## Agenda

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Agenda Item</th>
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<tbody>
<tr>
<td>9:00–9:15</td>
<td>Welcome and Introductions</td>
</tr>
<tr>
<td>9:15–9:30</td>
<td>Overview of Integrated Resource Plan (IRP) Process</td>
</tr>
<tr>
<td>9:30–10:00</td>
<td>Overview of NIPSCO</td>
</tr>
<tr>
<td>10:00–10:30</td>
<td>Customer Load Forecasting</td>
</tr>
<tr>
<td>10:30–10:45</td>
<td>Break</td>
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<tr>
<td>10:45–11:15</td>
<td>Demand Side Management (DSM)</td>
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<tr>
<td>11:15–11:45</td>
<td>Environmental Considerations</td>
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<tr>
<td>11:45–12:30</td>
<td>Lunch</td>
</tr>
<tr>
<td>12:30–2:30</td>
<td>IRP Development and Discussion</td>
</tr>
<tr>
<td>2:30–3:30</td>
<td>Public Advisory Feedback and Next Steps</td>
</tr>
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</table>
Welcome and Introductions

Presented by
Violet Sistovaris
Executive Vice President
Safety Message
Integrated Resource Plan Guiding Principles

- Reliable
- Compliant
- Affordable
- Flexible
- Efficient
Overview of the Public Advisory Process

Presented by
Dr. Marty Rozelle
The Rozelle Group Ltd
Overview Of Public Advisory Process

Objectives

- Enhance public involvement through multiple public advisory meetings
- Solicit relevant input for consideration in the development of the 2016 IRP
- Facilitate discussion on NIPSCO’s IRP process
<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
<th>Location</th>
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<tbody>
<tr>
<td>May 5, 2016</td>
<td>- Public Advisory Meeting #1</td>
<td>Radisson Hotel – Star Plaza, Merrillville, IN</td>
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<tr>
<td>Jul 12, 2016</td>
<td>- Public Advisory Meeting #2</td>
<td>Radisson Hotel – Star Plaza, Merrillville, IN</td>
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<td>Aug 2016</td>
<td>- Public Advisory Meeting #3</td>
<td>TBD</td>
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<tr>
<td>TBD</td>
<td>- Public Advisory Meeting #4</td>
<td>TBD</td>
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<tr>
<td>Aug–Oct 2016</td>
<td>- Develop IRP Report and Document Process</td>
<td>N/A</td>
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<tr>
<td></td>
<td>- Monitor Business Conditions and Finalize the Plan</td>
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<tr>
<td>Oct 2016</td>
<td>- Submit IRP Document to the Indiana Utility Regulatory Commission (IURC)</td>
<td>N/A</td>
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NIPSCO Electric Business Overview

Presented by
Daniel Douglas
Executive Director, Corporate Strategy & Development
# NIPSCO Electric Business

## NIPSCO Electric Business

<table>
<thead>
<tr>
<th>Electric Customer Count</th>
<th>~460,000</th>
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<tbody>
<tr>
<td>Major Industrial Customers</td>
<td>ArcelorMittal, Praxair, BP, US Steel, NLMK</td>
</tr>
<tr>
<td>Generation Capacity (MW)</td>
<td>3,405</td>
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<tr>
<td>2015 Internal Peak Load (MW)</td>
<td>3,050</td>
</tr>
<tr>
<td>Transmission System (miles)</td>
<td>2,800</td>
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<tr>
<td>Distribution System (miles)</td>
<td>10,000</td>
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<tr>
<td>Industrial Interruptible (MW)</td>
<td>530 (per Cause No. 44688)</td>
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<tr>
<td>2015 Residential Demand Savings (MW)</td>
<td>44</td>
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<td>2015 Commercial &amp; Industrial Demand Savings (MW)</td>
<td>20</td>
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<tr>
<td>Wind Feed-in-Tariff (MW)</td>
<td>1</td>
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<tr>
<td>Solar FIT (MW)</td>
<td>19</td>
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<tr>
<td>Biomass FIT (MW)</td>
<td>14</td>
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## NIPSCO Generation Assets

