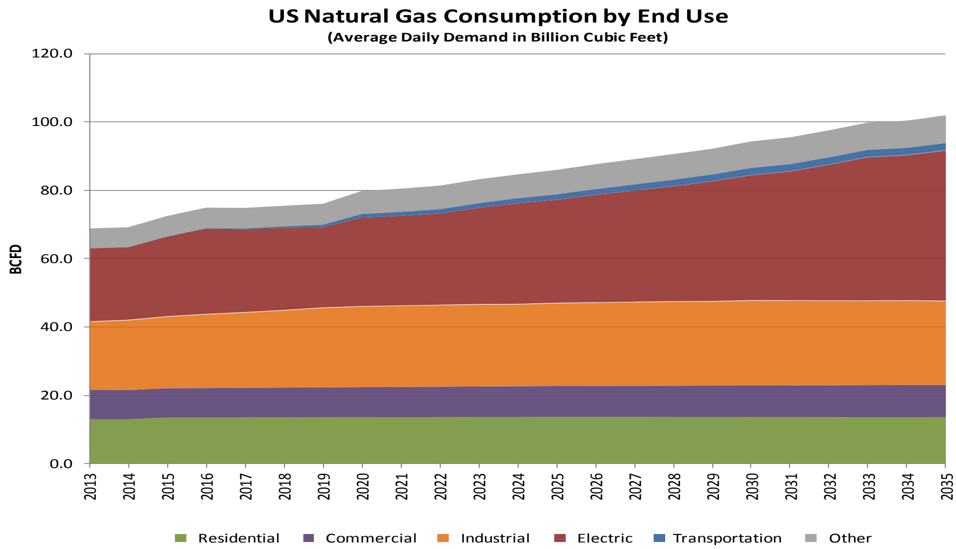
Range of Fundamental Outlooks for US Natural Gas Prices



The Range of Published Long Term Gas Forecast Views Has Tightened Considerably Over the Past Year



Most of the Growth in Demand for Natural Gas is Expected to Come from Power Generation



Source: Duke Energy

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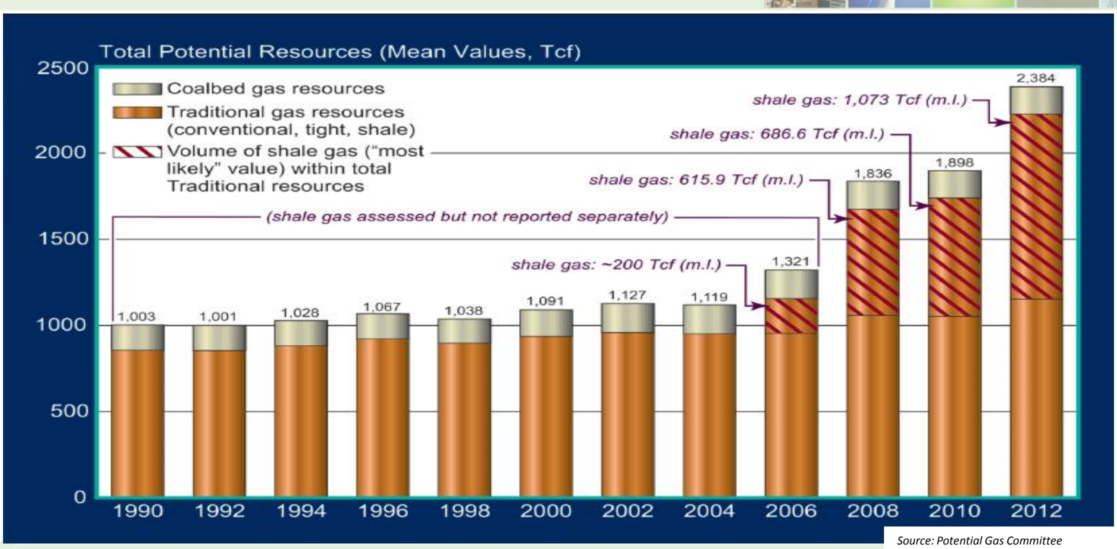
The Potential Gas Committee* Just Raised Their Total Resource Potential Estimate for the US by 25%



Source: Potential Gas Committee

* The potential gas committee is a non profit organization of mostly volunteer geologists & engineers, sponsored by the Colorado School of Mines to assess the total US resource potential

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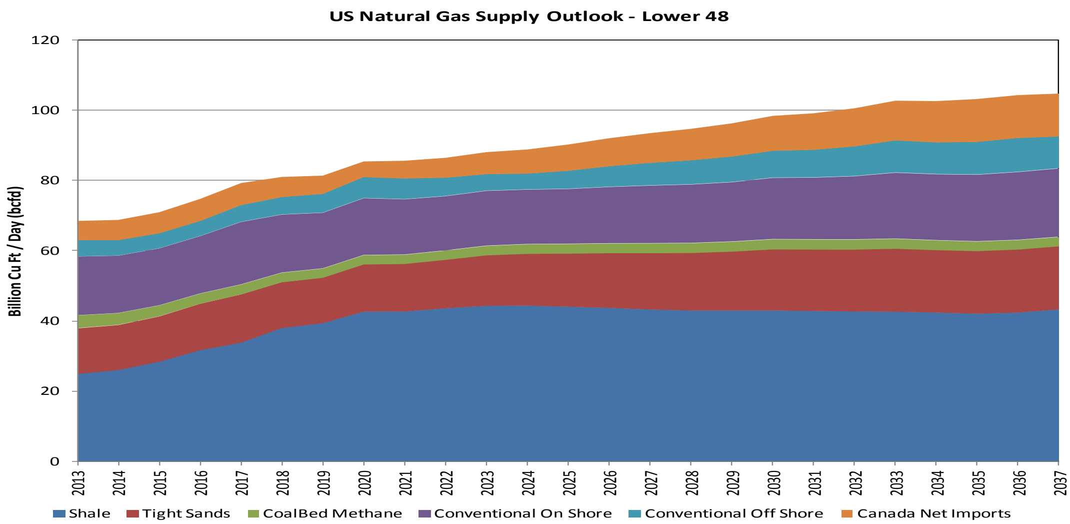
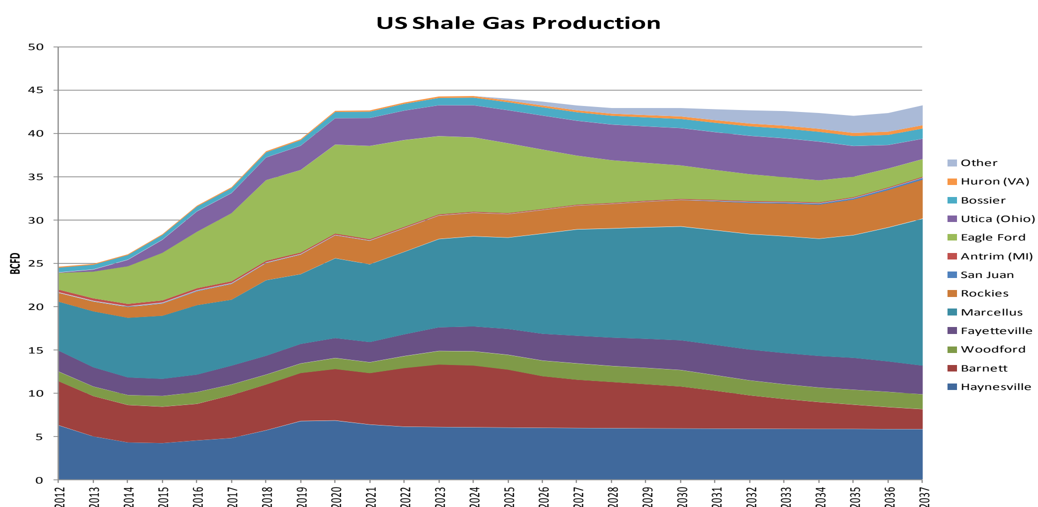
US Production Growth is Dominated by Unconventional Sources for Natural Gas



Source: Duke Energy

Near Term Growth In Liquids-Rich Eagle Ford Shale Gives Way To Long Term Growth in the Marcellus



Source: Duke Energy

Coal

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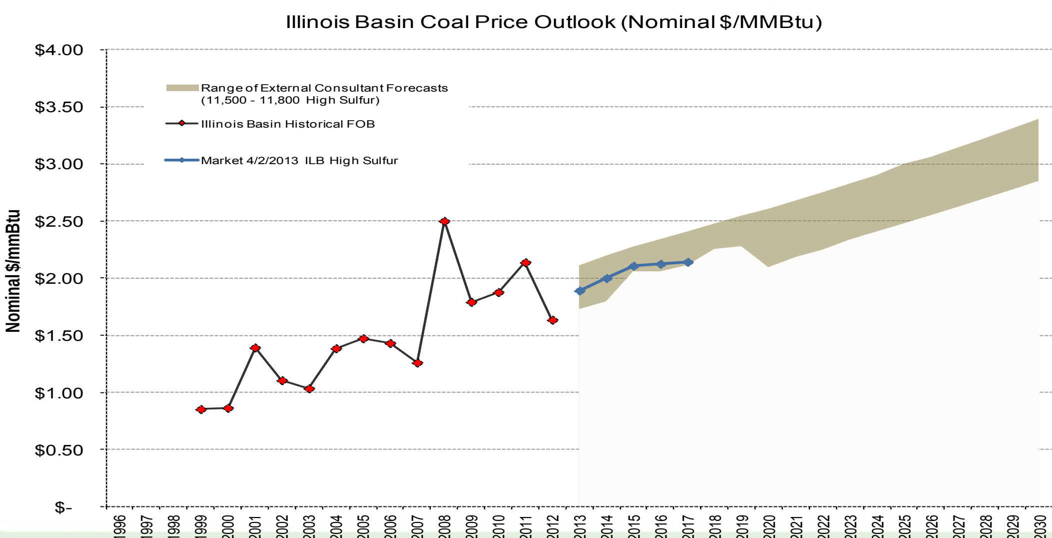
Range of Illinois Basin Coal Prices Remains Wide Even though the Resource Base is Well Known



Source: Duke Energy

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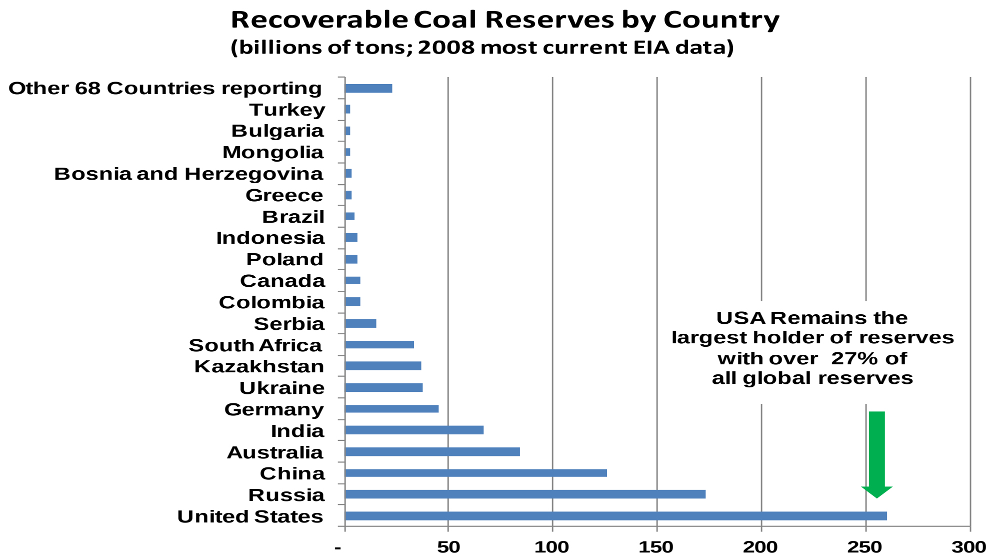
US Coal Supply – Future Challenges Mainly "Above Ground" Issues: Permitting, Safety, Climate Change, Natural Gas Prices



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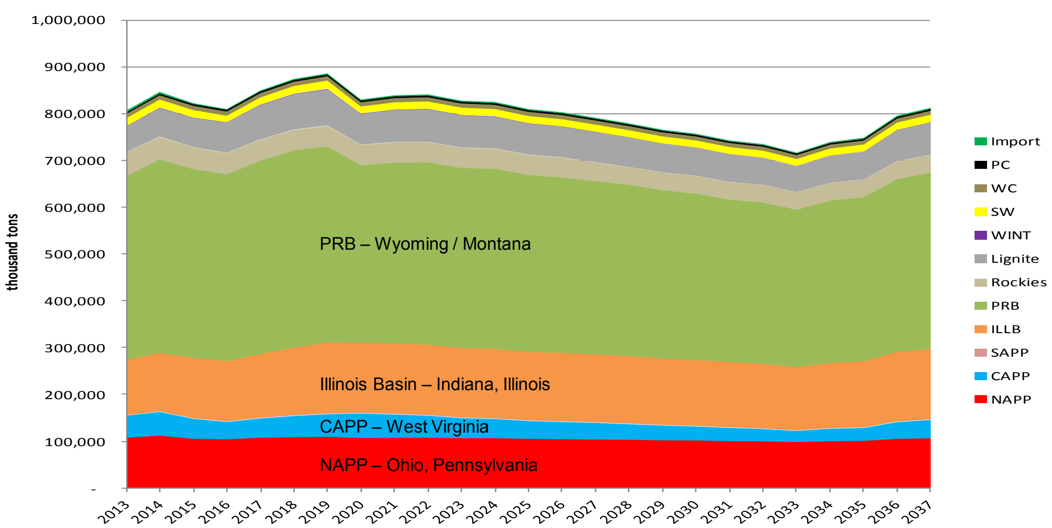
US Coal Supply by Source Basin



Source: Duke Energy

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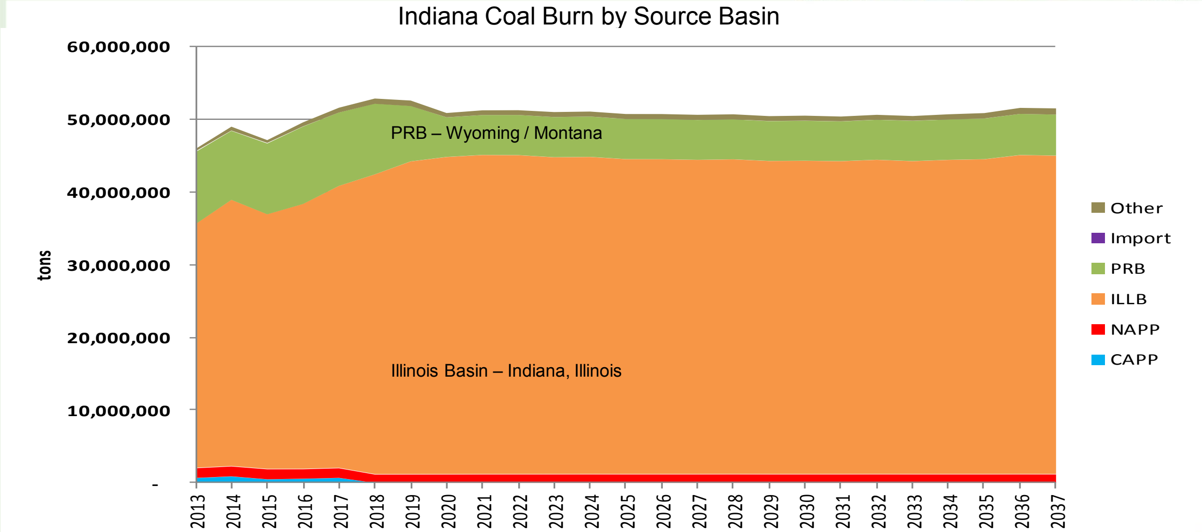
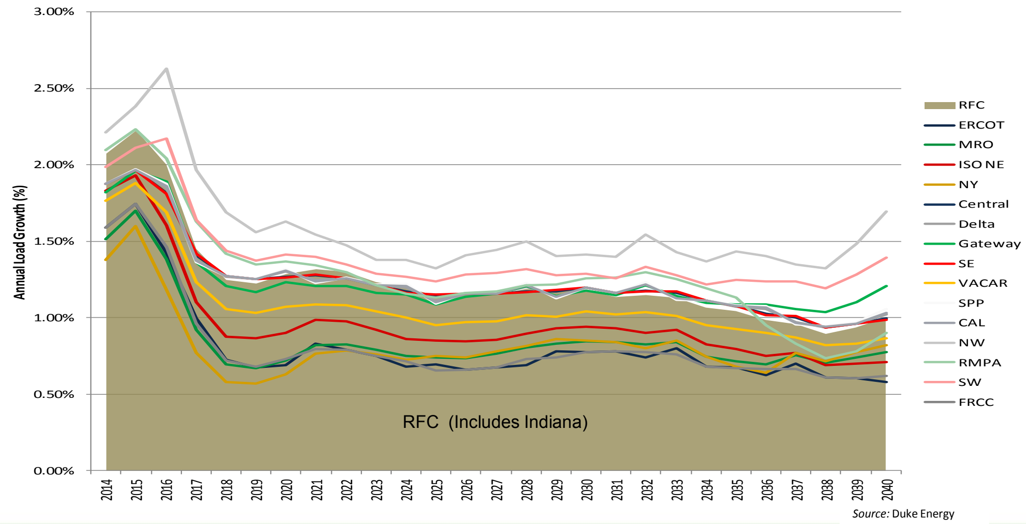
Indiana is Projected to Burn a Larger Share of Local Illinois Basin Coal Once all the Environmental Controls are in Place