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<tr>
<th>Unit</th>
<th>Michigan City 12</th>
<th>Bailly 7</th>
<th>Bailly 8</th>
<th>Bailly 10</th>
<th>Schahfer 14</th>
<th>Schahfer 15</th>
<th>Schahfer 16A</th>
<th>Schahfer 16B</th>
<th>Schahfer 17</th>
<th>Schahfer 18</th>
<th>Norway</th>
<th>Oakdale</th>
<th>Sugar Creek CT 1A</th>
<th>Sugar Creek CT 1B</th>
<th>Sugar Creek SCST</th>
<th>Barton (PPA)</th>
<th>Buffalo Ridge (PPA)</th>
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</thead>
<tbody>
<tr>
<td>Fuel</td>
<td>Coal</td>
<td>Coal</td>
<td>Coal</td>
<td>Natural Gas</td>
<td>Coal</td>
<td>Coal</td>
<td>Natural Gas</td>
<td>Natural Gas</td>
<td>Coal</td>
<td>Coal</td>
<td>Water</td>
<td>Water</td>
<td>Natural Gas</td>
<td>Natural Gas</td>
<td>Natural Gas</td>
<td>Wind</td>
<td>Wind</td>
</tr>
<tr>
<td>Capacity (MW)</td>
<td>469</td>
<td>160</td>
<td>320</td>
<td>31</td>
<td>431</td>
<td>472</td>
<td>78</td>
<td>77</td>
<td>361</td>
<td>361</td>
<td>4</td>
<td>6</td>
<td>152</td>
<td>154</td>
<td>229</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

**Notes:** Map excludes Peaker Capacity
### 2014 IRP Lessons Learned & Continuous Improvement Action Plan

<table>
<thead>
<tr>
<th>2014 IRP Feedback</th>
<th>Continuous Improvement Action Plan</th>
</tr>
</thead>
</table>
| Enhance Stakeholder Process | - Participated in joint educational session with Indiana utility peers to develop foundational reference materials  
- Engaging stakeholders to obtain feedback on IRP analysis and future world alternatives |
| Improve Load Forecasting Process | - Clarify the detailed narrative and load forecast enhancements |
| Clarify DSM Modeling | - Provide DSM development and modeling methodology detail |
| Expand Scenarios and Sensitivities | - Develop a robust set of scenarios and sensitivities to capture a wider range of potential risks/uncertainties  
- Increase emphasis on environmental rules and regulations |
| Address Customer-owned and Distributed Generation | - Evaluate distributed generation and Combined Heat & Power |
| Provide Confidential Data Proxies | - Reduce use of confidential data and use public/representative proxy data as substitute for proprietary data |
Long-Term Energy and Demand Forecast

Presented by
Amy Efland
Lead Forecasting Analyst
Load Forecasting Process

Data Sources

- Energy, Customers, Price
  Source: NIPSCO
- Economic Drivers
  Source: IHS Global Insight
- Appliance Saturation and Efficiencies
  Source: Itron
- Weather Data
  Source: Schneider Electric
- Major Industrial Accounts
  Source: Industrial Analysis

Customer Models

- Residential Commercial Street Lighting Public Authority Railroad Company Use
- Energy Forecast
- Historical Peak, and Energy Data Historical Interruptions
  Source: NIPSCO
- Weather Data
- Industrial

Peak Model

System Peak Forecast Demand
Residential Energy Forecast

- Residential New Customers First Three Years
  - New Business Team

- Residential New Customers Long Term Forecast Model
  - Econometric Model
  - Housing Starts

- Existing Customers
  - Historical Attrition Rate Incorporated

- Total Residential Customers

- Real Per Capita Income
- Price of Electricity
- Appliance Saturations and Efficiencies
- Cooling Degree Days
- Heating Degree Days

- Residential Use per Customer

- Total Residential Energy
Commercial Energy Forecast

Commercial
New Customers
Long Term
Forecast Model
- Econometric Model
- Population
- Gross County Product

Commercial Customers Model

Total Commercial Consumption Model

- Real County Retail Sales
- Price of Electricity
- Cooling Degree Days
- Heating Degree Days

Total Commercial Energy
Industrial Energy Forecast

- Individual Discussions with the Largest Industrial Customers
- Represents Approximately 80% of the Industrial Load

- Recent Historical Industrial Sales Trends
- Regional and Global Trends for Specific Industries
- Represents the Remaining 20% of the Industrial Load

Total Industrial Energy
“Other” Energy Forecast

- Recent Historical Data
- Anticipated Future Trends

Public Authority Railroad Company Use

- Econometric Approach
- Number of Hours of Dark
- Anticipated Future Trends

Street Lighting

Total “Other” Energy
Peak Forecast

NIPSCO peak model is a function of the weather at peak hour and the composition and level of load for:

- Residential class
- Commercial class
- Industrial class
Load Forecasts

Energy Requirement Projections 2016-2037 CAGR

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Base</th>
<th>Low</th>
<th>High</th>
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</thead>
<tbody>
<tr>
<td>Base</td>
<td>0.33%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>0.08%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>0.68%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base-No Major Industrial</td>
<td>0.58%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-No Major Industrial</td>
<td>0.12%</td>
<td></td>
<td></td>
</tr>
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</table>

Notes: Compound Annual Growth Rate (CAGR)
Demand Side Resources

Presented by
Alison Becker
Manager Regulatory Policy
Demand Side Management Process

Potential
- Study
- Customers
- Savings
- Costs
- Groupings

Benefit
- DSMore
- Standard Tests
- Cost-Effective

Supply & Demand
- IRP
- NIPSCO Resource Portfolio
- Cost-Effective Portfolio

Implementation
- Request For Proposal
- Programs
- Vendors
- EM&V
Existing Demand Side Resources

**Residential**
- Heating Ventilation and Air Conditioning (HVAC) Rebates
- Residential Lighting Program
- Home Energy Analysis (HEA)
- Appliance Recycling
- Low Income Appliance Replacement
- School Education
- Behavioral
- Income Qualified Weatherization

**Commercial & Industrial**
- Prescriptive Program
- Custom Program
- New Construction Program
- Small Business Direct Install Program
- Retro-Commissioning Program

**Demand Response**
- Industrial Interruptible
## Selectable Future Groupings

<table>
<thead>
<tr>
<th>Energy Efficiency (EE)</th>
<th>Demand Response (DR)</th>
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<tbody>
<tr>
<td><strong>Residential Program Groupings</strong></td>
<td><strong>Commercial Program Groupings</strong></td>
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<tr>
<td>Appliances</td>
<td>Cooling</td>
</tr>
<tr>
<td>Cooling</td>
<td>Exterior Lighting</td>
</tr>
<tr>
<td>Heating</td>
<td>Food Preparation</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>Heating</td>
</tr>
<tr>
<td>Exterior Lighting</td>
<td>Interior Lighting</td>
</tr>
<tr>
<td>Interior Lighting</td>
<td>Miscellaneous</td>
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<tr>
<td>Water Heating</td>
<td>Refrigeration</td>
</tr>
<tr>
<td></td>
<td>Ventilation</td>
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<tr>
<td></td>
<td>Water Heating</td>
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<tr>
<td></td>
<td>Office Equipment</td>
</tr>
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</table>
Utility Program Costs

Utility Costs by Program

Note: Costs are not present value costs
Environmental Considerations

Presented by
Kelly Carmichael
Vice President Environmental
Environmental Considerations

- **Clean Water Act 316(b) Cooling Water Intake Structures**
  - Requires all large existing steam electric generating stations with cooling water intake structures to deploy the best technology available to minimize adverse environmental impacts to fish and shellfish

- **Electric Steam Power Effluent Limitation Guidelines (ELG)**
  - Regulates wastewater stream processes and byproducts associated with steam electric power generation including ash handling water and flue gas desulfurization (FGD) wastewater
Environmental Considerations (Cont.)

- **Coal Combustion Residuals (CCR)**
  - Rule criteria that may require storage, treatment and disposal units to modify or cease CCR receipt based on:
    - Structural integrity requirements
    - Impact to groundwater
    - Locational requirements

- **National Ambient Air Quality Standards (Ozone NAAQS)**
  - The ozone standard has been lowered from 75 parts per billion to 70 parts per billion
  - Further lowering of standard is possible
Environmental Considerations (Cont.)

- **Cross State Air Pollution Rule (CSAPR)**
  - Reduces overall emissions of sulfur dioxide (SO\(_2\)) and Nitrogen Oxides (NO\(_x\)) by setting state-wide caps on power plant emissions
  - Allowance allocations may continue to be updated as standards are lowered
  - Draft revisions to CSAPR currently proposed by EPA

- **Clean Power Plan (CPP)**
  - Regulates carbon dioxide (CO\(_2\)) emissions from existing fossil-fuel fired electric generating units under the Clean Air Act
  - CPP establishes national CO\(_2\) emission standards that are applied to each state’s mix of affected electric generating units likely in the form of state-specific emission rate or mass emission limits
### Environmental Considerations (Cont.)