Source: Duke Energy

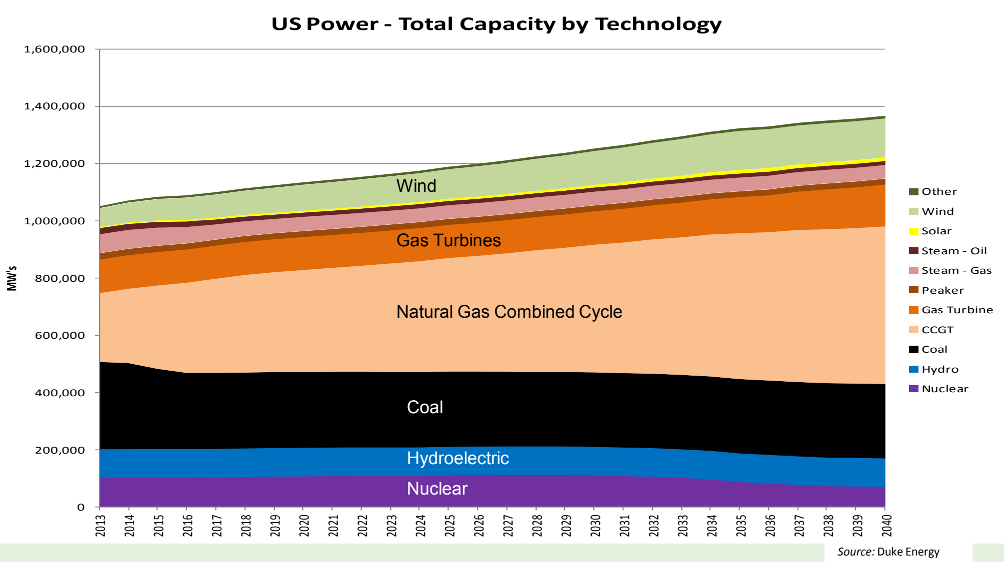
Power

Forecasted Electric Sales Growth (by NERC region) Moves Higher in the Near Term then Drops To Around 1% Long Term



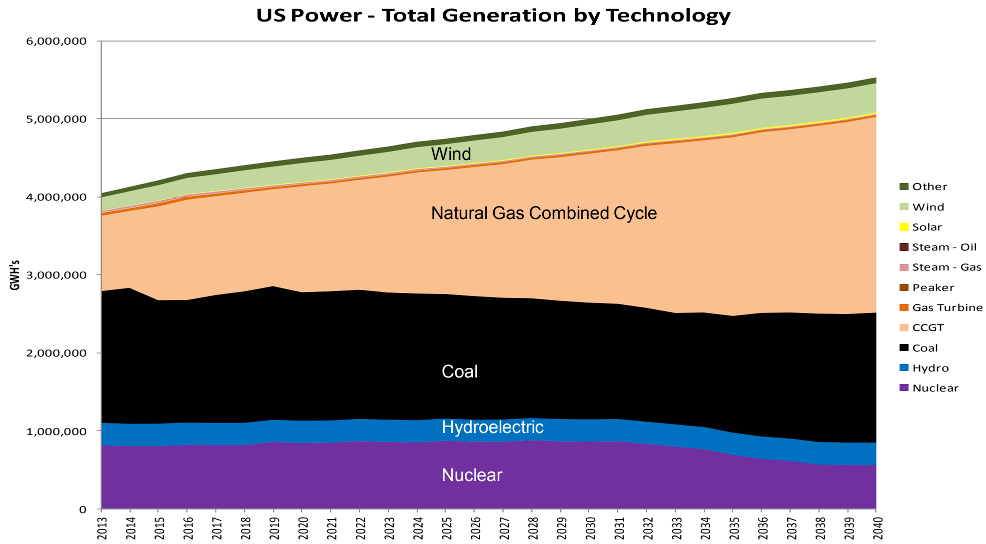
Source: Duke Energy

Long Term US Generating Capacity Shifts Toward Gas and to a Lesser Degree Renewable Sources



Source: Duke Energy

Long Term US Generation Fuel Mix Shifts Toward Gas



Source: Duke Energy

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Scott Park, Lead Economic Planning Analyst, Integrated Resource Planning

Overview of Scenarios

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Overview of Scenario Development

- Workshop #1: Discussed driving forces & input variables
- Workshop #2: Discussed draft scenarios
- Today, we will:
  - Share final scenarios
  - Discuss portfolios
  - Discuss assumptions of key variables

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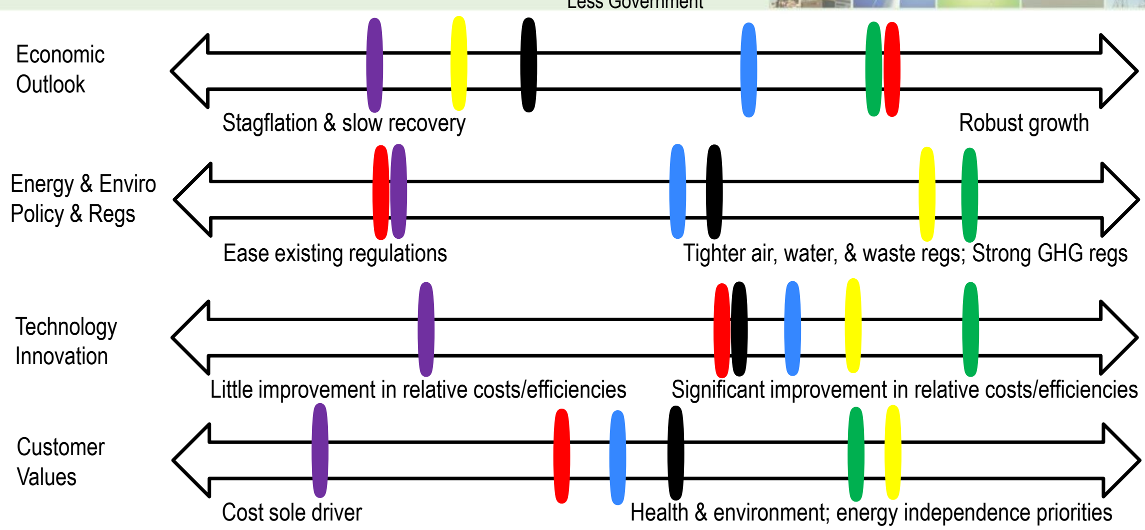
Scenarios 1 - 6 Driving Forces

- Duke Reference Case
- Green Future
- Domestic Focus
- Distributed World
- Climate Crisis
- Strong Economy & Less Government



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Stakeholder scenario selection from Jan 30 meeting

Scenario Pairs

- Green Future & Distributed World
- Green Future & Domestic Focus
- Distributed World & Climate Crisis
- Green Future & Climate Crisis
- Climate Crisis & Strong Econ / Less Government

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Scenario Consolidation

The results of the stakeholder scenario exercise led to the consolidation of 6 scenarios to 3 scenarios

1. Duke Energy Reference Case

2. Environmental Focus Case
   - Green Future
   - Climate Crisis
   - Distributed World

3. Low Regulation Case
   - Domestic Focus
   - Strong Economy / Less Government

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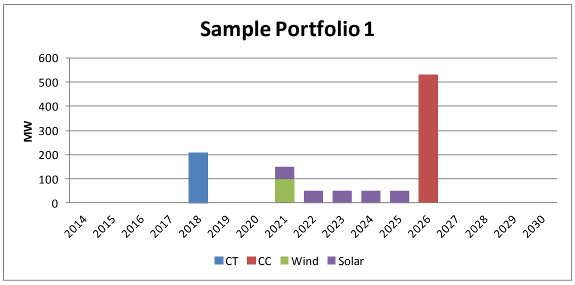
Scott Park, Lead Economic Planning Analyst, Integrated Resource Planning

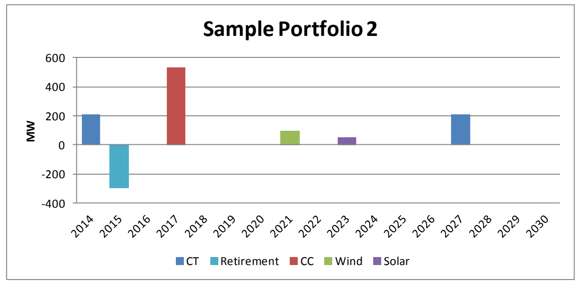
Portfolio Discussion

What are the Goals & Constraints of the IRP?

- The objective of the IRP is to produce a robust portfolio (resource plan) that meets the load obligation while minimizing the present value of revenue requirement (PVRR)
- Subject to:
  - Adhering to laws and regulations
  - Meeting reliability and adequacy requirements
  - Being operationally feasible
- An IRP is developed every two years and provides the strategic flexibility to alter the resource plan as issues develop and more information is learned

What does a portfolio look like?





53

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How are Portfolios Determined & Modeled?

- A capacity expansion model solves for the least cost portfolio (based on PVRR) given a set of inputs
  - Inputs: Scenario assumptions
  - Outputs: portfolios and cost data
  - Subject to meeting the net needs of the system while satisfying reserve adequacy requirements
- A more detailed production cost model is used to evaluate each portfolio in each scenario and sensitivity
  - Also in terms of PVRR
  - Includes environmental costs such as CO2, SOx & NOx
- Additional volumes are also quantified
  - CO2, SOx & NOx emitted
  - Water usage & Ash produced
- Model results are analyzed with respect to cost, risk and other attributes

54

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Portfolios Evaluation Example

- In our particular situation, assume that
  - Portfolio A is the least cost plan for the Environmental Focus Case
  - Portfolio B is the least cost plan for the Duke Energy Reference Case
  - Portfolio C is the least cost plan for the Low Regulation Case
- A note about model runs- they are an important consideration and represent a significant effort
  - To evaluate the 3 portfolios in 3 scenarios in the example above would be a minimum of 9 model runs
  - Add a low and high sensitivity for each of the 9 variables increases that to a minimum of 162 model runs

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Example of Results Matrix

PVRR ($)	Portfolio A	Portfolio B	Portfolio C
Environmental Focus Case	110	115	130
Duke Reference Case	105	100	110
Low Regulation Case	100	95	90

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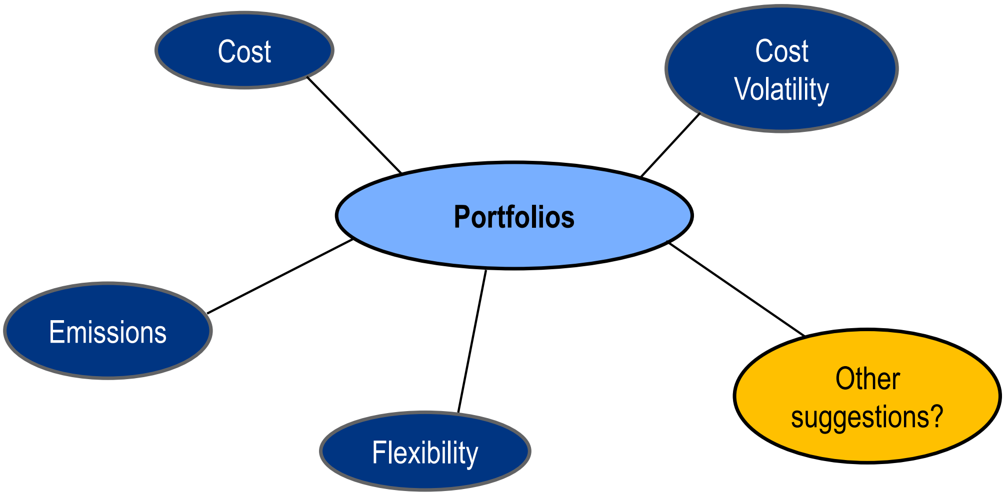
What attributes should be used to evaluate the portfolios?



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Risk Management

- What do we mean by risk?
  - A low risk portfolio is one that is relatively stable under a variety of assumptions
    - Scenarios
    - Sensitivities
- How can we measure risk?
  - Long term PVRR for Scenarios & Sensitivities
  - Short term PVRR for Scenarios & Sensitivities
  - Environmental attributes such as CO2, NOx, SOx, waste, water and other potential regulations
- IRP is updated every two years and provides the strategic flexibility to alter the resource plan as issues develop and more information is learned

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Robert Mc Murry, Director, Midwest IRP

Discussion & Exercise on the Reasonable Range for Assumptions

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Assumptions Exercise

- Objective
  - Stakeholder input on the reasonable ranges for key assumptions.
    - Feedback on ranges will be considered in defining the basis for each scenario and help define the range of sensitivities to be considered.
- Proprietary Information
  - Many of the assumptions that we will use are proprietary and public disclosure of this information could harm the competitive position of the company.
  - To mitigate this risk, we are presenting representative information of Duke Energy's view

60

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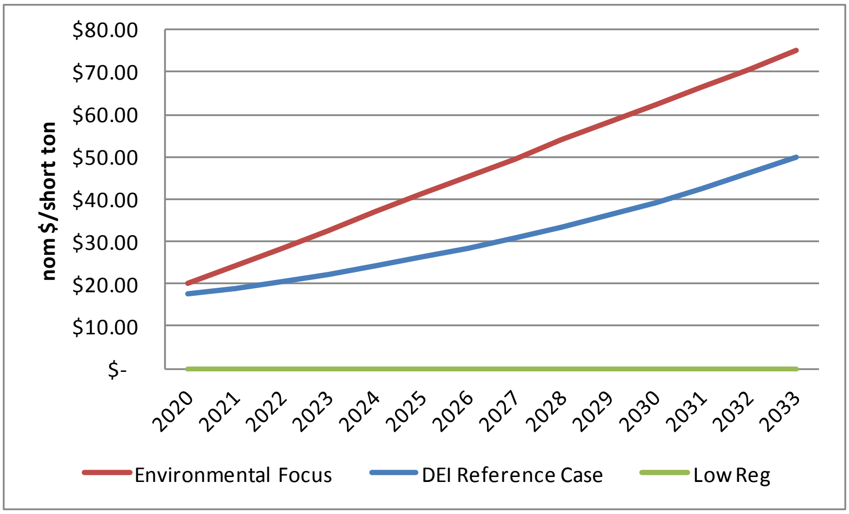
CO2



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National Ambient Air Quality Standards (NAAQS)

- Duke Energy Reference Case & Low Regulation Case
  - No additional SO2 requirements
  - Additional NOX reductions for units w/o SCR or SNCR
    - 0.15lb/mm > 400 MW (by 2020)
    - 0.25lb/mm < 400 MW (by 2020 in the Ref Case; by 2025 in the Low Regulation Case)
- Environmental Focus Case
  - Scrubbers for SO2 control & Selective Catalytic Reduction for NOx control.
    - Units >400 MW by 2020
    - Units < 400 MW by 2025

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316b & CCB

316b - Section of the Clean Water Act that addresses Fish Impingement & Entrainment

- Duke Energy Reference Case & Low Regulation Case
  - Lower intake velocity screens required by 2016 in the Ref Case; by 2020 in the Low Regulation Case
- Environmental Focus Case
  - Modified intake structures required by 2018.

Coal Combustion By-Products (CCB) that addresses fly-ash, bottom ash, scrubber by-products

- All scenarios assume that ash will be dry stored in lined landfills and designated a non hazardous.

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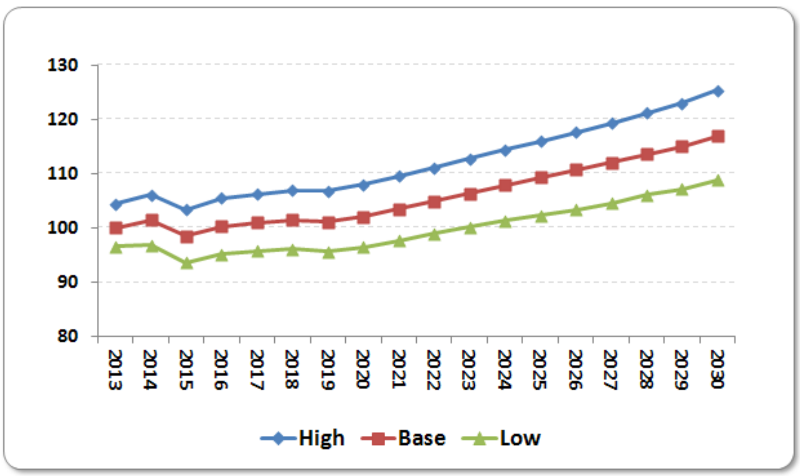
Indiana Load Growth

DEI System Annual Peak Load Scenarios: Retail + Wholesale (After EE Impacts): 2013 = 100



Note: Applicable to all three scenarios.

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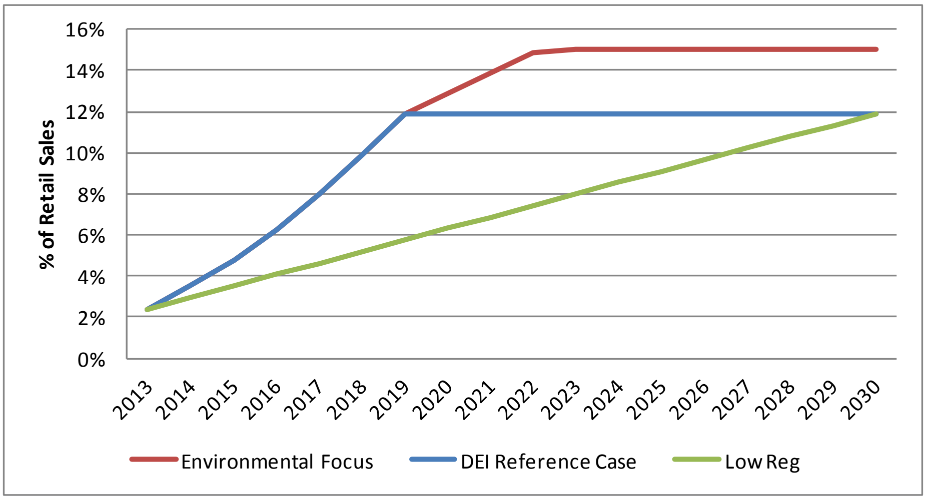
Energy Efficiency



65

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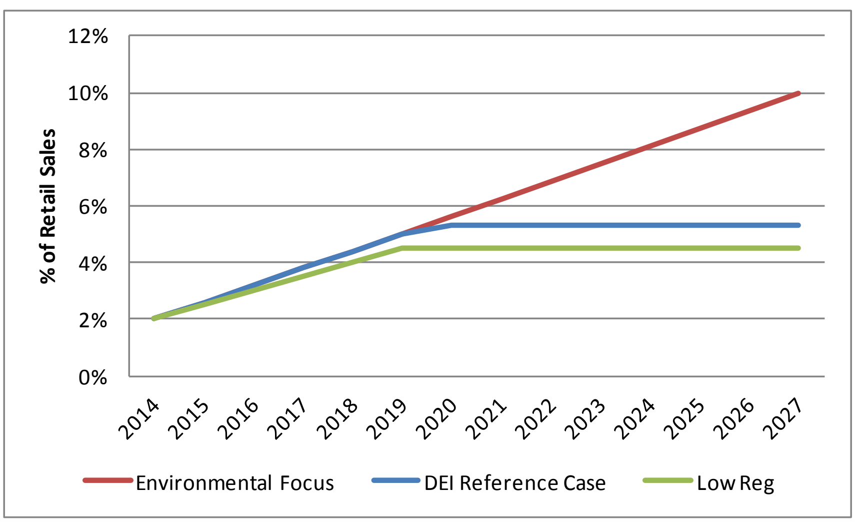
Renewable Energy in Indiana (minimum requirement)



66

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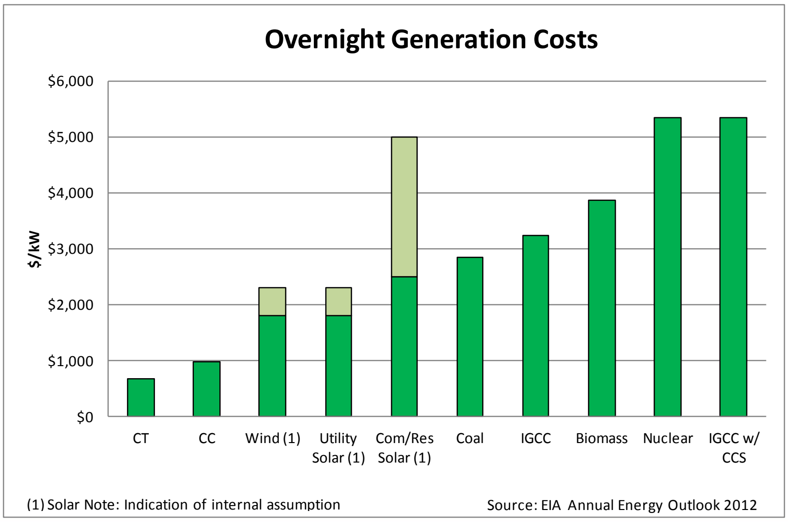
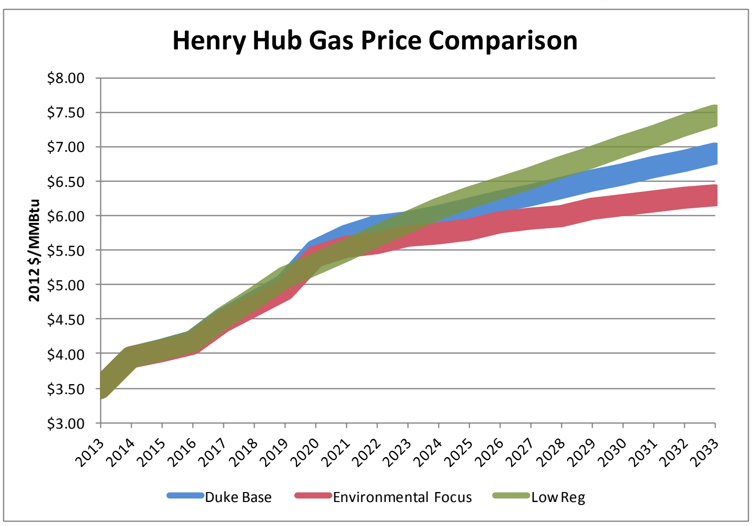
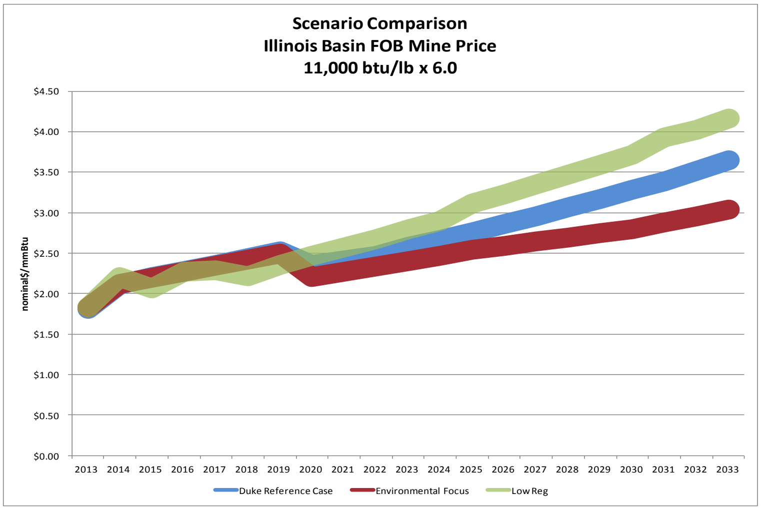
Capital Costs



Natural Gas Forecasts



Coal Forecasts



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Any other variables that you think we should consider?

- We have discussed the reasonable ranges for the following variables:
  - Carbon
  - NAAQS
  - 316b
  - Load Growth
  - Energy Efficiency
  - Renewables
  - Capital costs
  - Gas Prices
  - Coal Prices
- What other variables should be considered?
- What are the reasonable ranges of those variables?
- What is the timing of those variables?

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Decision Making Process

Inputs → Portfolio Development → Detailed Analysis → Plan "Quantitative" "Qualitative"

Inputs
- Load Forecast
- Existing Generation
- New Generation
- Energy Efficiency
- Fundamental Fuels

Sensitivities
- Fuel Prices
- Environmental Risks
- Carbon Policies
- Forecasted Load
- Capital Cost Variation

Plan
- Fuel Diversity
- Environmental Footprint
- Flexibility
- Rate Impact

Optimal Plan - Performs well under a wide range of circumstances, environmentally sound, incorporating management judgment

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Next Steps

- Development of portfolios for all scenarios and sensitivities
  - May 1 through mid June
- Thoughts on a stakeholder meeting in June to discuss Portfolios
  - Webinar
  - Online updates
  - Physical meeting
- Detailed Production Cost analysis of selected portfolios
- Present results to stakeholders in August 22nd meeting
- Submit IRP on November 1

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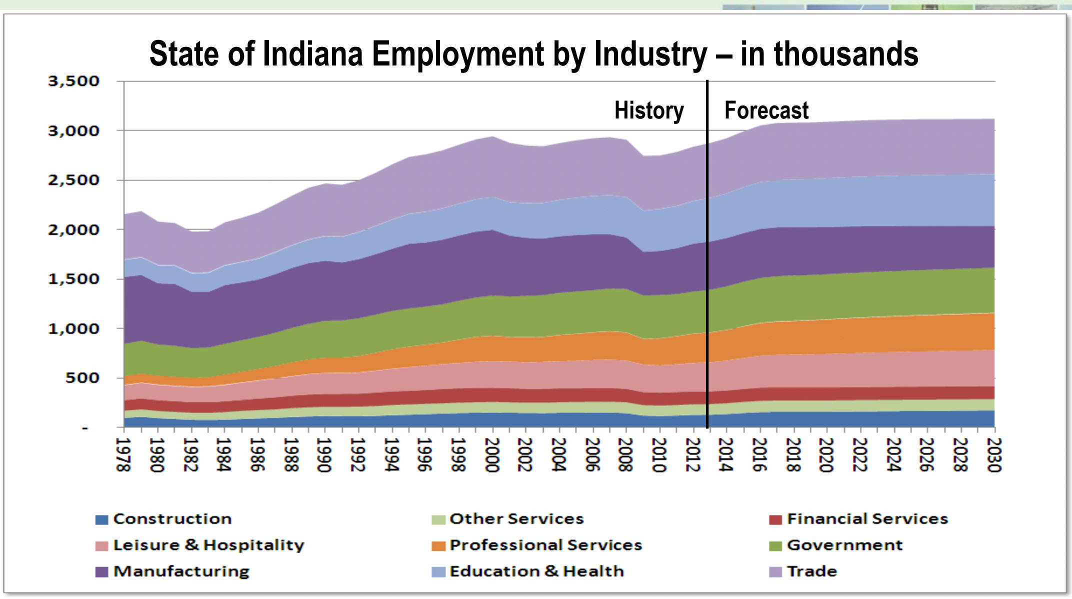
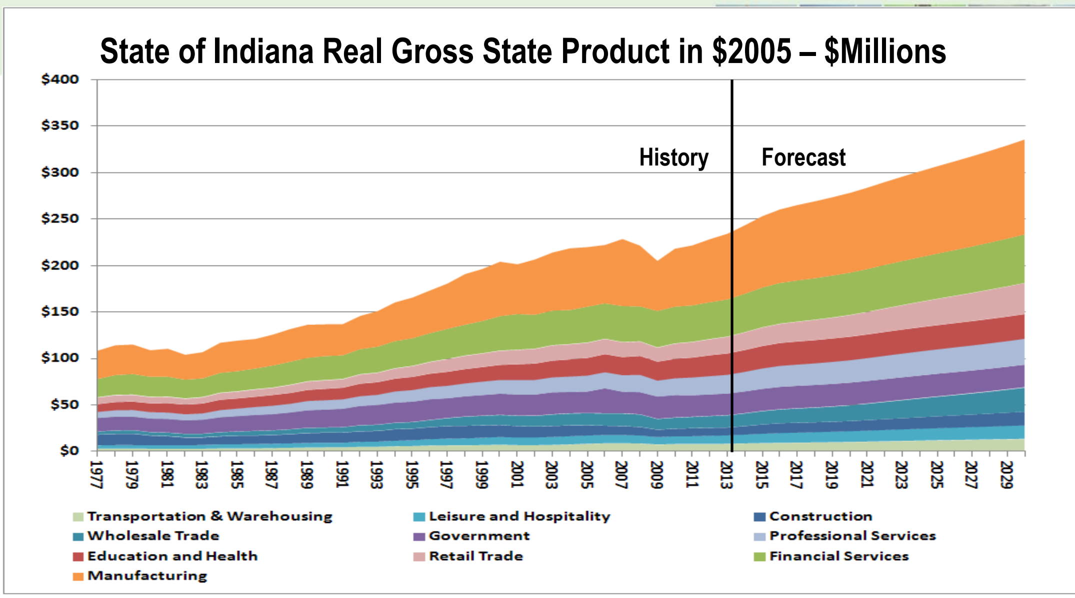
Load Supplemental Forecasting Slides



Source: Moody's Analytics



Source: Moody's Analytics

Duke Energy Indiana Stakeholder Workshop #3
April 24, 2013

NOTES

Welcome (slides 1-5)
Doug Esamann, State President, Duke Energy Indiana

Mr. Esamann thanked participants for coming to Duke Energy Indiana's third workshop. He appreciated everyone's time and effort in helping Duke with this process. He previewed the morning's presentations on load forecasting and market fundamentals. In the afternoon the group will discuss the scenarios that have been developed from suggestions at the last workshop, noting that a smaller representative set must be developed to be able to model them in the time available. For the safety message, Mr. Esamann observed that this is tornado season, so know your evacuation procedures wherever you are, and he described the process for this building. He reviewed again the objective for the stakeholder process, and introduced Marty Rozelle, the facilitator. He mentioned that he'd be stopping in as he can throughout the course of the day.

Agenda Overview (slides 6-11)
Marty Rozelle

Marty reviewed the agenda for the day, and asked everyone to introduce themselves.

Review of Workshops 1 & 2 (slides 12-16)
Marty Rozelle

Dr. Rozelle mentioned that Duke received a number of comments and suggestions from participants that the Company has sought to address. At the first workshop Duke talked about the Integrated Resource Plan (IRP) process and driving forces, and at the second workshop the stakeholders worked on developing scenario approaches. She mentioned that questions and comments will either be addressed through discussions today or are noted in a handout provided to participants.

Q: A participant asked if there could be a private room where attendees can caucus, possibly during lunch.
A: Yes, we'll check into it. (Note: A room was provided for the attendees to meet during lunch.)

Load Forecasting (slides 17 – 25)
Jose Merino, Director, Load Forecasting & Fundamentals

Mr. Merino described historical sales growth trends in Indiana and forecasts for the next several years, noting that the trend for the future assumes that consumers are using less and saving more. Energy use per customer increased in the last 10 years, but is expected to go down a bit in the next 10. Looking at sales by customer class, Duke uses different variables for each to predict load. He described the methodology used to forecast energy sales, which seeks to understand how much demand may go up or down as the input variables change. In summary, the Duke Energy Indiana base forecast is for 0.4% average load growth rate for 2014 to 2030, with a variance for high and low scenarios.

Q: How did the forecasting in past years look in comparison to what actually happened?
A: Missing the economic cycle timing (a recession for example) results on average in a 5 year out forecast error between 6% and 8%. If the economic booms and busts are taken out of the historical forecast error analysis, the average forecast error 5 years out is 3%-4%.Correctly predicting economic cycles is the hardest part of electric industry forecasting.

Q: Are you going to match cost of energy with use, particularly industrial use? How is this done? You should use price elasticity in demand projections and load forecasting.
A: This is included in overall retail sales, using the retail industrial rate. We do use price elasticity.

Q: How are you addressing the larger economy sector trends?
A: We don't project economic cycles, but we do look at trends. For large variations, we try to forecast how long it will take to get back to a predictable trend.

Q: On the economy versus sales chart, what does "weather normal" mean?
A: We use a long-term average, and don't try to predict short-term weather variations – so this is based on average historical weather patterns.

Q: Regarding weather data input, can you explain how or whether you use normalized data versus actual data in reviewing trends?
A: We compare how historical monthly sales have moved together with monthly weather data, evaluating how it has behaved over time, so in that sense it is real-time data.

Q: Is the mandated commission order energy efficiency (EE) target included in these forecasts? Do you include it before you run the model? Does the model balance the impacts of applying EE versus generation options? Does the model tell you the ideal amount of EE needed to meet projected demand?
A: This model doesn't give us the ideal amount of EE, but another model is used as input to this one. So EE is modeled outside of this process with the appropriate level of EE is input to this model. Mr. McMurry noted that the presentation this afternoon will describe the EE assumptions being used in the scenario modeling, which are not just the commission generic order goal.

Q: A participant noted that climate changes should be accounted for in developing load forecasting assumptions. There is a global trend toward increases in temperature, and in Indiana it is about 1.5 degrees Fahrenheit per century. He suggested Duke look at a 30-year average, which has been significant.
A: Yes, we look at temperatures and how they have evolved over time, but generally use a 10-year average.

C: A participant suggested that distributed energy could have an important effect on load forecasting. He gave an example of his own installation of a solar system, and said that it has caused him to also implement additional EE actions. He suggested that Duke look at net metering customers to see if they have implemented any other conservation measures, since they seem to have an incentive to do so - "As soon as I saw the meter running backward I started paying more attention".

Q: Taking EE as an example, how do you consider building and appliance efficiencies? It's already accounted for as a systemic factor in the modeling versus being accounted for outside it. For example, these factors may be different in Indiana than in Ohio.

A: Yes, different states have different data available; e.g. Ohio data is not kept by customer class. It's challenging to capture what's really occurring, to account for what actually affects demand, to evaluate the elasticity of those factors, and to judge whether we're in a period that reflects the past trends. Model results must be evaluated accordingly.

Q: How do you factor in building codes, e.g. for EE?
A: We do incorporate codes, making assumptions about what will happen to standards in future. We can't really model for specific or disruptive changes, however.

Q: The precipitous drop in the cost of solar installation a few years back may have increased the customer adoption rate; that could almost be considered a disruptive or revolutionary change.
A: We try to capture these types of things as trends, but need enough data and time to characterize them as such.

Q: With use of electric vehicles increasing, how do you account for this?
A: It's considered as an evaluation factor outside the model, noted as "EV" on slide 21.

Q: Are there differences among states for regulatory policies in the model?
A: Yes.

Q: How many customers does Duke Energy Indiana have?
A: 700,000 plus.

Q: How do you tell the difference between 'naturally occurring EE' versus the effect of specific utility programs?
A: We can only use and interpret the data we have. As an example, we can look at the overall efficiency of air conditioners over time as a proxy for naturally occurring EE.

Q: What level of EE are you assuming over time? For example, you show a leveling off at 2019.
A: We are using different growth rates and different EE assumptions. We assume the level of EE will increase through 2020 meeting the Indiana Utility Regulatory Commission (IURC) mandate (up to 11.9%), then would even off to mirror the projected load growth rate (<1%). We don't have enough information to continue projecting more EE implementation after the date of the Commission's rule.

Q: Do you have historical data to support this assumption, i.e., do customers who adopt EE level off or stop doing it over time?
A: We have some data, but it's not comprehensive.

Q: A participant objected to saying this forecast is "after application of EE" when the forecast is only meeting the Commission's mandate, when EE is much bigger than just the commission order. Duke is not considering other factors like net-zero buildings, for example.

A: That's true; we're just relying on historical trends for building efficiency.

C: As we move toward 2050, there needs to be a reduction in CO2 produced from coal, and that should be reflected in Duke's assumptions and modeling.

Market Fundamentals (slides 26 – 45)
Kevin Delehanty, Director, Market Fundamentals

Mr. Delehanty explained that the way Duke approaches developing fundamental commodity price outlooks is more tailored than some utilities, in that we rely on many data sources and internal expertise rather that just using a single model. We benchmark major industry planning models, evaluate their assumptions, modify them to reflect our needs, and use them as input to what we do.

In discussing natural gas outlooks, he noted that it appears that there is a consensus forming among the major consultants about the forecasted price, and that the data presented here are mostly all nominal numbers. The recent predictions about the amount of shale gas available have been a "game changer", but we don't know how accurate the predictions are, even though they represent a dramatic change in technology to extract shale gas.

Kevin explained the coal supply situation as forecasted through the next 25 years or so. He noted that for this forecast, we assumed a carbon price starting in 2020, correlating with a decline in coal consumption, and retiring nuclear units starting around 2033, corresponding with a new increase in coal use. By 2020, all coal generating units are assumed to have the full suite of emissions controls.

Q: Will you be updating the Duke fundamental forecast before completion of the IRP? What natural gas price will be used in the IRP?
A: No, we can only update it once a year starting in the fall because the whole process takes about a year. We will use a Duke "spring 2013" forecast which is based on fall 2012 data, then updated and approved by management in late spring 2013 which is the beginning of the Indiana IRP analysis.