<table>
<thead>
<tr>
<th>CCR</th>
<th>ELG</th>
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<tr>
<td><strong>Effective</strong></td>
<td><strong>January 4, 2016</strong></td>
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<tr>
<td><strong>Purpose</strong></td>
<td>Establishes discharge and disposal limits for wastewaters</td>
</tr>
<tr>
<td>Establishes storage and disposal requirements for CCRs</td>
<td>Wastewater streams associated with bottom ash, boiler slag, FGD, fly ash, flue gas mercury control waste, landfill leachate, and non-chemical metal cleaning waste</td>
</tr>
<tr>
<td><strong>Regulated</strong></td>
<td></td>
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<tr>
<td>CCRs from bottom ash, boiler slag, fly ash and certain FGD solids</td>
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<tr>
<td><strong>Compliance Timing</strong></td>
<td>Between November 1, 2018 and December 31, 2023</td>
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<tr>
<td>Multiple rule requirements each with its own compliance date; Earliest unit cease receipt of CCRs October 2018 or 2023 if unit is retired</td>
<td></td>
</tr>
<tr>
<td><strong>Enforcement</strong></td>
<td>Indiana Department of Environmental Management - National Pollutant Discharge Elimination System</td>
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<tr>
<td>Self Implementing</td>
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## Environmental Compliance Cost Estimates ($M)

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<th>ELG</th>
<th>CCR</th>
<th>316(b)</th>
<th>Ozone</th>
<th>Total Compliance Costs</th>
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<td><strong>Bailly</strong></td>
<td></td>
<td></td>
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<tr>
<td>(2023 Retirement)</td>
<td>$0</td>
<td>$5 - 7</td>
<td>$0</td>
<td>$0</td>
<td>$5 - 7</td>
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<td>(No Retirement)</td>
<td>$189 - 265</td>
<td>$53 - 74</td>
<td>$32 - 40</td>
<td>$0</td>
<td>$274 - 379</td>
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<td>Michigan City</td>
<td>$1 - 2</td>
<td>$40 - 55</td>
<td>$0</td>
<td>$0</td>
<td>$41 - 57</td>
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<td>Schahfer</td>
<td>$224 - 313</td>
<td>$85 - 120</td>
<td>$0</td>
<td>$0 - 325</td>
<td>$309 - 758</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
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<tr>
<td>(Bailly Retirement)</td>
<td>$225 - 315</td>
<td>$130 - 182</td>
<td>$0</td>
<td>$0 - 325</td>
<td>$355 - 822</td>
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<tr>
<td>(No Retirement)</td>
<td>$414 - 580</td>
<td>$178 - 249</td>
<td>$32 - 40</td>
<td>$0 - 325</td>
<td>$624 - 1,195</td>
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</table>
## Mass-Based Allocation Based On CPP Federal Implementation Plan

### INDIANA

<table>
<thead>
<tr>
<th>Compliance Periods</th>
<th>Indiana Mass Emissions Cap</th>
<th>Renewable Energy Set Aside</th>
<th>Output-Based Set Aside</th>
<th>Clean Energy Incentive Program Set Aside</th>
<th>Total Allowances Distributed to Utilities</th>
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<tbody>
<tr>
<td>Interim Step 1 Period 2022-2024</td>
<td>92,010,787</td>
<td>4,600,539</td>
<td>0</td>
<td>5,754,076</td>
<td>81,656,172</td>
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<tr>
<td>Interim Step 2 Period 2025-2027</td>
<td>83,700,336</td>
<td>4,185,017</td>
<td>1,106,150</td>
<td>0</td>
<td>78,409,169</td>
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<tr>
<td>Interim Step 3 Period 2028-2029</td>
<td>78,901,574</td>
<td>3,945,079</td>
<td>1,106,150</td>
<td>0</td>
<td>73,850,345</td>
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<td>Finial Period 2030-2031, 32-33, etc.</td>
<td>76,113,835</td>
<td>3,805,692</td>
<td>1,106,150</td>
<td>0</td>
<td>71,201,993</td>
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### NIPSCO

<table>
<thead>
<tr>
<th>Compliance Periods</th>
<th>Bailly Allowances</th>
<th>Michigan City Allowances</th>
<th>Schahfer Allowances</th>
<th>Sugar Creek Allowances</th>
<th>Total NIPSCO Allowances*</th>
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<tr>
<td>Interim Step 1 Period 2022-2024</td>
<td>1,481,933</td>
<td>1,771,796</td>
<td>5,390,361</td>
<td>1,620,081</td>
<td>10,264,170</td>
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<td>Interim Step 2 Period 2025-2027</td>
<td>1,423,005</td>
<td>1,701,342</td>
<td>5,176,017</td>
<td>1,555,659</td>
<td>9,856,023</td>
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<tr>
<td>Interim Step 3 Period 2028-2029</td>
<td>1,340,269</td>
<td>1,602,423</td>
<td>4,875,076</td>
<td>1,465,211</td>
<td>9,282,979</td>
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<tr>
<td>Finial Period 2030-2031, 32-33, etc.</td>
<td>1,292,206</td>
<td>1,544,959</td>
<td>4,700,251</td>
<td>1,412,667</td>
<td>8,950,081</td>
</tr>
</tbody>
</table>