Q: A participant noted that it's interesting to see the relative supply of energy resources. He noted that the U.S. has about 20 times the amount of coal as we have of natural gas, so coal is the "800 pound gorilla". He suggested that a reasonable assumption might be that integrated gasification combined cycle (IGCC) with sequestration may facilitate an increased use of coal. Also, he doesn't agree with the estimate of 100-year supply of natural gas, observing that it's more like 40 years. Duke doesn't see clearly

that the source of gas will decrease and the cost increase – he suggested a 5% increase might be a reasonable assumption. In summary, what he doesn't see here is a recognition that coal will continue to be a large source of power, and will not be overtaken by gas.
A: Ms. Hager clarified that by assuming a carbon price, which seems publicly and politically-acceptable, Duke Energy Indiana is recognizing that the nation has taken action on reducing carbon emissions. Our assumptions would need to change as social conditions and regulations change in future.

Q: Did you only look at IGCC with sequestration for use of coal in future?
A: To achieve the New Source Performance Standard for new coal facilities, the only available coal technology is sequestration, using IGCC or pulverized, but these options are so expensive that the model doesn't pick them.

Q: Uncertainty and risk are supposed to be built into this process, but this participant doesn't see how that's been done. There was a discussion about why certain assumptions and technologies were used. The participant cited the Stern Report by the British government, which says economic impacts of climate change will produce a permanent depression in the western world. He thinks that Duke has chosen a traditional cap-and-trade model where the variable is carbon price.
A: No, that's not really what we've done – we assumed a price on carbon via a national carbon tax. We used options that are available in the market, and it's hard to predict how unproved new technologies may come on line.

C: A participant noted that it would be helpful to understand what prices are being used in the models, or at least a range for the various technologies and approaches. She suggested possibly using something like the data available on the MISO web site that has version 6 of Lazard levelized costs for technologies, dated June 2012. (https://www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/PAC/2012/20121221/20121221%20PAC%20Supplemental%20Levelized%20Cost%20of%20Energy%20Analysis.pdf)
A: Cost information, such as carbon prices, capital costs, and commodity prices will be discussed after lunch.

C: We should understand what assumptions the company is making, and we may need to agree to disagree. Please be clear about what is and isn't included, and where the data come from.
A: We plan to discuss cost information in the afternoon session. Indicative capital costs discussed in the April stakeholder meeting were taken from the 2012 EIA Annual Energy Outlook.

C: A participant feels that all he's hearing is information about external forces over which the company has no control. He would like to hear how the IRP will be used to identify things Duke Energy Indiana intends to do take control of the future. Some examples are 1.) distributed energy is a transformational experience that Duke can influence, 2.) establishing variable rates depending on usage, as in Tampa, or 3.) providing incentives to certain technologies.

Lunch (a participant complimented the food and quality of service)

Overview of Scenarios & Portfolio Discussion (slides 46 – 59)
Scott Park, Lead Economic Planning Analyst, IRP

Mr. Park gave a brief overview of what was discussed at the last meeting to help Duke develop scenarios. He reviewed the scenario pairs that were suggested and how they were translated into the three scenarios that Duke will be modeling over the next couple of months. He reminded the participants of the goals and constraints of the IRP process, the main one being to produce a robust portfolio that meets the load obligation while minimzing the present value of revenue requirement (PVRR). Scott noted that Duke doesn't "pick" the portfolios, but the models do that given a set of input assumptions; it identifies the least-cost plan to meet the need. He talked about risk relative to portfolios and risk management.

Participants' comments included discussion of the concept of least-cost versus other objectives, and the concept of risk as it applies to alternative technologies. There was discussion about how the model performs in creating portfolios and how those are further evaluated outside of the model.

Q: How do you account for EE in these example portfolios? This morning you said you'd use EE as a resource. Participants want to see a description and quantification of EE measures as a specified resource in the plan. For example, the level of assumed EE can impact decisions on retrofitting existing coal plants, so it could influence the plan.
A: It's included in the load forecast. This model is not a good way of looking at individual EE measures. We use an outside model to do that screening and then create a large suite of EE measures to input into the model. In that way, we include it as a resource in the load forecasting, and it becomes part of the portfolio in that way. We will look at evaluating EE in more detail when the Indiana Market Potential Study is completed at the end of this year.

C: Without cost information, it's hard to evaluate the scenarios and portfolios.

Q: How is life extension of existing units reflected here?
A: The capital costs involved in extending the life of a unit as well as the ongoing production costs are included in the analysis. If it is more cost effective to retire a unit and replace it with a new unit, the planning process evaluates that possibility.

Q: When does capacity expansion equal demand reduction?
A: They would be treated equally if they were equally cost effective, and could be exchanged for one another (assuming they were of the same magnitude). A complicating factor is quantifying the amount of EE since it is a function of customer adoption rates.

C: A participant noted that in terms of risk, it's a lot less risky to add very small units of generation (e.g., biomass, solar) than to add a very large unit (coal, combustion turbine/CT).
A: Not necessarily, while it is true that renewable technologies come in smaller sizes, cost as well as the intermittency of some types of that generation needs to be considered.

C: Clarify that the goal is to identify the least-cost portfolio. Duke is locked into this conclusion by the model you're using. What if least-cost is not a common goal among stakeholders?
A: We take input from stakeholders and will discuss this process in the IRP, but IRP remains the responsibility of Duke.

Q: How long does it take to run one model?
A: It depends on the model – 30 minutes to 1.5 hours for run time - but then we need to add time for analysis of risk versus cost, application of other professional judgment factors, and summarizing.

C: A participant noted that the relative range of hypothetical costs shown on slide 56 is not right compared to real costs that have been developed in previous plans, which are a much smaller spread, e.g., 100 / 100.5 / 101.
A: The numbers provided were only for illustration purposes.

Q: With regard to flexibility, does it capture the speed of response? For example, if the adoption rate of solar went way up, how fast can that power be integrated with the baseload system, since a coal plant can't just stop working at the minute solar kicks in?
A: This situation does involve grid stability factors. California, for example, has a large renewable component that can supply load during day, but what happens when the sun goes down and people start using more power when they come home from work?

Q: Can we equate flexibility with reliability?
A: Not really, but you do need a flexible system to maintain reliability.

C. A participant suggested that "size of the total resource" could be included as a portfolio attribute.
A:System Optimizer (the capacity expansion model) considers the size of the unit in the selection of portfolios.

C: "Price", "quality", "choice" are the things customers value most highly. Duke's experience with Google in North Carolina was cited as an example of their desire to install a total solar system with 100% reliability.

Reasonable Range of Assumptions for Scenarios (slides 60 – 72)
Robert McMurry, Director, Midwest IRP

Mr. McMurry suggested that this is the last opportunity for participants to modify or add assumptions to the factors that will be modeled starting in May. He explained the assumptions being considered as model inputs.

<u>Carbon Dioxide</u>: A carbon tax would start in 2020. Bobby noted that at a carbon price of about $50 per ton, other technologies like nuclear, solar, and EE become competitive. In the reference case this occurs around 2033; in the Environmental Focus case this occurs around 2029.

C: A participant who is a climate scientist suggested that only starting to address the carbon issue by considering a carbon price starting in 2020 is unacceptable. The impact of climate change from CO2 emissions will continue to increase (example of Indiana soy beans), as the carrying capacity of the state of Indiana decreases. It's bad for Duke's image to not consider this.

C: Globally, the political response toward CO2 emissions and climate change is likely to be escalated, including violence against carbon-producing facilities. If it's ignored, adjustments will likely happen quickly in response to political action; e.g., go from zero to $60 all at once.

C: Are you assuming any carbon price will be created by legislation rather than EPA rules? This is not necessarily true: see new Administrator's suggestion that they're going to move ahead on regulating greenhouse gases from power plants starting next year.
A: We are assuming that the NSPS for new units is incorporated into our analysis.

C: The point of establishing a carbon price is to reduce CO2 emissions and make carbon-fueled electricity more expensive. So, there are any number of carbon prices that could be evaluated, above the Duke reference case price, which could make this happen. This participant is skeptical that the prices picked aren't high enough to create this endpoint.

C: Using the Google example in North Carolina, that wasn't in response to any regulatory action but a decision by a large consumer to become energy independent. How can you account for this type of action, and this value system, in resource planning?
A: This is an evolving issue and to date, a very small percentage of customers have shown an interest in this.

National Ambient Air Quality Standards: NOx controls will be installed on all facilities by 2020.

Q: Are you assuming new ozone regulations?
A: Yes, with varying levels of stringency in the scenarios. There was discussion of how EPA's cross-state air pollution rule regulates this now, what types of new regulations might be adopted, and new control levels or technologies.

Clean Water Act Section 316b & Coal Combustion Byproducts: Mr. McMurry explained the difference in fish impingement methods assumed. All scenarios assume that ash will be dry stored in lined landfills, and designated as non-hazardous. He noted that there is ongoing discussion among regulators on the issue of designating fly ash as hazardous.

Load Growth: The Duke Energy Indiana base case assumes .5% load growth, while the high scenario is .6% and the low is .4%.

Energy Efficiency: We assumed we don't meet the IURC order until 2030 in the low regulatory case and in 2019 in other scenarios. In the Environmental Focus scenario, we meet the 11.9% generic order in 2019 and it continues to grow to 15% by 2030.

Q: Can you give us a range of the costs you're looking at for EE? When comparative national studies are done, EE is usually estimated at about $.03 per kilowatt hour, compared to Duke Energy Indiana's estimated $.14.
A: Yes, we can provide a range of costs. Duke's all-in average for all programs is about $.12 per kilowatt hour. When comparing studies, we need to make sure we are comparing apples to apples, in that different studies may include different factors.

Q: To clarify, does it cost Duke $.12 for every kilowatt hour that a customer reduces his use?
A: It doesn't cost Duke, it costs customers – Duke gets an incentive for doing demand-side management (DSM).

C: A participant noted that there is a difference between commercial/industrial users in the cost of DSM measures.

C: There was discussion and requests for clarifications on the assumptions used in EE assumptions graph.

Renewable Energy: The percent of renewable energy retail sales starts at about 2% for all scenarios in 2014 and rises together until about 2020 at which point the reference case and low regulation cases level off and the environmental focus case continues to rise to about 10% by 2027.

Q: Is this in relation to peak generating capacity or gigawatt hours (GWH) produced? What is Duke's production?
A: Yes, it is GWH. Duke produces about 27,000 GWH annually.

C: A participant suggested that a reasonable assumption would be 25% sales in renewable by 2025, which is the goal in more progressive states.

Capital Costs: This is an all-in cost of what we think it will cost to deliver power to the grid, via alternating current. Mr. McMurry suggested that if participants look at other studies, please see if they make comparable assumptions. These are representative of what Duke will use in the IRP, but not exact costs since most of this data is proprietary.

Q: Do you have similar costs for operating costs? For example, once you install solar your operation and maintenance costs are pretty low compared to other generation sources.
A: We do factor this in.

Q: You should use levelized cost of energy (LCOE) instead of just capital cost.
A: Capital costs were presented based on feedback from the January stakeholder meeting. The analysis includes capital costs as well as operating costs.

Q: Will you include solar storage?
A: No, it would be screened out at this time, since it's not yet commercially proven.

C: A participants considers $5,000 installed per kilowatt (KW) for solar to be "ancient history". He gave several examples of facilities in the geographic area who are installing about 5-megawatt systems at a cost of about $2,500-$3,000 per KW; these are direct current (DC) systems, whereas you need to add about 25% for AC systems. In Indiana, he feels a typical cost is about $3500 per KW for large residential and small commercial systems right now. It depends on the size, location, and provider.

Q: Is there a third option of combined cycle with sequestration, which would be carbon-neutral and would please climate scientists.
A: Combined cycle produces about 50% lower emissions than a coal unit, so Duke will evaluate it.

Natural Gas: There was some discussion and clarification of the projections shown on the chart for natural gas price increases from the present to 2033.

Coal: The assumptions for coal prices were explained and discussed.

Mr. McMurry asked participants if there are other variables that should be considered. No one suggested anything at the meeting, but participants were asked to submit their comments and suggestions using copies of the slides that were distributed and collected.

He reviewed Duke Energy Indiana's decision process for developing the IRP. They will be finished with System Optimizer modeling by mid- to late-June, so could have another in-person meeting, webinar, or some other information sharing event. He asked for the group's thoughts on this. Most participants said they'd like another in-person meeting in June; there was no interest in an online forum.

Q: Could we accommodate a wider audience by using a public facility and broadcasting the meeting to the public, maybe over a public TV station?
A: Mr. McMurry said Duke may consider this for the final August meeting, but it would be cumbersome to try it for an interactive June meeting (Live Meeting will be available for the July Stakeholder meeting.)

Q: Can we submit ideas and comments after today to be considered, since we want to consult with our constituents in developing these?
A: Yes, please try to get them in by May 3. Send any comments to our email address: 2013irp@dukeenergy.com

Mr. Esamann thanked the group for coming, and reiterated that Duke Energy Indiana is serious about this effort, and will carefully consider all the input we get today. We believe this will improve the process and the outcome.

Notes submitted by Debra Duerr, The Rozelle Group Ltd.

2013 Integrated Resource Plan

Stakeholder Workshop #4

July 19, 2013
Plainfield, IN

Doug Esamann, State President- Indiana, Duke Energy

Welcome

Welcome

- Safety message
- Why are we here today?
- Objectives for stakeholder process
- Introduce the facilitator

Why are we here today?

- Duke Energy Indiana developing 2013 Integrated Resource Plan (IRP)
- Proactively complying with proposed Commission IRP rule
- Today is the fourth stakeholder workshops

Objectives for Stakeholder Process

- **Listen:** Understand concerns and objectives.
- **Inform:** Increase stakeholders' understanding of the IRP process, key assumptions, and challenges we face.
- **Consider:** Provide a forum for productive stakeholder feedback at key points in the IRP process to inform Duke Energy Indiana's decision-making.
- **Comply:** Comply with the proposed Commission IRP rule.

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The Facilitator

- Duke Energy Indiana hired Dr. Marty Rozelle of The Rozelle Group and her colleagues to:
  - Help us develop the IRP stakeholder engagement process
  - Facilitate and document stakeholder workshops

DUKE ENERGY.

Marty Rozelle, President, The Rozelle Group

Agenda & Introductions

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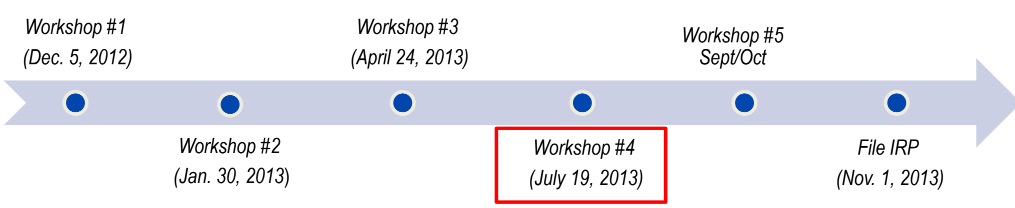
Engagement Process Overview

- Third party, unbiased facilitator
- Involving stakeholders from the beginning of the IRP development
- Four stakeholder workshops
- Informative presentations and interactive workshop exercises
- Summaries on IRP website (www.duke-energy.com/in-irp)



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Agenda

8:30	Registration & Continental Breakfast
9:00	Welcome from Doug Esamann
9:10	Agenda Review and Introductions
9:25	Review of Workshops 1 - 3
9:40	Stakeholder Feedback & Duke Energy Indiana Responses
10:15	Scenario Review, Modeling Methodology & Portfolios Discussion
11:45	Lunch
12:30	Portfolio Evaluation
2:00	Wrap up and next steps

Ground rules

- All agree to act in good faith with open minds
- Start on time and stay on schedule
- Raise your hand to be recognized by the facilitator
- Be concise and stick to the topics on the meeting agenda
- Respect others and do not interrupt
- Turn off phones
- Since we are using Live Meeting:
  - Please announce your name and affiliation before you speak
  - The phone lines will be un-muted during designated Q&A times

Introductions

- Participants
- Duke Energy

DUKE ENERGY

Marty Rozelle, President, The Rozelle Group

Review of Workshops 1 - 3

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Review Workshop 1 - 3

Workshop 1

- Background on IRP process
- Discussion of Driving Forces in order to develop Scenarios

Workshop 2

- Discussion of Energy Efficiency & Renewable Energy
- Scenario development exercise

Workshop 3

- Discussion of Load Forecasting & Market Fundamentals
- Modeling assumptions discussion

Scott Park, Director- Midwest IRP

Stakeholder Feedback & Duke Responses

Stakeholder Feedback

- Received 43 comments and recommendations
- Highlights to be addressed in presentation
- Written responses provided to comments and recommendations

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Stakeholder Feedback & Responses

- Live Meeting is being provided
- The economics of retiring units are analyzed as part of the IRP
- Over one hundred model runs are being conducted as part of the IRP
- CO2
  - We believe the range of carbon prices in the 3 scenarios provides sufficient breadth of possible outcomes
- Other regulations
  - Preparing for expected regulation and modeling possible regulations, but have time to adjust for implementation
- An Indiana specific market potential study for EE is being performed in 2013
- All scenarios include a renewable generation minimum; additional renewable generation is included when cost effective

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Jim Hobbs, Senior Portfolio Analyst

Scenario Review, Modeling Methodology & Portfolios Discussion

Scenarios

The results of the stakeholder scenario exercise led to the consolidation of 6 scenarios to 3 scenarios

1. Low Regulation Case
2. Duke Energy Reference Case
3. Environmental Focus Case

Modeling Methodology

- As discussed in the last stakeholder meeting, a set of internally consistent model inputs were developed for each of the 3 scenarios
- Once the model inputs have been loaded into the capacity expansion model, developing portfolios is a two step process
  1. The economic viability of existing units are evaluated using scenario specific regulation as well as expected capital investment and O&M costs.
  2. Once any expected retirements are determined, the capacity expansion model then solves for the resource additions that are needed to meet customers' load

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Duke Energy Indiana Resource Definitions

STATION NAME	UNIT ABBREV	MW
Wabash River	WR 2-5	350
	WR 6	318
Cayuga	CAY	995
Gallagher	GAL	280
Gibson	GIB 1-4	2,512
	GIB 5	310
Various	Old CTs	166
Combined Cycle	CC	340
Combust Turbine	CT	200
Nuclear	N	280

-WR 2-5 modeled as retired on 4/16/15.

-WR 6 Coal modeled as retired on 3/1/16.

-WR 6 Gas modeled as in-service on 5/1/16.