---

**Notes:** All units are in annual average short tons of CO₂  
* Additional allowances available from renewable, output based and clean energy set-asides
IRP Development

Presented by
Edward Achaab
Manager Resource Planning
IRP Is About “Matching Supply And Demand”

**Step 1**
Gather data, develop input assumptions, screen technologies, and create scenarios.

**Step 2**
Develop portfolios, deploy planning strategies to assess various options.

**Step 3**
Analyze portfolios, assess risks, and select the preferred plan.

**Step 4**
Develop IRP report and submit report by November 1, 2016.

**Illustrative Electric Supply & Demand Forecast**

- **Existing Resources (MW)**
- **Capacity Need (MW)**
- **Load + MISO Reserve Margin (MW)**

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</tr>
</thead>
<tbody>
<tr>
<td>Capacity (MW)</td>
<td>0</td>
<td>50</td>
<td>1,000</td>
<td>1,500</td>
<td>2,000</td>
<td>2,500</td>
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<td>8,000</td>
<td>8,500</td>
<td>9,000</td>
<td>9,500</td>
<td>10,000</td>
<td>10,500</td>
</tr>
</tbody>
</table>

Step 1 Gather data, develop input assumptions, screen technologies, and create scenarios.

Step 2 Develop portfolios, deploy planning strategies to assess various options.

Step 3 Analyze portfolios, assess risks, and select the preferred plan.

Step 4 Develop IRP report and submit report by November 1, 2016.
Resource Modeling Optimization

Demand Side Resources

- Assess NIPSCO Existing Resources
  - Coal, Gas, Hydro, Solar, Wind, Biomass, Demand Response, Energy Efficiency

- Bundle Measures into Program Groupings
- Run DSM Standardized Tests Using DSMore

Supply Side Resources

- DSM Programs that Passed Standardized Tests
- Engineering Study
  - Consider Potential Options
  - Run Screening Curves for Self-build Options

Model Optimization

- ABB Strategist® Module PROVIEW

Model Output

- Integrated Resource Portfolio Plans

Risk Assessment

Perform Risk Assessment: Evaluate Various Scenarios and Sensitivities
## Future Resource Options

<table>
<thead>
<tr>
<th>Options</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Conventional Technology</td>
<td>Engineering Study by Sargent &amp; Lundy (S&amp;L)</td>
</tr>
<tr>
<td>• Renewable Technology</td>
<td></td>
</tr>
<tr>
<td>• Distributed Generation (DG) Technology</td>
<td></td>
</tr>
<tr>
<td>• Demand Side Energy Efficiency</td>
<td>Market Potential Study by Applied Energy Group (AEG)</td>
</tr>
<tr>
<td>• Demand Response</td>
<td></td>
</tr>
</tbody>
</table>
Screening Criteria For Future Supply Side Options

- Energy Source Availability
- Technical Feasibility
- Commercial Availability
- Economically Attractive
- Environmental Compatibility
## Future Supply Side Resources

### Conventional Resources

- **Coal**
  - Integrated Gasification Combined Cycle
  - Circulating Fluidized Bed
  - Supercritical Pulverized Coal

- **Gas**
  - Combustion Turbine
  - Combined Cycle Combustion Turbine (CCGT)
  - Coal to Gas Conversion

- **Nuclear**
  - Small Module Reactor
  - Advanced Pressurized Water Reactor

### Renewable & Emerging Resources

- **Wind**
  - Onshore – Utility Scale
  - Offshore – Utility Scale
  - Onshore – DG

- **Solar**
  - Photovoltaic – Utility Scale
  - Photovoltaic – DG

- **Other**
  - Combined Heat & Power
  - Battery Storage
  - Microturbines
  - Biomass
  - Reciprocating Engine
### New Resource Costs

<table>
<thead>
<tr>
<th>Technology</th>
<th>Size (MW)</th>
<th>Variable O&amp;M ($/MWh)</th>
<th>Fixed O&amp;M ($/kW/yr)</th>
<th>Total Overnight Cost in 2014¹ ($/kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrubbed Coal New</td>
<td>1,300</td>
<td>4.47</td>
<td>31.16</td>
<td>2,917</td>
</tr>
<tr>
<td>Coal-Gasification Integrated Combined Cycle (IGCC)</td>
<td>1,200</td>
<td>7.22</td>
<td>51.37</td>
<td>3,727</td>
</tr>
<tr>
<td>Advanced Gas/Oil Combined Cycle (CC)</td>
<td>400</td>
<td>3.27</td>
<td>15.36</td>
<td>1,017</td>
</tr>
<tr>
<td>Advanced Combustion Turbine</td>
<td>210</td>
<td>10.37</td>
<td>7.04</td>
<td>671</td>
</tr>
<tr>
<td>Advanced Nuclear</td>
<td>2,234</td>
<td>2.14</td>
<td>93.23</td>
<td>5,366</td>
</tr>
<tr>
<td>Distributed Generation-Base</td>
<td>2</td>
<td>7.75</td>
<td>17.44</td>
<td>1,477</td>
</tr>
<tr>
<td>Distributed Generation - Peak</td>
<td>1</td>
<td>7.75</td>
<td>17.44</td>
<td>1,774</td>
</tr>
<tr>
<td>Biomass</td>
<td>50</td>
<td>5.26</td>
<td>105.58</td>
<td>3,659</td>
</tr>
<tr>
<td>Wind</td>
<td>100</td>
<td>0</td>
<td>39.53</td>
<td>1,980</td>
</tr>
<tr>
<td>Wind Offshore</td>
<td>400</td>
<td>0</td>
<td>73.96</td>
<td>6,154</td>
</tr>
<tr>
<td>Photovoltaic²,³</td>
<td>150</td>
<td>0</td>
<td>24.68</td>
<td>3,279</td>
</tr>
</tbody>
</table>

Sources and notes: EIA Annual Energy Outlook 2015; All costs in 2013 $; ¹Overnight capital cost including contingency factors, excluding regional multipliers and learning effects. Interest charges are also excluded; These represent costs of new projects initiated in 2014; ²Capital costs are shown before investment tax credits are applied; ³Costs and capacities are expressed in terms of net AC power available to the grid for the installed capacity.
Scenario Vs. Sensitivity

A **scenario** is a simulation of a future world described in terms of a technical, regulatory, and load environment, as well as fuel costs, capital costs, economic drivers, customer-owned resources.

A **sensitivity** is a case run against a specific scenario varying one element, such as fuel prices.

Sources and notes: Definitions adapted from *Electricity Director's Final Report 2014-2015 Integrated Resources Plans*, IURC, p. 9; Varying one “element” of a scenario to create a sensitivity may require changes to multiple variables to ensure that input data are properly correlated; For example, a low gas price sensitivity also requires correlated (lower) electricity prices.
NIPSCO’s Scenarios Building Process

- Identify highest impact risks/uncertainties
- Imagine possible futures
- Design scenarios
- Analyze the diversity and robustness of scenarios

- Scenario-building is an iterative process of creating and consolidating different possibilities
- NIPSCO identifies risks/uncertainties that could potentially affect its business environment
- The list of uncertainties becomes a set of building blocks that guides NIPSCO in thinking about possible futures
- NIPSCO develops narratives to describe the possible futures
- The list of possible futures is grouped by common “theme” or scenario
- Candidate scenarios are assessed for diversity and robustness

NIPSCO’s Goal Is To Utilize A Well Designed And Robust Set Of Scenarios
Risks And Uncertainties

These Drivers Form The Foundation Of NIPSCO’s Scenarios
Scenarios And Sensitivities

**Scenarios**
- Base
- Challenged Economy
- Aggressive Environmental Regulation
- Booming Economy

**Sensitivities**
- No CO$_2$ Price
- Low Load
- High Gas Price
- No Major Industrial Load
- No CO$_2$ Price
- No Major Industrial Load
- High Renewables & Increasing Load
- High Renewables & Decreasing Load
- No CO$_2$ Price
- No Major Industrial Load

Sources and Notes: Definitions adapted from *Electricity Director’s Final Report 2014-2015 Integrated Resources Plans*, IURC, p. 9; Varying one “element” of a scenario to create a sensitivity may require changes to multiple variables to ensure that input data are properly correlated; For example, a low gas price sensitivity also requires correlated (lower) electricity prices.
Base Scenario And Sensitivities