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Low Regulation Scenario – Preliminary Portfolio

Generation Impacts	2014 - 2018	2019 - 2023	2024 - 2028	2029 - 2033
Retirements	WR 2-6 Coal	Old Oil CTs		
Additions	WR 6 Gas, CT	CT	CT	CC

Energy Efficiency	2018	2023	2028	2033
MWs Peak Contribution	190	350	520	690
GWHs	1,000	1,900	2,800	3,700
% Retail Sales	5%	8%	10%	12%

Renewables	2018	2023	2028	2033
MWs Nameplate	60	320	660	720
MWs Peak Contribution	25	90	150	180
GWHs	400	1,000	1,600	1,700
% Total Sales	1%	3%	4%	4%

Reference Case Scenario – Preliminary Portfolio

Duke Energy Indiana Example Resource Portfolio - Reference Case Scenario

Generation Impacts	2014 - 2018	2019 - 2023	2024 - 2028	2029 - 2033
Retirements	WR 2-6 Coal	Old Oil CTs		
Further Analysis		GAL, GIB5		
Additions	WR 6 Gas	CT	CC, CT	CC

Energy Efficiency	2018	2023	2028	2033
MWs Peak Contribution	400	600	640	690
GWHs	2,100	3,300	3,500	3,700
% Retail Sales	10%	12%	12%	12%

Renewables	2018	2023	2028	2033
MWs Nameplate	60	400	800	1800
MWs Peak Contribution	25	100	200	300
GWHs	400	1,200	1,900	4,800
% Total Sales	1%	3%	5%	12%

Environmental Focus Scenario – Preliminary Portfolio

Generation Impacts	2014 - 2018	2019 - 2023	2024 - 2028	2029 - 2033
Retirements	WR 2-6 Coal	Old Oil CTs		
Likely Retirements		GAL, GIB5		CAY, GIB1-4
Additions	WR 6 Gas	CT	CC, CT	Nuclear, CC

Energy Efficiency	2018	2023	2028	2033
MWs Peak Contribution	400	650	750	860
GWHs	2,200	3,500	4,000	4,600
% Retail Sales	10%	13%	14%	15%

Renewables	2018	2023	2028	2033
MWs Nameplate	60	800	1600	2100
MWs Peak Contribution	25	200	350	400
GWHs	400	2,200	3,900	5,400
% Total Sales	1%	6%	10%	14%

Generation Impacts Comparison

Low Regulation Scenario

Generation Impacts	2014 - 2018	2019 - 2023	2024 - 2028	2029 - 2033
Retirements	WR 2-6 Coal	Old Oil CTs		
Additions	WR 6 Gas, CT	CT	CT	CC

Reference Case Scenario

Generation Impacts	2014 - 2018	2019 - 2023	2024 - 2028	2029 - 2033
Retirements	WR 2-6 Coal	Old Oil CTs		
Further Analysis		GAL, GIB5		
Additions	WR 6 Gas	CT	CC, CT	CC

Environmental Focus Scenario

Generation Impacts	2014 - 2018	2019 - 2023	2024 - 2028	2029 - 2033
Retirements	WR 2-6 Coal	Old Oil CTs		
Likely Retirements		GAL, GIB5		CAY, GIB1-4
Additions	WR 6 Gas	CT	CC, CT	Nuclear, CC

Energy Efficiency Comparison

Low Regulation Scenario

Energy Efficiency	2018	2023	2028	2033
MWs Peak Contribution	190	350	520	690
GWHs	1,000	1,900	2,800	3,700
% Retail Sales	5%	8%	10%	12%

Reference Case Scenario

Energy Efficiency	2018	2023	2028	2033
MWs Peak Contribution	400	600	640	690
GWHs	2,100	3,300	3,500	3,700
% Retail Sales	10%	12%	12%	12%

Environmental Focus Scenario

Energy Efficiency	2018	2023	2028	2033
MWs Peak Contribution	400	650	750	860
GWHs	2,200	3,500	4,000	4,600
% Retail Sales	10%	13%	14%	15%

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Renewable Energy Comparison

Low Regulation Scenario

Renewables	2018	2023	2028	2033
MWs Nameplate	60	320	660	720
MWs Peak Contribution	25	90	150	180
GWHs	400	1,000	1,600	1,700
% Total Sales	1%	3%	4%	4%

Reference Case Scenario

Renewables	2018	2023	2028	2033
MWs Nameplate	60	400	800	1800
MWs Peak Contribution	25	100	200	300
GWHs	400	1,200	1,900	4,800
% Total Sales	1%	3%	5%	12%

Environmental Focus Scenario

Renewables	2018	2023	2028	2033
MWs Nameplate	60	800	1600	2100
MWs Peak Contribution	25	200	350	400
GWHs	400	2,200	3,900	5,400
% Total Sales	1%	6%	10%	14%

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Scott Park, Director- Midwest IRP

Portfolio Evaluation

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How are portfolios evaluated?

- Once the capacity expansion planning model has selected an optimal portfolio for a given scenario, the portfolio is then evaluated in a detailed production cost model
- Production cost modeling provides output on several attributes of the portfolio being modeled that can be used to calculate:
  - Cost
  - Capacity Factors
  - CO2
  - SOx, NOx, & Mercury
  - Water
  - Ash and Byproducts

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Example of Results Matrix

PVRR ($)	LRP (Low Reg Portfolio)	RCP (Ref Case Portfolio)	EFP (Enviro Focus Portfolio)
Low Regulation Scenario			
Duke Reference Case Scenario			
Environmental Focus Scenario			

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Example of Results Matrix

CO_2 (tons)	LRP (Low Reg Portfolio)	RCP (Ref Case Portfolio)	EFP (Enviro Focus Portfolio)
Low Regulation Scenario			
Duke Reference Case Scenario			
Environmental Focus Scenario			

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Sensitivity Analysis

- Sensitivity analysis will be used to further complement the cross-scenario analysis
  - Provides additional insight into a portfolios risks
  - Measures responsiveness to changes in key variables
- Sensitivity analysis allows for the comparison of portfolios with respect to changes in key variables
  - For example, portfolio A is more or less responsive than portfolio B to changes in CO2, gas, or coal prices

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Sensitivities for the Low Regulation Scenario (Current Plan)

	LOW REGULATION		
	Low Sens	Base	High Sens
CO2		$0	$17/tn in 2020 going to $50/tn in 2033
NAAQS		No new SO2 reqs; NOX reqs (SCR > 400 MW; SNCR < 400 MW) (25)	No new SO2 reqs; NOX reqs (SCR > 400 MW; SNCR < 400 MW) (20)
316b		Lower intake velocity screens by 2020	Lower intake velocity screens by mid-2016
IN Load Growth	approx 87% of base case in 2033 (MW)	0.95% CAGR (after EE)	approx 109% of base case in 2033 (MW)
IN Renewable Energy		1% in 2018 and grows to 3% in 2028	1% in 2018 and grows to 5% in 2028
IN Energy Efficiency		7% in 2019 and grows to 11.9% in 2030	11.9% in 2019 and grows with load growth
Capital Cost	CC, CT & Controls -5%; Solar & Wind - 30%	Duke Reference Case Assumptions	CC, CT +30%; Controls +20%; Solar & Wind- same as ref case
Gas Prices	$4-10 /mmBtu	$5-13/mmBtu	$6-15/mmBtu
Coal Prices	$2-4/mmBtu	$3-5/mmBtu	$3-6/mmBtu

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Sensitivities for the Reference Case Scenario (Current Plan)

	DUKE ENERGY REFERENCE CASE		
	Low Sens	Base	High Sens
CO2	$0	$17/tn in 2020 going to $50/tn in 2033	$20/tn in 2020 going to $75/tn in 2033
NAAQS	No new SO2 reqs; NOX reqs (SCR > 400 MW; SNCR < 400 MW) (25)	No new SO2 reqs; NOX reqs (SCR > 400 MW; SNCR < 400 MW) (20)	Units >400 MW need a SCR & scrubber by 20; < 400 MW by 25
316b	Lower intake velocity screens by 2020	Lower intake velocity screens by mid-2016	Mod intake struct (18) and cooling towers req on estuary/coast units > 500 MW (20)
IN Load Growth	approx 87% of base case in 2033 (MW)	0.95% CAGR (after EE)	approx 109% of base case in 2033 (MW)
IN Renewable Energy	1% in 2018 and grows to 3% in 2028	1% in 2018 and grows to 5% in 2028	1% in 2018 and grows to 10% in 2028
IN Energy Efficiency	7% in 2019 and grows to 11.9% in 2030	11.9% in 2019 and grows with load growth	11.9% in 2019 and grows to 15% in 2030
Capital Cost	CC, CT & Controls -5%; Solar & Wind - 30%	Duke Reference Case Assumptions	CC, CT +30%; Controls +20%; Solar & Wind- same as ref case
Gas Prices	$4-10/mmBtu	$5-12/mmBtu	$5-14/mmBtu
Coal Prices	$2-4/mmBtu	$3-5/mmBtu	$4-6/mmBtu

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Sensitivities for the Environmental Focus Scenario (Current Plan)

	ENVIRONMENTAL FOCUS		
	Low Sens	Base	High Sens
CO2	$17/tn in 2020 going to $50/tn in 2033	$20/tn in 2020 going to $75/tn in 2033	
NAAQS	No new SO2 reqs; NOX reqs (SCR > 400 MW; SNCR < 400 MW) (20)	Units >400 MW need a SCR & scrubber by 20; < 400 MW by 25	All units scrubbed
316b	Lower intake velocity screens by mid-2016	Mod intake struct (18) and cooling towers req on estuary/coast units > 500 MW (20)	
IN Load Growth	approx 87% of base case in 2033 (MW)	0.95% CAGR (after EE)	approx 109% of base case in 2033 (MW)
IN Renewable Energy	1% in 2018 and grows to 5% in 2028	1% in 2018 and grows to 10% in 2028	
IN Energy Efficiency	11.9% in 2019 and grows with load growth	11.9% in 2019 and grows to 15% in 2030	
Capital Cost	CC, CT & Controls -5%; Solar & Wind - 30%	Duke Reference Case Assumptions	CC, CT +30%; Controls +20%; Solar & Wind- same as ref case
Gas Prices	$4-9/mmBtu	$5-11/mmBtu	$6-13/mmBtu
Coal Prices	$2-3/mmBtu	$3-4/mmBtu	$4-5/mmBtu

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Portfolio Risks

- Scenario analysis provides insight into the broad based exposure to different futures
- Sensitivity analysis provides more targeted insight into a portfolio's risk with respect to specific variable
- While System Optimizer optimizes resource plans over the entire planning period
  - Evaluating the portfolios over the actionable future is also instructive

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Generation Impacts Comparison

Low Regulation Scenario

Generation Impacts	2014 - 2018	2019 - 2023	2024 - 2028	2029 - 2033
Retirements	WR 2-6 Coal	Old Oil CTs		
Additions	WR 6 Gas, CT	CT	CT	CC

Reference Case Scenario

Generation Impacts	2014 - 2018	2019 - 2023	2024 - 2028	2029 - 2033
Retirements	WR 2-6 Coal	Old Oil CTs		
Further Analysis		GAL, GIB5		
Additions	WR 6 Gas	CT	CC, CT	CC

Environmental Focus Scenario

Generation Impacts	2014 - 2018	2019 - 2023	2024 - 2028	2029 - 2033
Retirements	WR 2-6 Coal	Old Oil CTs		
Likely Retirements		GAL, GIB5		CAY, GIB1-4
Additions	WR 6 Gas	CT	CC, CT	Nuclear, CC

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Decision Making

- Modeling the various combinations of portfolios, scenarios and sensitivities requires over 100 model runs and creates a tremendous amount of data
- The objective of the IRP is to produce a robust portfolio (resource plan) that meets the load obligation while minimizing the present value of revenue requirement (PVRR)
  - Subject to:
    - Adhering to laws and regulations
    - Meeting reliability and adequacy requirements
    - Being operationally feasible
- Strategic flexibility to alter the resource plan is a very important attribute of a resource plan
  - We don't predict the future, but prepare for what the future might hold
  - Focus on the decision making period
  - Preserve options for the future

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Next Steps

- Detailed Production Cost analysis of selected portfolios
- Planning for September/October Stakeholder meeting
  - Present modeling results
  - Present IRP portfolio
  - Discussion on preferred format for the Sept/Oct meeting
- Submit IRP on November 1

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Duke Energy Indiana Stakeholder Workshop #4
July 19, 2013

SUMMARY

Welcome (slides 1-6)
Doug Esamann, State President, Duke Energy Indiana

Mr. Esamann thanked participants for coming to Duke Energy Indiana's fourth stakeholder workshop. He said that Live Meeting format will be used today in response to some requests. There will be one more workshop during this IRP process. He noted that the purpose of consulting with stakeholders is to help Duke develop a more robust plan for filing with the Commission this fall. He thanked the participants for their involvement in this important process.

Introductions & Agenda Overview (slides 7-11)
Marty Rozelle, Facilitator, The Rozelle Group Ltd.

Marty explained some of the logistics for the meeting today, which are a little different because of the Live Meeting. She provided direction on using the microphones, both for those calling in and those in the room. Marty reviewed the agenda for the day, and asked everyone to introduce themselves. She mentioned that for anyone participating remotely and using an iPad, please send an email to Debra Duerr now and she will email a copy of the presentation. She reviewed the meeting ground rules and asked participants to introduce themselves.

Some participants asked that materials from this meeting be made available as soon as possible, noting that the information from last meeting wasn't posted until yesterday. Ms. Hager apologized for not having today's meeting materials posted on the website, but explained that they have been working on developing the information until now.

Review of Previous Workshops (slides 12-13)
Marty Rozelle

Dr. Rozelle mentioned that Duke received a number of comments and suggestions from participants that the company has tried to address. At the first workshop Duke talked about the Integrated Resource Plan (IRP) process and stakeholders provided specific input on driving forces, and at the second workshop they worked on developing scenario approaches. The third workshop focused on modeling assumptions for scenarios and development of portfolios.

Stakeholder Feedback & Reponses (slides 14-16)
Scott Park, Director, Midwest IRP

Scott handed out a spreadsheet summarizing stakeholder comments from previous meetings and Duke's responses. This will also be posted on the web site. He provided a brief overview of the types and scope of the 43 comments received that included ideas about load forecasting, carbon prices, unit retirements, various regulations, energy efficiency, renewable resources, and other topics.

Questions and comments from participants at the meeting included the following:

Q: A participant asked for clarification of the statement that states are backing away from renewable energy.
A: This is a misunderstanding – that was a stakeholder comment, not a Duke comment.

Q: A participant suggested that a key issue needs to be clarified; he feels that Duke Energy Indiana needs to respond to the new rule that says you must do a better job of analyzing risk and uncertainty outside of the conditions you might expect. He asked whether Duke will be explicit about that in the plan, so stakeholders can evaluate it.
A: Scott described the range of the scenarios that are being analyzed, along with the notion of sensitivities for them that provide a greater range of factors.

Q: Are you going to explain why you didn't model more than three scenarios?
A: We wanted to represent a reasonable range of futures. The scenarios are not intended to cover the entire range of possible futures.

Q: Please explain the framework of the energy efficiency (EE) study: when will it be done, to what extent will inputs be disclosed?
A: Duke Energy and its Oversight Board chose a vendor (Forefront Economics) through an RFP process to perform the study. With regard to data inputs, Forefront gathers all

available information from Duke Energy and other sources enabling them to analyze and complete the assessment and action plan which comprise the MPS. The EE study should be completed in November.

Q: Does this consultant consider only what Duke can do or can they consider what any party can do?
A: They can consider anything and any program anywhere to bring in new ideas and practices.

Q: Recalling the last workshop cost discussions, does the modeling take into account a non-static pricing approach, considering trends and changes over time?
A: Yes. For example, with solar there has been a decrease in price over recent years, so we're showing a continuation in that trend that might consider increased technological improvements as well as tax credits.

Questions from online participants were:

Q: Regarding the 316b rule, did you say you consider this unlikely and so aren't modeling it?
A: No, we don't think cooling towers are likely, not that the regulation itself is unlikely.

Q: Can you please repeat what you said about the assumptions regarding CO2 prices?
A: In the base case we assume a carbon price of $17 per ton in 2020 growing to $50 at the end of the planning period; in the environmental focus scenario, the assumption is for $20 increasing to $70 at end of the period.

Q: Are you recording this meeting?
A: No, nor have we recorded any previous meetings.

Scenario Review, Modeling Methodology & Portfolio Discussion (slides 17-26)
Jim Hobbs, Senior Portfolio Analyst

Jim summarized the three scenarios that have been developed from the six discussed at the last meeting, noting the major inputs. These are *Duke Energy Reference* case, *Low Regulation* case, and *Environmental Focus* case. He briefly described the modeling methodology, and showed a legend to help explain the slides that follow.

He first described the preliminary portfolio that results from the **Low Regulation** scenario using the assumptions presented on slide 21. These assumptions include several coal unit retirements and installation of combustion turbine and combined cycle gas units. For EE, this portfolio doesn't meet the Commission's standard of 11.9% until the end of the planning horizon. Renewables start at 1% and go to 4% over the period, of which about 75% is wind and 25% is solar.

Questions about this scenario included:

Q: Gallagher units are not retired in this scenario?
A: No.

Q: Can you give us the fuel prices you're assuming?
A: See slides 32 to 34.

Q: Why haven't you included any biomass? This can be dispatchable, as you say wind and solar are not.
A: While biomass is a possible modeling option and the model does select it in some cases in small amounts, it is a very expensive technology.

Q: What about anaerobic digesters that use animal waste, in addition to woody biomass units? This person referenced the NIPSCO feed-in tariff, and mentioned several existing online units.
A: These are included in North Carolina regulations, but no one has developed such units yet. We will factor this into the analysis when or if it becomes viable.

Q: When you reference total sales, is that on a yearly basis?
A: Yes.

Questions from online participants included:

Q: Can you describe the guidelines used for capacity value of wind and solar? For example, if they don't count for reliability, does Duke use some capacity factor?
A: Yes, we use a peak capacity value of 10% for wind (based on MISO) and 40% for solar (based on experience from installations in the Carolinas).

Q: A participant asked for clarification about some specifics on what's an input and what's an output from the model.
A: There was discussion of some of the specific assumptions and process inherent in the modeling methodology.

Q: Is Duke assuming there will be no advances in battery technology in the next 20 years?

A: In past IRPs, we assumed that storage technology is not commercially viable, so we haven't included it in long-term planning. We update this 20-year plan every other year and will include this as it makes sense to do so.