**Base Scenario**

- The scenario NIPSCO considers most likely to occur
- Economy (national, regional, and local) continues to recover
- Load growth slowly increases
- National Carbon Policy effective 2023
- Natural gas supplies from Appalachia remain strong
- Non-carbon environmental compliance costs reflect only current and proposed regulations, including CSAPR, ELG, CCR, and 316(b)

<table>
<thead>
<tr>
<th>Sensitivities</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No CO₂ Price</strong></td>
<td>- National Carbon Policy is not effected and no carbon price is modeled&lt;br&gt;- Natural gas and power prices reflect a broader energy market not subject to carbon policy</td>
</tr>
<tr>
<td><strong>Low Load</strong></td>
<td>- Load is lower over the study period</td>
</tr>
<tr>
<td><strong>High Gas Price</strong></td>
<td>- Natural gas and on-peak power prices are higher&lt;br&gt;- Environmental compliance costs are higher</td>
</tr>
<tr>
<td><strong>No Major Industrial Load</strong></td>
<td>- Load is significantly lower due to the loss of major industrial load</td>
</tr>
</tbody>
</table>
Challenged Economy Scenario And Sensitivities

**Challenged Economy Scenario**

- Economic downturn with growth stalling
- Customer load growth stagnates, but no major industrial customer loss
- National Carbon Policy effective 2023
- Reduced demand for natural gas and coal
- Non-carbon environmental compliance costs reflect only current and proposed regulations

**Sensitivities**

<table>
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<tr>
<td>No CO₂ Price</td>
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<tr>
<td></td>
<td>- Natural gas and power prices reflect a broader energy market not subject to</td>
</tr>
<tr>
<td></td>
<td>carbon policy</td>
</tr>
<tr>
<td>No Major Industrial Load</td>
<td>- Load is significantly lower over the study period due to the loss of major</td>
</tr>
<tr>
<td></td>
<td>industrial load</td>
</tr>
</tbody>
</table>
Aggressive Environmental Regulation Scenario And Sensitivities

Aggressive Environmental Regulation Scenario

- Environmental regulations are more stringent than currently anticipated for both power generation and natural gas production (hydraulic fracturing)
- Non-carbon environmental compliance costs are higher than the Base Scenario
- Stricter National Carbon Policy effective 2023
- More stringent regulations placed on coal production

Sensitivities

<table>
<thead>
<tr>
<th>Sensitivities</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Renewables and Increasing Load</strong></td>
<td>- Indiana’s voluntary renewable portfolio standard (RPS) becomes mandatory</td>
</tr>
<tr>
<td></td>
<td>- Natural gas and power prices reflect the mandatory RPS and higher CO₂ price</td>
</tr>
<tr>
<td></td>
<td>- Load is greater over the study period</td>
</tr>
<tr>
<td><strong>High Renewables and Decreasing Load</strong></td>
<td>- Indiana’s voluntary renewable portfolio standard (RPS) becomes mandatory</td>
</tr>
<tr>
<td></td>
<td>- Natural gas and power prices reflect the mandatory RPS and higher CO₂ price</td>
</tr>
<tr>
<td></td>
<td>- Load is lower over the study period</td>
</tr>
</tbody>
</table>
Booming Economy Scenario And Sensitivities

**Booming Economy Scenario**

- Economic growth is greater than expected
- State and national regulators introduce more stringent environmental regulations with reduced risk of negatively impacting economic growth, but compliance costs increase
- More aggressive regulatory environment leads to higher natural gas and coal production costs
- National Carbon Policy effective 2023
- Non-carbon environmental compliance costs are higher than the Base scenario

<table>
<thead>
<tr>
<th>Sensitivities</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>No CO₂ Price</td>
<td>- The National Carbon Policy is not effected and non-carbon regulations are same as Base case</td>
</tr>
<tr>
<td></td>
<td>- Natural gas and power prices reflect a broader energy market not subject to the carbon legislation</td>
</tr>
<tr>
<td>No Major Industrial Load</td>
<td>- Load is significantly lower due to loss of major load over the study period</td>
</tr>
</tbody>
</table>
### Scenarios And Sensitivities Variables Descriptions