Q: Are you only using programmatic assumptions for demand side management (DSM) projections? These figures don't reflect anything over the state mandate in this scenario.
A: Mr. Hobbs clarified that retail sales are what the Commission uses to calculate EE.

Assumptions for the **Duke Reference Case** portfolio were shown. Main features of this are the retirements included in the Low Regulation case and also further analysis of Gallagher and Gibson. The Commission's EE mandate is met in the 2019. Renewable energy increases from 1% to 12% over the planning horizon.

Questions included:

Q: Why did you only evaluate retirement of Gibson 5, not units 1-4?
A: We do evaluate the retirement of Gibson 1-4 but retiring those units does not appear to be cost-effective in the Low Regulation or Reference Case scenarios; however, they are still under evaluation. Gibson 5 is slightly less efficient than units 1-4 and has a older and less efficient scrubber that will require additional capital for upgrades or replacement in the future..

Online questions:

Q: Will this analysis be fully documented at some point? i.e. including the step-by-step unit retirement analysis? If not, is this the time to raise questions about the economic viability of these units? The participant felt he needs more information to assess this.
A: Yes, the process will be discussed at the next workshop and documented in the IRP.

Regarding the **Environmental Focus** preliminary portfolio, all pulverized coal units are retired. The retired capacity is replaced by the addition of gas units, and also ½ unit of nuclear to make up for the lost baseload coal. For EE, the commission mandate is met by 2019 and continues to grow. Renewables grow to 12% of total sales over the planning period. In this scenario, the price of carbon is high enough to make other technologies cost-competitive, i.e. nuclear. When variable resources reach more than 10% of the portfolio, it starts to have negative system impacts in terms of accommodating that, such as new transmission requirements. In this scenario, the renewable component grows to 14% in 2033; we understand that some people would like to see this higher.

Jim then showed tables that compare the three portfolios for each of the main categories of generation, EE, and renewables.

Questions and clarifications included:

Q: Please confirm that you're adding about 560 megawatts of nuclear?
A: Yes.

There was a discussion to clarify coal retirements, regarding cost assumptions and definitions, e.g. use of levelized versus capital costs.

Q: How is co-generation (combined heat and power/CHP) accounted for in this plan? The participant thinks that this should be considered as a specific resource.
A: We don't have any specific assumptions in this plan. Typically, this is up to customers to install based on economics. Duke explained that they did look at this in the past based on Indiana usage, which amounted to about 30 MW, but they haven't had anybody approach them about this type of facility since then.

Q: Is there a specific event that triggers retirement of Gibson in future?
A: Yes, the cost of carbon.

Q: What's the timeframe used for levelized cost of energy?
A: Our methodologies do not use a simple levelized cost of energy approach but are more sophisticated.

C: A participant said that Duke Energy Indiana does not permit cogeneration under its Indiana net metering tariff. She referenced recent US Dept of Energy reports on 70% efficiency for these types of units.

Q: A participant asked for clarification of cost assumptions for unit retirements and additions, noting that it seemed to him that we're using essentially comparable prices for coal, nuclear, and net metering. What do you use as your avoided cost?
A: Ms. Hager explained the model is given the ability to choose the optimal portfolio. The process essentially compares all resources with no explicit avoided cost assumed. We do impose some limits on how much of any given resource can be added each year based on real-world conditions.

Q: A participant felt that if there's an option in the model to put constraints on resources like wind or solar, this implies that the only choices made were things like combined cycle that represents baseload resources. He asked how, specifically, Duke proposes to replace the 4100 MW from Cayuga and Gibson? He noted a discrepancy among the assumptions made about capacity size (slide 20) for various resources, with each being different; for example, combustion turbines can only be added in 200 MW units, nuclear at 280 MW, etc. Ms. Hager clarified that all resources including renewables were choices available to the model. She used the previous slide to detail how the capacity of Cayuga and Gibson would be replaced.

Q: Please explain the assumptions used for renewables input?
A: Ms. Hager provided the following information on assumptions:

- 50 MW wind blocks to a maximum of 300 MW per year
- 10 MW solar blocks, up to 100 MW
- 2 MW of biomass, increasing to 6 MW

So, the model can pick up to 300 MW/year of wind, 100 MW/year of solar, and 6 MW/year of biomass. However, Duke did include limits on the amount of renewables on the system, to a maximum of 15% (composed of 10.5% wind, 3.8% solar, and .7% biomass).

Q: So, for purposes of the current Request for Proposals that Duke has issued, would five 10MW solar projects be considered as a 50MW minimum project?
A: No

C: A participant suggested pricing solar at 2.8 cents/kwh in the model and see how much it selects.

Q: Regarding baseload replacement in 2030 timeframe, is there a menu of options available to the System Optimizer model? Did it pick nuclear from that menu? Where can we see quantities used in the model?
A: Yes, there is a menu of options. Yes, the model did pick nuclear as an option. We will share some data later in presentation, but some is proprietary.

Q: If nuclear is seriously considered in the IRP, then CHP should also be considered as a Duke-initiated program.
A: Customers can look at CHP. Customers have a significantly shorter payback period available than Duke does.

Lunch

Overview of Scenarios & Portfolio Discussion (slides 27-38)
Scott Park

Mr. Park gave a brief overview of how portfolios are evaluated in the two-stage modeling process, and the main inputs to the cost production model, which are cost, capacity factors, CO_2, air quality constituents, water, and ash and byproducts. He showed an example of how the model output for these factors can be displayed at the next meeting.

Scott described how the sensitivity analysis will be used to further complement the cross-scenario analysis by providing additional insight into portfolio risks, and measuring a portfolio's responsiveness to changes in key variables. He discussed the specific sensitivities proposed to be run for the three scenarios (slides 32, 33, and 34).

The group had quite a few questions and comments on sensitivities proposed for the various scenarios:

Q: A participant wanted to clarify that in the Low Regulation scenario, Duke is not assuming that they will be subject to market forces rather than monopoly conditions?
A: No, we're not assuming deregulation.

Q: What if a portfolio is not compliant with certain regulations, under a given scenario?
A: Those portfolios would then need to include additional capital costs to make them compliant, as regulatory conditions warrant in the future.

Q: Can you explain the difference between scenarios and sensitivities?
A: Scenarios provide internally consistent assumptions to evaluate a portfolio, but sensitivities are designed to isolate the sensitivity of that portfolio to a specific variable- to assess risk.

Q: Can you translate the solar photovoltaic (PV) cost to a cost per watt that was used in modeling?
A: It's in the $1800-$2000/kW range. This compares to about $1000/kW for combined cycle and about $600/kW for combustion turbines; but you need to buy gas for those, so there's a tradeoff between installation cost and operating cost.

Q: What's the status of Duke's Request for Proposal (RFP) for purchasing market power (up to 300 MW)?
A: Although we're doing long-term modeling, we need peaking capacity within those timeframes. Consequently, we need to look at the options available, like purchasing power from the market or building something new ourselves. The RFP seeks to supplement short-term resources by purchasing them from the market.

C: A participant said that he thought Duke imposed serious restrictions in the RFP, resulting in the company missing information Duke will get from the marketplace; for example, no energy efficiency is included; imposing restrictions on the size of renewables (50 MW minimum), the term of contract (5-10 years). Also, the short timeframe for bids is a serious limitation. It was noted that there is no bidders' conference and no pre-registration.

Q: A participant noted that 50 MW is very difficult to meet for a solar project; so, can the projects be hybrid projects, like part wind and part solar, if alone they don't meet the 50 MW minimum?
A: We are open to filling resource needs in the best practical way at any given time, so if there's a resource we haven't thought of or economics change, we will consider using it.

Q: Are you going to select the Reference Case?
A: No, that would be pre-judging the results of the modeling.

Sensitivities for Reference Case Scenario:

Q: On the issue of fuel prices being different for different scenarios, what are these based on?
A: These were the inputs for the macro-model that gave us our fuel curves. The costs reflect assumptions about demand, so, for example, if demand for fuel decreases in the Environmental Focus scenario we assume the price of fuel would decrease.

Q: Would hydro be viable? Was it modeled or was it excluded?
A: Hydro was not included as an option in the modeling. While it has some good attributes, it has permitting/licensing issues and relatively high cost. We might look at micro-turbines or new technologies in the future.

Q: A participant pointed out that Duke already has an unused hydro plant at Williams Dam.
A: Because this facility is very old, it is not viable to retrofit it.

Q: A participant questioned the assumption of capping renewables at 15% penetration, noting that studies in other states (Colorado, California) show more like 20% or 30% before system impacts occur.
A: Duke's experience in the Carolinas has shown intermittent thresholds of around 10%.

C: Please provide these studies so we can compare and evaluate them ourselves.

Q: Please clarify coal assumptions in the Environmental Focus case. If you retire all the coal plants, why have a low sensitivity? I understand why you don't have a high CO2 sensitivity. Also, on air quality, why assume scrubbers on all units if they're all being retired anyway?
A: All portfolios are run through these sensitivities, so you just get different costs in each case. Regarding air quality controls, scrubbers would be installed at a point prior to retirement.

Online comments:

Q. There was a discussion and clarification about the Gallagher and Wabash River plants assumptions for upgrades or conversion.

Q: There were questions about fuel price assumptions, ranges, and timing.
A: We won't be providing detailed costs that are proprietary, i.e. annual fuel prices. Carbon prices are not proprietary.

Q: Please clarify assumptions about carbon prices used.
A: We used assumptions that we think are reasonable.

Q: Please clarify that combustion turbines (CT) are added in the Low Regulation case in 2019 because the renewables assumptions are lower in that scenario.
A: Correct.

C: A participant suggested that Duke needs to have a fundamental assumption that its customers are going to be rational, and the way you're modeling, the only rational decision customers can make is that they want somebody other than Duke Energy as their provider. He can understand why Duke would want to continue their monopoly. The Low Regulation case rules out any deregulation, for example.

Q: In this participant's opinion, the Environmental Focus scenario doesn't model what the driving forces are. It's being driven by a particular view of the world as shared by an institution, and Duke's interpretation of that view of the world is not correct.
A: Mr. Park asked for clarification and examples of this statement; for example, is the participant referring to net metering?

C: A participant expressed the opinion that by 2033 we will have a dramatically different energy marketplace in this country than we have today. For example, Rocky Mountain Institute has a stakeholder process going on where these alternatives are being discussed. All of these scenarios incorrectly include continuation of the traditional utility model.

C: There was discussion on some of the specifics of model inputs, data, timing of implementing assumptions, and flexibility in changing them.

Q: Will something like the example of portfolio results matrix be provided at next meeting?
A: Yes

Next Steps

Scott Park described the decision process that Duke will use to finish the IRP. This includes a detailed Production Cost analysis of selected portfolios. The modeling results will be discussed at the next stakeholder workshop.

The next meeting will be informational only, before the IRP filing. We originally thought this might be held in late August, but now think that a late September/early October timeframe is more realistic to accomplish all that needs to be done. Mr. Park asked the group if they would prefer having an in-person meeting or just an online meeting or Webinar. Most people seem to like the in-person option, also including the live meeting function as we did today.

The IRP will be submitted on November 1.

A participant noted that after the IRP filing, there will be a comment period, and the stakeholders need to have access to confidential information (filed as a separate document). He asked whether this would available to those who sign confidentiality agreements.

Dr. Rozelle invited participants to take a comment sheet and fill it out here or send it in to Scott after the meeting. She asked participants to evaluate the things they liked about this meeting and the things that could be improved. These included:

Like about this meeting	Improve
Company's willingness to meet	Plan is flawed in many ways from the start – doesn't model reality
Presence of multiple microphones	Healthier food options in morning. Absence of recognition and response of the company to the inevitable future of net metering
Appreciated Duke sharing information and knowledge	No comment provided
Appreciate the presence of multiple points of view – gave him lots to think about	No comment provided
Adding live meeting capability	"Disappointment approaching disillusionment"
Adding live meeting capability	Frustration that information is characterized as confidential and proprietary
	Would like more understanding of the solar issue
Willingness of Duke to listen to diverse, difficult comments	Not getting materials out ahead of time – please do it next time
Thanks for doing this – facility, food, participation	"You listen but you do not hear", quoted from Sherlock Holmes
	It's a 20-year plan with a 2-year lifespan – need to make that clear
Live meeting is good	Please record the sessions in future so Mr. Esamann and others who cannot attend can hear the sentiments expressed rather than a summary of them.
Can understand that Duke has a hard job trying to put together so many points of view	But it's frustrating because comments solicited are not really taken into consideration (reference response matrix) – Suggest considering leaving enough time to incorporate public input in future, because there have been many good suggestions and ideas proposed in this process.
Echoed others	Unacceptable to only post the materials the day before the meeting, e.g. meeting notes from last time – no excuse. People want to be informed to participate.

Appreciate the phone access and answering his questions.	Not enough details to allow him to understand it sufficiently
Appreciates opening the meeting to public and addressing hard questions	Dismayed at flaws in model and modeling process, for example dealing with climate change
No comment provided	Suggested more frequent updates as model changes. And having a separate meeting for technical folks who want more detail.

Ms. Hager thanked everyone again for coming, some for the fourth time. We hope to see you at the next meeting in September or October. One participant humorously suggested that faithful attendees should get a t-shirt.

Please submit any comment or corrections to:
Debra Duerr, The Rozelle Group Ltd.
tpc.llc@cox.net

2013 Integrated Resource Plan

Stakeholder Workshop #5

October 9, 2013
Plainfield, IN

Doug Esamann, State President- Indiana, Duke Energy

Welcome

Welcome

- Safety message
- Why are we here today?
- Objectives for stakeholder process
- Introduce the facilitator

DUKE ENERGY.

The Facilitator

- Duke Energy Indiana hired Dr. Marty Rozelle of The Rozelle Group and her colleagues to:
  - Help us develop the IRP stakeholder engagement process
  - Facilitate and document stakeholder workshops

DUKE ENERGY.

Why are we here today?

- Duke Energy Indiana developing 2013 Integrated Resource Plan (IRP)
- Proactively complying with proposed Commission IRP rule
- Today is the fifth stakeholder workshops

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Objectives for Stakeholder Process

- **Listen:** Understand concerns and objectives.
- **Inform:** Increase stakeholders' understanding of the IRP process, key assumptions, and challenges we face.
- **Consider:** Provide a forum for productive stakeholder feedback at key points in the IRP process to inform Duke Energy Indiana's decision-making.
- **Comply:** Comply with the proposed Commission IRP rule.

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Agenda

9:00	Registration & Continental Breakfast
9:30	Welcome from Doug Esamann
9:40	Agenda Review and Introductions
10:00	Workshops 1 – 4 Review & Stakeholder Feedback/Response Discussion
10:40	Scenarios & Portfolios
11:00	Modeling Results
11:45	Lunch
12:30	Decision Making & Risk Management
1:15	IRP Portfolio Selection & Short Term Implementation Plan
2:00	Wrap up and next steps

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Marty Rozelle, President, The Rozelle Group

Review of Workshops 1 - 4

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Review of Workshops 1 - 4

Workshop 1
- Background on IRP process
- Discussion of Driving Forces in order to develop Scenarios

Workshop 2
- Discussion of Energy Efficiency & Renewable Energy
- Scenario development exercise

Workshop 3
- Discussion of Load Forecasting & Market Fundamentals
- Modeling assumptions discussion

Workshop 4
- Scenarios & Portfolios

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Scott Park, Director IRP & Analytics- Midwest

Stakeholder Feedback & Duke Responses

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Stakeholder Feedback & Responses

Issue	Detail	Not Used- Why Not?	Influenced Decision How?	Directly Accepted- How?
Range of Scenarios	*Include a wide range of scenarios reflecting major changes from 'business as usual'*		Range of scenarios, coupled with sensitivity analyses, reflects a wide range of future assumptions.	
Rates	*Demonstrate that rates will be kept affordable*			IRP methodology focuses on customer rates by using present value of revenue requirements as the metric. By choosing the lowest PVRR portfolio, one is choosing the portfolio that minimizes rates the most over the planning horizon.
Renewable Energy	*Include more solar & wind resources*			All scenarios include a renewable generation minimum; additional renewable generation is included when cost effective and includes solar, wind and biomass; the Coal Retires portfolio includes 15% of renewables by 2032.
	More emphasis on energy efficiency programs			One portfolio has higher EE than Generic Order requirements. An Indiana specific market potential study for EE is being performed in 2013
	Significant commitment to distributed energy		Although distributed resources were not explicitly modeled, other resources (e.g., solar and wind) can be considered placeholders for distributed resources.	Duke Energy Indiana is committed to providing cost-effective generation that meets federal and state renewable policies. Customer investment in distributed generation is also encouraged through the net metering tariff. As distributed energy resources become cost-effective and/or are mandated where not cost-effective, they are included in our plan. The three portfolios show various levels of renewables reflecting these tenets.
	Include other alternatives: waste-to-energy, etc.	Our experience is that these do not provide a significant level of cost-effective resources. For example, landfill gas facilities are reasonably cost-effective but typically very small; hog waste generation facilities are high cost and currently not large scale. As these technologies mature and drop in price/increase in size, they will be considered in future IRPs.	Although waste-to-energy resources were not explicitly modeled, other resources (e.g., biomass) can be considered placeholders for such resources.	

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Stakeholder Feedback & Responses

Issue	Detail	Not Used- Why Not?	Influenced Decision How?	Directly Accepted- How?
Coal Dependency	*Reduce DEI dependency on coal generation*			The retirement of units is considered as part of the normal IRP process. Coal retirements range from 948 MW to 5365 MW in the three portfolios.
	Assume implementation of high carbon taxes as disincentive			Range of carbon tax assumptions varied significantly among scenarios. The Environmental Focus scenario assumes a $75/ton price on CO2 in 2033. A higher CO2 sensitivity assuming a $100/ton price on CO2 in 2033 was also evaluated.
	Consider climate change issues – direct costs, externalities		We do not believe it is appropriate for the utility to quantify externalities in its resource planning. However, climate change concerns and external environmental effects were indirectly considered in developing scenarios that reflect high carbon taxes and replacement of coal generation with cleaner fuels, renewable resources, and energy conservation.	
Modeling	*Modeling methodologies should be shared, be clear*			Modeling methodologies were described at workshops.
	Consider alternative methodologies, e.g. as used by other utilities	Duke Energy Indiana uses industry standard optimization models and believes that these models would develop more optimal portfolios than what stakeholders would create. We also believed that one of the optimized portfolios would contain the elements most stakeholders desired (e.g., the Coal Retires Portfolio); we have heard that not all stakeholders agree.		
	Share model inputs & confidential data	The release of confidential data could harm the company's and customer's position in negotiated transactions.		Model inputs were shared with the stakeholder group. To address some concerns about confidential data, representative proxies were provided.
Trust, Transparency, & Relationships	*Take Proposed Rule seriously, build personal relationships with stakeholders, share information, take feedback seriously*			5 planning workshops held for all interested parties Many Duke IRP & Indiana staff attended. Live Meeting was used for last two meetings. Stakeholder feedback is reflected in the scenarios and portfolios that were developed.

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Jim Hobbs, Senior Portfolio Analyst

Scenarios & Portfolios

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Scenarios

Low Regulation Scenario

- Carbon emissions price: $0/ton
- Lower environmental requirements
- Higher fuel prices

Reference Scenario

- Carbon emissions price: $17/ton in 2020; $50/ton in 2033
- Internal assumptions for environmental requirements

Environmental Focus Scenario

- Carbon emissions price: $20/ton in 2020; $75/ton in 2033
- Stricter environmental requirements
- Lower fuel prices

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Portfolios

Traditional Portfolio

- Optimized for the Low Regulation Scenario

Blended Approach Portfolio

- Optimized for the Reference Scenario

Coal Retires Portfolio

- Optimized for the Environmental Focus Scenario

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Duke Energy Indiana Resource Definitions

STATION NAME	UNIT ABBREV	MW
Wabash River	WR 2-5	350
	WR 6	318
Cayuga	CAY	995
Gallagher	GAL	280
Gibson	GIB 1-4	2,512
	GIB 5	310
Connersville	Connersville	166
Miami-Wabash	Mi-Wa	
Combined Cycle	CC	340*
Combust Turbine	CT	200
Nuclear	Nuclear	280**

*represents half of a CC unit

**represents a quarter of a nuclear unit

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Summary of Portfolios

TRADITIONAL PORTFOLIO (Optimized for Low Regulation Scenario)	2014-2018	2019-2023	2024-2028	2029-2033
Retirements	WR 2-6 Coal Connersville 1-2 CT Mi-Wa 1-3, 5 & 6 CT	Gall 2,4 Coal		WR 6 NG Conversion
Additions	WR 6 NG Conversion New CT (400 MW)	New CT (600 MW)	New CT (400 MW)	New CC (680 MW)
Renewables (Cumulative Nameplate MW)	64	328	662	672
Energy Efficiency (% of Retail Sales)	5%	8%	10%	12%

BLENDED APPROACH PORTFOLIO (Optimized for Reference Scenario)	2014-2018	2019-2023	2024-2028	2029-2033
Retirements	WR 2-6 Coal Connersville 1-2 CT Mi-Wa 1-3, 5 & 6 CT	Gall 2,4 Coal		WR 6 NG Conversion
Additions	WR 6 NG Conversion	New CT (600 MW)	New CC (340 MW) New CT (200 MW)	New CC (340 MW) New Nuclear (280 MW)
Renewables (Cumulative Nameplate MW)	64	398	894	2344
Energy Efficiency (% of Retail Sales)	10%	12%	12%	12%

COAL RETIRES PORTFOLIO (Optimized for Environmental Focus Scenario)	2014-2018	2019-2023	2024-2028	2029-2033
Retirements	WR 2-6 Coal Connersville 1-2 CT Mi-Wa 1-3, 5 & 6 CT	Gall 2,4 Coal	Gibson 5 Coal	Cayuga 1,2 Coal Gibson 1-4 Coal
Additions	New CT (400 MW)	New CT (200 MW)	New CC (340 MW) New CT (600 MW)	New CC (2380 MW) New Nuclear (1120 MW) New CT (170 MW)
Renewables (Cumulative Nameplate MW)	64	826	1576	2606
Energy Efficiency (% of Retail Sales)	10%	13%	14%	15%

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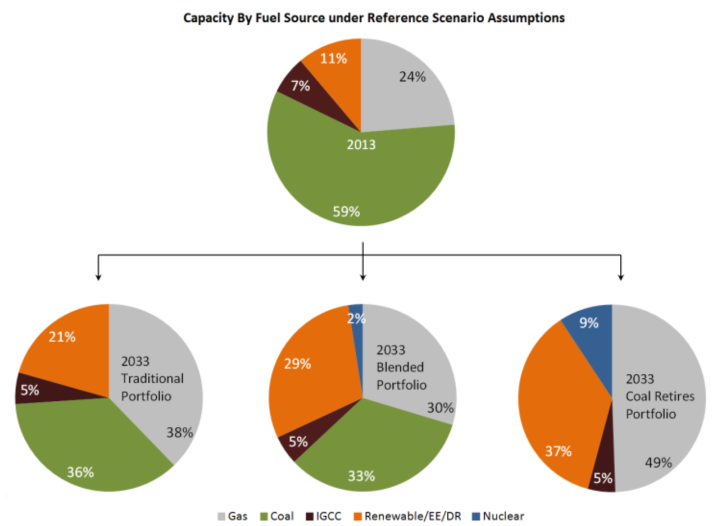
Capacity Changes Over Time by Portfolio



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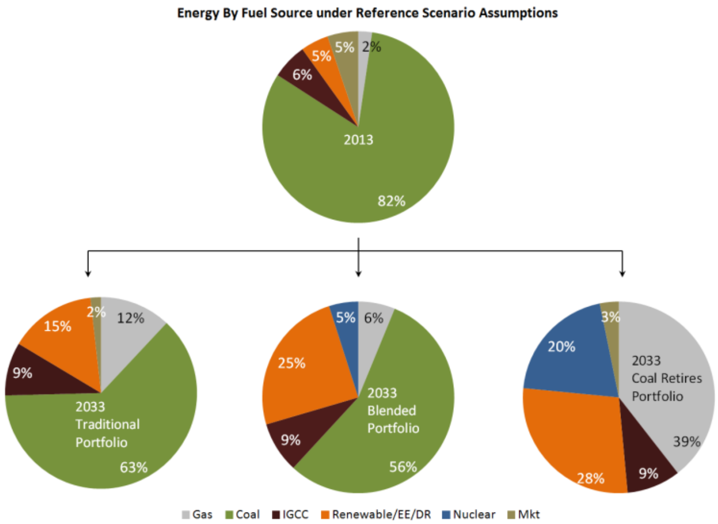
Energy Changes Over Time by Portfolio



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Jim Hobbs, Senior Portfolio Analyst

Modeling Results

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High Level Description of Modeling Results

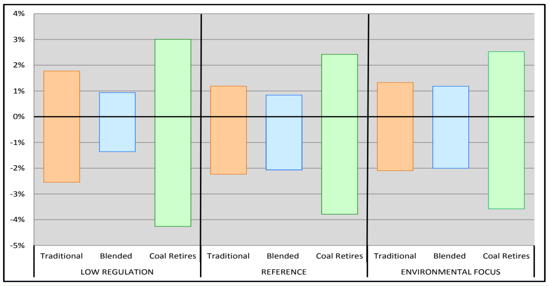
<u>Scenario Analysis</u>

- Used to compare portfolios in different internally consistent futures
- Calculate PVRR's
  - for each portfolio in each scenario

PVRR (MM$)		SCENARIOS		
		LOW REGULATION	REFERENCE	ENVIRONMENTAL FOCUS
PORTFOLIOS	TRADITIONAL	$38,014	$52,261	$56,889
	BLENDED APPROACH	$38,258	$51,420	$55,273
	COAL RETIRES	$44,477	$51,990	$54,051

<u>Sensitivity Analysis</u>

- Used to compare how sensitive each portfolio is to changes in key variables
- Calculate PVRR's of each portfolio for a given sensitivity in each scenario
  - presented as a comparison to base case assumption



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Portfolio Performance in Each Scenario

PVRR (MM$)		SCENARIOS		
		LOW REGULATION	REFERENCE	ENVIRONMENTAL FOCUS
PORTFOLIOS	TRADITIONAL	$38,014	$52,261	$56,889
	BLENDED APPROACH	$38,258	$51,420	$55,273
	COAL RETIRES	$44,477	$51,990	$54,051

Note- the coloring highlights the lowest cost portfolio in a given scenario

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CO2 Sensitivity

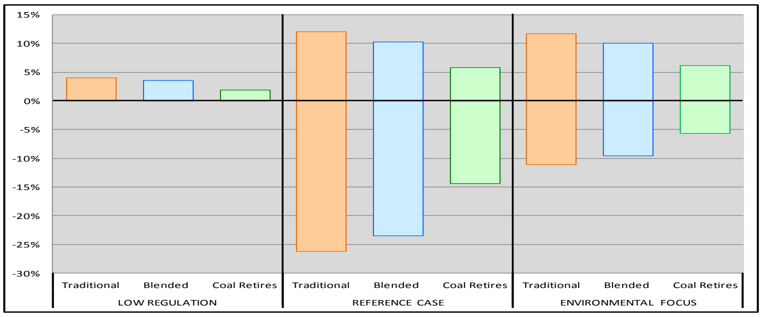
ASSUMPTIONS

	SCENARIOS		
	Low Regulation	Reference	Environmental Focus
High Senstivity	$5/tn in 2025; $7/tn in 2033	$20/tn in 2020; $75/tn in 2033	$25/tn in 2020; $100/tn in 2033
Base Assumption	$0/tn	$17/tn in 2020; $50/tn in 2033	$20/tn in 2020; $75/tn in 2033
Low Sensitivity	NA	$5/tn in 2025; $7/tn in 2033	$17/tn in 2020; $50/tn in 2033

RESULTS

% Change in PVRR

(compared to base assumption)



- The Coal Retires Portfolio is the least sensitive to changes in CO2 prices
- The Traditional Portfolio is the most sensitive to changes in CO2 prices

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Load Growth Sensitivity

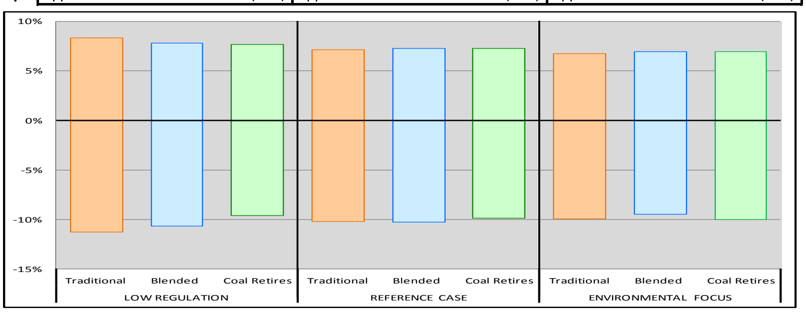
ASSUMPTIONS

	SCENARIOS		
	Low Regulation	Reference	Environmental Focus
High Senstivity	approx +9% of base case in 2033 (MW)	approx +9% of base case in 2033 (MW)	approx +9% of base case in 2033 (MW)
Base Assumption	0.95% CAGR (after EE)	0.95% CAGR (after EE)	0.95% CAGR (after EE)
Low Sensitivity	approx -13% of base case in 2033 (MW)	approx -13% of base case in 2033 (MW)	approx -13% of base case in 2033 (MW)

RESULTS

% Change in PVRR

(compared to base assumption)



- All three portfolios are, generally speaking, equally sensitive to changes in load

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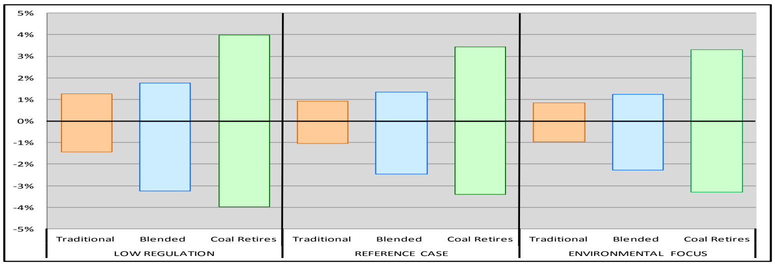
Capital Costs Sensitivity

ASSUMPTIONS ➡

	SCENARIOS		
	Low Regulation	**Reference**	**Environmental Focus**
High Senstivity	CC, CT & Nuclear +30%; Controls +20%; Solar & Wind- same as ref case	CC, CT & Nuclear +30%; Controls +20%; Solar & Wind- same as ref case	CC, CT & Nuclear +30%; Controls +20%; Solar & Wind- same as ref case
Base Assumption	Reference Scenario Assumptions	Reference Scenario Assumptions	Reference Scenario Assumptions
Low Sensitivity	CC, CT, Nuclear & Controls -5%; Solar & Wind - 30%	CC, CT, Nuclear & Controls -5%; Solar & Wind - 30%	CC, CT, Nuclear & Controls -5%; Solar & Wind - 30%

RESULTS
% Change in PVRR
(compared to base assumption) ➡



- The Traditional Portfolio is the least sensitive to changes in capital costs
- The Coal Retires Portfolio is the most sensitive to changes in capital costs

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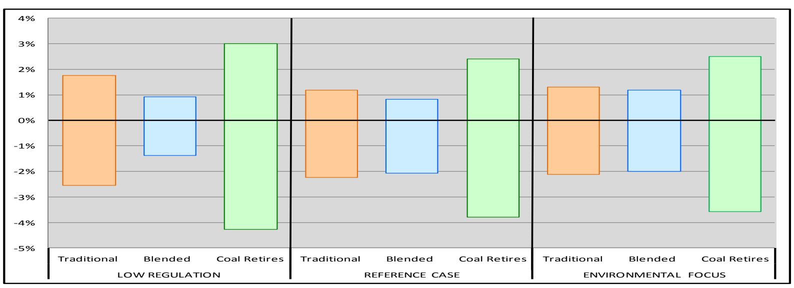
Gas Price Sensitivity

ASSUMPTIONS ➡

	SCENARIOS		
	Low Regulation	**Reference**	**Environmental Focus**
High Senstivity	$6-15/mmBtu	$5-14/mmBtu	$6-13/mmBtu
Base Assumption	$5-13/mmBtu	$5-12/mmBtu	$5-11/mmBtu
Low Sensitivity	$4-10 /mmBtu	$4-10/mmBtu	$4-9/mmBtu

RESULTS
% Change in PVRR
(compared to base assumption) ➡



- The Blended Approach Portfolio is the least sensitive to changes in Gas prices
- The Coal Retires Portfolio is the most sensitive to changes in Gas prices

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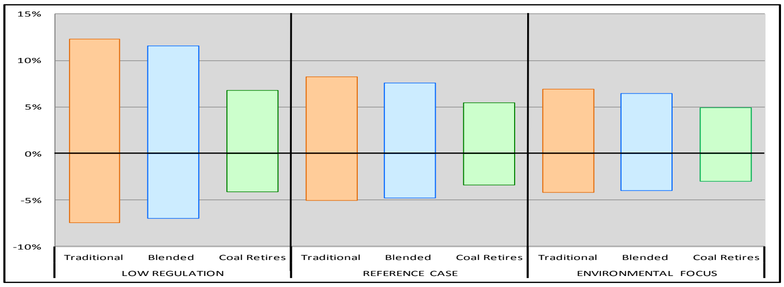
Coal Price Sensitivity

ASSUMPTIONS →

	SCENARIOS		
	Low Regulation	**Reference**	**Environmental Focus**
High Senstivity	$3-6/mmBtu	$4-6/mmBtu	$4-5/mmBtu
Base Assumption	$3-5/mmBtu	$3-5/mmBtu	$3-4/mmBtu
Low Sensitivity	$2-4/mmBtu	$2-4/mmBtu	$2-3/mmBtu

RESULTS
% Change in PVRR
(compared to base assumption) →



- The Coal Retires Portfolio is the least sensitive to changes in Coal prices
- The Traditional Portfolio is the most sensitive to changes in Coal prices

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Renewable Energy Sensitivity

ASSUMPTIONS →

	SCENARIOS		
	Low Regulation	**Reference**	**Environmental Focus**
High Senstivity	Additional 2% of Total Sales	Additional 2% of Total Sales	Additional 2% of Total Sales
Base Assumption	4% of Total Sales	14% of Total Sales	15% of Total Sales
Low Sensitivity	Reduction of 2% of Total Sales	Reduction of 2% of Total Sales	Reduction of 2% of Total Sales

RESULTS
% Change in PVRR
(compared to base assumption) →

- The renewable energy sensitivity is still being analyzed.

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Scott Park, Director IRP & Analytics- Midwest

Decision Making & Risk Management

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Decision Making

- Modeling the various combinations of portfolios, scenarios and sensitivities requires over 100 model runs and creates a tremendous amount of data
- The objective of the IRP is to produce a robust portfolio (resource plan) that meets the load obligation while minimizing the present value of revenue requirement (PVRR)
  - Subject to:
    - Adhering to laws and regulations
    - Meeting reliability and adequacy requirements
    - Being operationally feasible
- Strategic flexibility to alter the resource plan is a very important attribute of a resource plan
  - We don't predict the future, but prepare for what the future might hold
  - Focus on the decision making period
  - Preserve options for the future

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Framework for Reviewing Results

- Scenarios were used to create a set of internally consistent futures that cover a greater range of potential futures
- Likelihood of each scenario is not known
- As a result, we want to see how each portfolio performs under a range of scenario probabilities
- Given this uncertainty, we look at:
  - Most often the lowest cost portfolio
  - Least often the highest cost portfolio

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Model Results and Decision Making Tools

PVRR (MM$)		SCENARIOS		
		LOW REGULATION	REFERENCE	ENVIRONMENTAL FOCUS
PORTFOLIOS	TRADITIONAL	$38,014	$52,261	$56,889
	BLENDED APPROACH	$38,258	$51,420	$55,273
	COAL RETIRES	$44,477	$51,990	$54,051

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When is a Portfolio the Least Cost?

LEAST COST PORTFOLIO

LOW REG SCENARIO PROBABILITY (rows) / ENVIRONMENTAL FOCUS SCENARIO PROBABILITY (columns)

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
100%	T										
90%	T	T									
80%	T	BA	BA								
70%	BA	BA	BA	BA							
60%	BA	BA	BA	BA	BA						
50%	BA	BA	BA	BA	BA	BA					
40%	BA	BA	BA	BA	BA	BA	BA				
30%	BA	BA	BA	BA	BA	BA	BA	BA			
20%	BA	BA	BA	BA	BA	BA	BA	BA	BA		
10%	BA	BA	BA	BA	BA	BA	BA	CR	CR	CR	
0%	BA	BA	BA	BA	CR	CR	CR	CR	CR	CR	CR

T = Traditional Portfolio
BA = Blended Approach Portfolio
CR = Coal Retires Portfolio

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When is a Portfolio the Highest Cost?