<table>
<thead>
<tr>
<th>Scenarios &amp; Sensitivities</th>
<th>NIPSCO Load</th>
<th>CO₂ Price</th>
<th>Natural Gas Price</th>
<th>Power Price</th>
<th>DSM</th>
<th>RPS</th>
<th>Enviro. Compliance Costs</th>
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</thead>
<tbody>
<tr>
<td>Base</td>
<td>Base Load</td>
<td>Y</td>
<td>Base</td>
<td>Base</td>
<td>Base</td>
<td>N</td>
<td>Base</td>
</tr>
<tr>
<td>No CO₂ Price</td>
<td>Base Load</td>
<td>N</td>
<td>Base No CO₂</td>
<td>Base No CO₂</td>
<td>Low</td>
<td>N</td>
<td>Base</td>
</tr>
<tr>
<td>Low Load</td>
<td>Low Load</td>
<td>Y</td>
<td>Base</td>
<td>Base</td>
<td>Base</td>
<td>N</td>
<td>Base</td>
</tr>
<tr>
<td>High Gas Price</td>
<td>Base Load</td>
<td>Y</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>N</td>
<td>High</td>
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<tr>
<td>No Major Industrial Load</td>
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<td>Base</td>
<td>Base</td>
<td>Base</td>
<td>N</td>
<td>Base</td>
</tr>
<tr>
<td>Challenged Economy</td>
<td>Low Load</td>
<td>Y</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>N</td>
<td>Base</td>
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<tr>
<td>No CO₂ Price</td>
<td>Low Load</td>
<td>N</td>
<td>Low No CO₂</td>
<td>Low No CO₂</td>
<td>Very Low</td>
<td>N</td>
<td>Base</td>
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<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>N</td>
<td>Base</td>
</tr>
<tr>
<td>Aggressive Environmental Regulation</td>
<td>Base Load</td>
<td>Y</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>N</td>
<td>High</td>
</tr>
<tr>
<td>High Renewables &amp; Increasing Load</td>
<td>High Load</td>
<td>Y</td>
<td>Very High</td>
<td>Very High</td>
<td>Very High</td>
<td>Y</td>
<td>High</td>
</tr>
<tr>
<td>High Renewables &amp; Decreasing Load</td>
<td>Low Load</td>
<td>Y</td>
<td>Very High</td>
<td>Very High</td>
<td>Very High</td>
<td>Y</td>
<td>High</td>
</tr>
<tr>
<td>Booming Economy</td>
<td>High Load</td>
<td>Y</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>N</td>
<td>High</td>
</tr>
<tr>
<td>No CO₂ Price</td>
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<td>Very Low</td>
<td>N</td>
<td>Base</td>
</tr>
<tr>
<td>No Major Industrial Load</td>
<td>Base, No Major Indust.</td>
<td>Y</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>N</td>
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</tr>
</tbody>
</table>
Scenario Variable Diversity Analysis

Scenarios & Sensitivities Scores

We are exploring approx. 70% of possible outcomes

Load, electricity price, gas price, environmental compliance costs, renewable adoption, or DSM programs greater than expected in Base

Load, electricity price, gas price, or carbon price lower than expected in Base, but still includes required environmental compliance costs and DSM as filed

We are not considering scenarios without environmental compliance costs or filed DSM programs
On-Peak Electricity Price Forecast

MISO IN On Peak Price

$/MWh (nominal $)

Source: PIRA Energy Group, NiSource Requested Scenarios 2016
Off-Peak Electricity Price Forecast

MISO IN Off Peak Price

Source: PIRA Energy Group, NiSource Requested Scenarios 2016
Natural Gas Price Forecast

Natural Gas Price, Chicago Citygate

$/MMBtu (nominal $)

Source: PIRA Energy Group, NiSource Requested Scenarios 2016
Coal Price Forecast

Powder River Basin
(8,800 Btu/lb; 5.0 lbs SO2/mmBtu)

Illinois Basin
(1,500 Btu/lb; 5.0 lbs SO2/mmBtu)

Source: PIRA Energy Group, NiSource Requested Scenarios 2016
CO₂ Price Forecast

Carbon Price

$/short ton (nominal $)

Source: PIRA Energy Group, NiSource Requested Scenarios 2016
## Capacity Price Forecast (MISO IN)

### Capacity Price

- **$/kW-yr (nominal $)**

### Trend Analysis:
- **Base**
- **Low**
- **High**
- **Very High**
- **No carbon**

**Source:** PIRA Energy Group, NiSource Requested Scenarios 2016
Next Steps

Presented by
Dr. Marty Rozelle
The Rozelle Group Ltd
Next Steps

- Participant speakers
- Future meeting timeline
- Meeting summary (Available May 12th, 2016)
- NIPSCO website (www.nipsco.com/irp)
- NIPSCO IRP email (NIPSCO_IRP@nisource.com)
Q&A