HIGHEST COST PORTFOLIO

LOW REG SCENARIO PROBABILITY (rows) / ENVIRONMENTAL FOCUS SCENARIO PROBABILITY (columns)

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
100%	CR										
90%	CR	CR									
80%	CR	CR	CR								
70%	CR	CR	CR	CR							
60%	CR	CR	CR	CR	CR						
50%	CR	CR	CR	CR	CR	CR					
40%	CR	CR	CR	CR	CR	CR	CR				
30%	CR	CR	CR	CR	CR	CR	CR	T			
20%	CR	CR	CR	CR	CR	T	T	T	T		
10%	CR	CR	T	T	T	T	T	T	T	T	
0%	T	T	T	T	T	T	T	T	T	T	T

T = Traditional Portfolio
BA = Blended Approach Portfolio
CR = Coal Retires Portfolio

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Supplementing Risk Analysis with Sensitivities

- The exercise of analyzing portfolios under different scenarios is very informative in terms of risk analysis
- Sensitivities supplement that picture by measuring how responsive a portfolio is to changes in a key variable

Scott Park, Director IRP & Analytics- Midwest

IRP Portfolio & Short Term Implementation Plan

Selecting the IRP Portfolio

- The IRP portfolio is a flexible 20 year resource plan
  - updated again in 2 years
- Near term tactical decisions will also be evaluated

- The Blended Approach Portfolio was selected as the IRP portfolio
  - Most frequently the least cost portfolio
  - Least often the highest cost portfolio
  - Performed well in sensitivity analysis

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Blended Approach Portfolio

Year	Retirements	Additions	Renewables (Nameplate MW) Wind	Solar	Biomass
2014					
2015	Wabash River 2-5 (350 MW)				
2016	Wabash River 6 Coal (318 MW)	Wabash River 6 NG Conversion (318 MW)			
2017					
2018	Connersville 1&2 CT (86 MW) Mi-Wabash 1-3,5-6 CT (80 MW)			60	4
2019	Gallagher 2&4 (280 MW)	CT 200 MW	50	30	
2020		CT 200 MW	50	20	2
2021			50	30	
2022			50	20	2
2023		CT 200 MW		30	
2024			50	30	2
2025		CT 200 MW	50	40	2
2026			250	70	
2027		CC 340 MW			2
2028					
2029					
2030		CC 340 MW			
2031	Wabash River 6 NG (318 MW)	Nuclear 280 MW	250		
2032			600		
2033			600		
Total MW	1432	2078	2000	330	14

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Short Term Implementation Plan

TRADITIONAL PORTFOLIO	2014-2018	2019-2023	2024-2028	2029-2033
Retirements	WR 2-6 Coal Connersville 1-2 CT MW 1-3, 5 & 6 CT	Gall 2,4 Coal		WR 6 NG Conversion
Additions	WR 6 NG Conversion New CT (400 MW)	New CT (600 MW)	New CT (400 MW)	New CC (680 MW)
Renewables (Cumulative Nameplate MW)	64	328	662	672
Energy Efficiency (% of Retail Sales)	5%	8%	10%	12%

BLENDED APPROACH PORTFOLIO	2014-2018	2019-2023	2024-2028	2029-2033
Retirements	WR 2-6 Coal Connersville 1-2 CT MW 1-3, 5 & 6 CT	Gall 2,4 Coal		WR 6 NG Conversion
Additions	WR 6 NG Conversion	New CT (600 MW)	New CC (340 MW) New CT (200 MW)	New CC (340 MW) New Nuclear (280 MW)
Renewables (Cumulative Nameplate MW)	64	398	894	2344
Energy Efficiency (% of Retail Sales)	10%	12%	12%	12%

COAL RETIRES PORTFOLIO	2014-2018	2019-2023	2024-2028	2029-2033
Retirements	WR 2-6 Coal Connersville 1-2 CT MW 1-3, 5 & 6 CT	Gall 2,4 Coal	Gibson 5 Coal	Cayuga 1,2 Coal Gibson 1-4 Coal
Additions	New CT (400 MW)	New CT (200 MW)	New CC (340 MW) New CT (600 MW)	New CC (2380 MW) New Nuclear (1120 MW)
Renewables (Cumulative Nameplate MW)	64	826	1576	2606
Energy Efficiency (% of Retail Sales)	10%	13%	14%	15%

Next Steps

- Prepare IRP document
- Contemporary Issues Conference
- Submit IRP on November 1
- IRP & Non-Technical IRP Summary posted on Duke Energy website in early November
- Begin process in late 2014 for 2015 IRP

Duke Energy Indiana Integrated Resource Plan
Stakeholder Workshop #5
October 9, 2013

SUMMARY

Welcome (slides 2-6)
Doug Esamann, State President, Duke Energy Indiana

Mr. Esamann thanked participants for coming to Duke Energy Indiana's fifth stakeholder workshop, and also welcomed the participants joining in via Live Meeting. He asked the participants how many of them had come to all the workshops, and most have done so. Mr. Esamann noted that the Integrated Resource planning process is highly analytical and challenging, and he appreciates the stakeholders' willingness to actively engage in it and provide such valuable contributions.

Introductions, Agenda Overview & Review of Previous Workshops (slides 7-9)
Marty Rozelle, Facilitator, The Rozelle Group Ltd.

Dr. Rozelle reviewed the purpose and content of the four previous workshops. She noted that the main purpose of the meeting today is to present the modeling results, so it will be largely informational. The Integrated Resource Plan will be filed in about three weeks on November 1. She reviewed the agenda for the workshop, which will end at 2:00. She asked participants to introduce themselves. There were 14 participants at the workshop, and four on the phone, not including Duke Energy representatives.

Stakeholder Feedback & Reponses (slides 11-12)
Scott Park, Director, Midwest IRP

Mr. Park described a spreadsheet that was handed out summarizing the main stakeholder suggestions and expectations that have been expressed both in interviews conducted with key stakeholders before the process began and through the previous workshops. The table summarizes how stakeholder input was considered in the IRP process, and notes whether suggestions were 1.) accepted by Duke Energy Indiana in developing scenarios and portfolios, 2.) influenced the decision in an indirect way, or 3.) were not used, and why not.

Scenarios & Portfolios (slides 13-19)
Jim Hobbs, Senior Portfolio Analyst

Mr. Hobbs summarized characteristics of the three scenarios that have been discussed in prior workshops, which are the Low Regulation, Reference, and Environmental Focus scenarios. He noted that the names used for the portfolios have been changed, to reduce confusion, to Traditional, Blended Approach, and Coal Retires portfolios; these correspond to the three scenarios. A table was shown that summarized the main components of the three portfolios over the planning horizon. Jim also showed a series of slides showing capacity and energy changes over time for the three portfolios.

Questions and comments from participants at the meeting included the following:

Q: Do the combined cycle (CC) units include carbon sequestration?
A: No

Q: Regarding the 400 megawatts (MW) of new combustion turbine (CT) generation, are these new locations or existing?
A: Duke Energy Indiana hasn't specified this yet.

Q: What kind of combined cycle is assumed?
A: Natural gas

Q: What do the renewable additions consist of?
A: These represent new generation sources.

Q: Are these generic renewable resources, or specific? If not specific, what are the characteristics and assumptions used?
A: These are generic resources, used as a proxy for solar, wind and a small amount of biomass. For each year, Duke Energy Indiana allows the model to select 600 MW of wind, 200 MW of solar and 10 MW of biomass, up to a maximum of 20% renewables in any year.

Q: What was the cap set for renewable energy in the model?
A: 20% energy maximum

Q: On this table, are these quantities cumulative with the megawatts added in the previous period?
A: Yes

Q: Does this analysis assume the same costs for company-owned and non-company-owned renewable resources?
A: Yes

C: We can assume that climate effects will continue; so in the first portfolio there will still be carbon emissions from Duke Energy Indiana facilities into the long-term future, e.g. 2070.

Q: In the 2013 Reference scenario assumptions, there is 6% integrated gasification combined cycle (IGCC) – what is that?
A: the Edwardsport plant

Marty asked participants how their own “favorite” portfolio might be similar to or different from those presented here. Ideas included the following:

- Consider carbon sequestration – move from CT plants to CC plants with carbon sequestration; why hasn’t Duke Energy Indiana included this?
    - Extra cost
- Can’t match the slides presented here with the slides sent out ahead of the workshop
    - The slides sent out included only the slides showing the modeling results. Modifications have been made since then, and this presentation included additional slides.
- Please post these slides on the website, or otherwise provide them electronically.
    - Duke Energy Indiana will do so.
- These portfolios do not reflect the kind of “sea-change” that some think is warranted in the present day, e.g., you can’t compare distributed energy with utility generation resources; sequestration isn’t just a technical issue but a political one; assuming new nuclear plants is not at all realistic/is hypothetical; the capability for solar storage should be explicitly assumed and added to these portfolios. This participant recognized that the currently-used models can’t be revised ‘over night’ and it takes time, but they should be modified to reflect the ways in which the world is changing.

- Gas is not ultimately a solution to the carbon problem, but in the near term is a mitigation measure. Combined heat and power (CHP) should be included, as being a 'different animal'.
- Energy efficiency should not be constrained by the regulatory mandate, but should look at a variety of techniques that should all be included, at least in the IRP narrative. Examples include price-induced conservation, improved appliances and equipment, programmatic-induced efficiency.
- Janice Hager (Duke Energy) summarized the discussion by suggesting that the ideal portfolio to meet these particular concerns would include:
  - Renewable energy generation
  - Distributed energy
  - Solar storage
  - Cogeneration (CHP)
- Beth Harriman (Duke Energy Indiana) asked participants to suggest how distributed energy could be reflected in the models.
  - Some of the issues that should be considered include substitutes for transmission and upgrades, extent to which customer capital can be invested and tariff structure would change, and aggregation of resources such as micro-grids.
- A participant suggested that Duke Energy Indiana should begin a process to figure out how to address some of these issues before the next IRP cycle, including looking at other models.
  - suggested American Council for an Energy-Efficient Economy (ACEEE) as a resource, and the National Research Energy Laboratory (NREL)
- PURPA is a current constraint (at $.029/kwh).

Modeling Results (slides 20-28)
Presenter: Jim Hobbs

Jim described the sensitivity analyses conducted to assess the performance of each portfolio in each scenario. These included CO2 sensitivity, load growth sensitivity, capital cost sensitivity, gas price sensitivity, coal price sensitivity, and renewable energy sensitivity (the last analysis is not complete at this time).

Comments and questions included:

Q: What changed between these slides and the ones previously sent out?
A: A few refinements and changes in data were completed in the last week.

Q: There were several technical questions about the performance of the model and uses of optimization, and observations about how different approaches might influence the results. The flatness of the sensitivity for load growth was pointed out as an example of model constraints and how re-optimization opportunities/feedback loops could be included for distributed energy and other concerns.

Q: Clarify what PVRR means?
A: Present value of revenue requirements, which is the cost to customers that would be passed on in rates (includes Duke Energy Indiana's return)

Q: Are most of the sensitivities reflected here driven by changes that wouldn't be implemented until much later in the planning horizon?
A: Generally, that's correct. We need to recognize that this is a strategic plan, and there will be tactical plans that are developed to implement it, which can be more flexible.

Q: For the gas prices, why are different definitions used in the three scenarios?
A: Each scenario has its own internal assumptions; the demand for gas under the different scenarios is reflected in the price assumptions, i.e. more demand drives the price higher, lower demand results in lower price.

Q: There were several additional questions about specific assumptions used in the sensitivity analyses.
A: Mr. Park explained how certain assumptions and costs were developed and used. For example, levels of environmental controls are built into assumptions about retiring units and these influence cost assumptions.

Q: Recognizing that the renewable sensitivities aren't provided yet for participants to look at, a participant recapped his understanding of the results by observing that the Environmental Focus scenario is the best in 4 out of 6 sensitivities. So, how important are the sensitivities relative to each other and to the decision?
A: All of the data needs to be factored into a decision, and interpreted using judgment as well. There is no single way in which any given sensitivity affects each portfolio; for example, a sensitivity may have a hypothetically large impact on a portfolio, but it is highly unlikely to occur.

Q: Are there other sensitivities in addition to these?
A: No, these are all of them. Load growth is also a proxy for energy efficiency.

Lunch

Decision Making & Risk Management (slides 29-35)
Presenter: Scott Park

Mr. Park said that the afternoon's discussion will highlight how Duke Energy Indiana uses the data described this morning to make a decision, what the decision is, and what's the short-term implementation plan for the selected portfolio. He provided an overview of the decision-making process, noting that strategic flexibility to alter the resource plan is a very important attribute. A main point from Duke Energy Indiana's perspective is to evaluate how often a given portfolio is either least cost or highest cost. He showed a summary chart of the relative occurrence of the least cost portfolio using the range of probabilities, which showed that the Blended Approach portfolio being most often the 'least cost' option. A similar chart shows that the Coal Retires portfolio is most often the highest cost.

Scott asked the participants to reflect on their own ideas about the probability of the Low Regulation, Reference, and Environmental Focus scenarios occurring. The group's observations included the following:

C: A participant noted that it might be unfair to ask people to do this based on little knowledge and the many variables assumed to occur simultaneously in the portfolios – each of the variables must be assessed independently; for example, carbon price stands alone and is not the same as capital cost variables, so would have a different probability of occurring. This approach is too simplistic, perhaps in a way that 'obfuscates rather than reveals'.

C: A participant observed that he thinks the model used is not able to capture the true range of probabilities over the planning horizon because it did not use enough scenarios.

Q: What is being calculated as the 'least cost' in this analysis?
A: The PVRR costs for each portfolio is calculated based on a weighted average of probabilities for the three scenarios occurring (for example, Low Regulation = 20% probability, Reference = 40%, Environmental Focus = 40%); each cell in the table has a number that is based on this weighted average, and the lowest cost of these is equated with the corresponding portfolio, which is the 'least cost' portfolio shown in that cell.

C: How much of the total cost of the portfolios is attributable to costs that only occur in the long term, e.g. in the Coal Retires portfolio? This participant suggested that a cumulative present-value calculation graph would be more informative and accurate.

Q: A participant suggested that this approach is flawed because internal assumptions are inconsistent. The arithmetic approach results in a portfolio that doesn't exist in the real world.
A: Duke Energy Indiana believes that the assumptions in each scenario are internally consistent.

IRP Portfolio & Short Term Implementation (slides 29-39)
Presenter: Scott Park

Scott said that, given the analysis described above, the Blended Approach portfolio was selected for presentation in the 2013 IRP. He talked about some of the specifics of this portfolio in terms of unit retirements and additions, and level of renewable resources assumed. He showed how a short-term implementation plan could be crafted within this portfolio, emphasizing that there is flexibility to later refocus on a different approach depending on how the world may change over the next 5 to 10 years.

Group discussion included:

C: A participant observed that Duke Energy Indiana's company policy decisions between 2014 and 2023 will also influence deployment of resources, and this may result in lost opportunities; for example, if policy focuses on nuclear generation, the lead time for renewable energy resources may be foregone.

C: Having a higher limit for renewables built into the model is at least a step in the right direction.

C: A participant noted that developing an IRP every two years allows flexibility to change course as needed. Duke Energy Indiana needs to figure out the short-term needs for the next two years, during which some of these issues can be addressed before the next IRP.

Q: From the November 1 IRP filing to February 1 there will be a 90-day review and comment period for stakeholders, as provided by a new Indiana Utility Regulatory Commission (IURC) rule. What will happen during that period? Will stakeholders and their consultants have access to the data used in the analysis? Will they be able to submit alternative plans?
A: This is a new process for Duke Energy Indiana, so they don't really know how it will be implemented. We will seek additional guidance.

Q: How willing is the company to look at CHP for the next round of resource planning? Are they willing to commit to that today?
A: We will need to look at it; CHP is very customer-specific, and each has different electrical and thermal needs. Duke Energy Indiana is open to having customers participate in such a program, but doesn't carry an inventory of facilities.

C: A participant noted that Purdue University is a CHP; Indiana University could be. There are many different ways to do CHP.

Q: A participant suggested that Duke Energy Indiana could undertake a "potential" study for CHP, as they're doing for energy efficiency (EE).

Next Steps (slide 40)

Mr. Park said that the IRP will be submitted on November 1.

The group had the following observations about the filing and the planning process:

- Noted a marked improvement in the way Duke Energy Indiana has incorporated stakeholder input from previous workshops, and seems to really be taking into account stakeholder comments
- The fact that the process is even considering climate change implications is a step in the right direction.
- Should be a point in the process at which stakeholders could select their own resource portfolios
- To reinforce this suggestion, it would be nice to start the process next time where we left off this time, in reviewing innovations and progress that have occurred in the interim.
- Consider including stakeholder technical consultants in the next planning effort, and allowing access to confidential information.
- How can the 2013 IRP specifically look forward to the next IRP by describing the changes expected?

Duke Energy's Bobby McMurry, who was joining the workshop via Live Meeting, thanked everyone for their important and valuable participation in this process.

Dr Rozelle asked the Duke Energy participants to reflect on what they have learned from this process:

- The scenario analysis was an additional step to the model previously used, and turned out to support a better, more thoughtful decision making process.

- The company learned how to listen better.
- The company learned how to try and communicate in a better way.
- The company heard many positive suggestions for developing a more robust IRP. We have more to do and look forward to continuing working with stakeholders in the future efforts.

Mr. Esamann thanked everyone again for coming today, and especially for continuing with the process. He also thanked the Duke Energy team for all their efforts.

He mentioned a few “takeaways” that he had learned. In looking at the summary of 20-year PVRR costs, he noted that the costs are not that far apart, although the likelihood of the Traditional portfolio occurring is not high. The fact that costs and investments in the short term are similar among portfolios is a good thing in being able to allow for flexibility. This seems to be a balanced plan, and there is not a great deal of variability when we look at the portfolios under different scenarios. The results can provide a basis for the various stakeholders to advocate for their preferences in future.

Please submit any comment or corrections to:
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