Welcome

- Safety message
- Technology
  - Call-in # 866-385-2663
  - Wi-Fi provided as in previous meetings
- Opening Comments
- Introductions
Why are we here today?

- Recap May stakeholder meeting and respond to comments/questions
- Present Preferred Portfolio
- Discuss lessons learned from this IRP cycle
<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1:30</td>
<td>Registration</td>
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<tr>
<td>2:00</td>
<td>Welcome, Introductions, Agenda</td>
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<tr>
<td>2:20</td>
<td>Review of May Meeting; Responses to Questions/Feedback</td>
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<td>2:40</td>
<td>Present Preferred Portfolio</td>
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<td>3:15</td>
<td>Lesson Learned Discussion</td>
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<td>3:45</td>
<td>Next Steps and Closing Comments</td>
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Nate Gagnon – Lead Planning Analyst

Review of May Meeting, Comments and Overall Update
Recap of May Meeting

- Review of previous meeting
- Update on additional work with stakeholders
- Review scenarios & optimized portfolios
- Sensitivities & alternate portfolios
- Modeling results
- Risk Analysis Sensitivities
Portfolio Capacity Mixes by 2037

DEI 2018

Optimized Portfolios

Alternative Portfolios

Today
Current Conditions
Slower Innovation
Reference, No Carbon
Reference Case
High Tech Future
Moderate Transition
Aggressive Transition
Rapid Decarbonization: CT
Rapid Decarbonization: Storage

- DSM
- EE
- Storage
- Wind
- Solar
- Hydro
- Cogen
- CT
- CC
- Coal
<table>
<thead>
<tr>
<th>STAKEHOLDER QUESTIONS/COMMENTS</th>
<th>RESPONSES</th>
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<tbody>
<tr>
<td>Duke should model capacity on a UCAP basis</td>
<td>Duke Energy has questions about this approach as it requires the estimate of additional parameters, but is willing to discuss before the start of the next IRP cycle.</td>
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<tr>
<td>EE should be modeled using the decrement approach</td>
<td>Duke Energy has never said that this approach could not be done, but has questions about why the decrement approach is better than modeling EE as a supply side resources. Additionally, the size and the shape of the decrement matters as it relates to the shapes of the various EE measures. We are willing to discuss different methods for modeling EE before the start of the next IRP cycle.</td>
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<td>The 20 year time frame for modeling the IRP is inappropriate</td>
<td>Interesting thought and can discuss before start of next IRP cycle.</td>
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## Comments/Questions from May Meeting

<table>
<thead>
<tr>
<th>STAKEHOLDER QUESTIONS/COMMENTS</th>
<th>RESPONSES</th>
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<tr>
<td>What is the basis for limiting retirements to beyond 2024?</td>
<td>Retiring one of the larger coal units, in general, will require long lead time transmission upgrades that will depend upon the specific unit retiring as well as other retirement and additions across MISO.</td>
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<td>How are CCR and ELG costs modeled in the IRP?</td>
<td>There are essentially two types of costs to consider here: unavoidable costs, such as legacy ash pond closure costs; and potentially avoidable costs, such as capital and O&amp;M investments for continued operation of generating units in compliance with the regulations. First, unavoidable costs do not influence unit retirement decisions, therefore we do not include them in unit go-forward costs for retirement analysis. For CCR and ELG rule compliance, the dry ash and water re-direct projects are already complete at Gibson and Cayuga, and Gallagher’s already planned retirement avoids such costs. There are no additional capital costs in the forecast period for CCR or ELG compliance. Specifically, there is ~$32M capital at Cayuga and ~$7.5M capital at Gibson in 2033 for placeholder VSEP technology. This also includes approximately $6M/yr O&amp;M at Cayuga (no incremental O&amp;M at Gibson). In the 2030’s we do have placeholder projects at Cayuga and Gibson for a future ELG revision assumption (including capital and O&amp;M costs for “enhanced ash fixation”), but that is beyond anything envisioned for the current rule.</td>
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Scott Park – Director IRP Analytics - Midwest

Preferred Portfolio
## Features of Moderate Transition Portfolio

- Adds over 2300 MW of renewable generation
  - 1650 MW of solar
  - 700 MW of wind
- Retires over 2800 MW of coal generation
- Adds over 300 MW of incremental utility sponsored EE
- Includes CHP
- Adds 2 combined cycle to further diversify fleet

## Benefits of Moderate Transition Portfolio

- Cost competitive with other portfolios
- Reduces risk by reducing market purchases and increasing diversity of supply
- Greater CO2 reductions than most optimized portfolios
- Measured additions and retirements smooth rate impacts to customers
- Greater diversity and measured changes increase that ability of the portfolio to respond to changing market conditions
## Preferred Portfolio Details

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PVRR by Portfolio

Investments Through 2027

- High Tech Future Scenario
- Reference Scenario
- Slower Innovation Scenario
- Reference w/o CO2 Reg Scenario
- Current Conditions Scenario

Investments Through 2037

More diversified portfolios are subject to less cost volatility under CO2 regulation.

All portfolios perform similarly over the range of scenarios.
CO₂ Emissions Reduction by Portfolio

**Reduction by 2027 from 2005 Baseline**

More diversified portfolios show larger reductions across all scenarios.

**Reduction by 2037 from 2005 Baseline**

Substantial reductions across all scenarios.
Market Risk (20 years)

PVRR With and Without the MISO Energy Market

All portfolio PVRRs rise without access to market

PVRR Change When Market is Unavailable

Least sensitive to market exposure
Moderate Transition Performance

PVRR

$18

$16

$14

$12

$10

$8

$6

$4

$2

$-

Market Exposure

100%

90%

80%

70%

60%

50%

40%

30%

20%

10%

0%

CO₂ Reduction

90%

80%

70%

60%

50%

40%

30%

20%

10%

0%

Moderate Transition Range
Brian Bak – Lead Planning Analyst

Lessons Learned
Lessons Learned Discussion

- Scenario Development
- Portfolio Development
- Modeling
Next Steps

- Slides posted to website in late June
- Final IRP document to be submitted on July 1
- IRP process and methodology discussion to take place in Fall 2019 timeframe
Scott Park – Director IRP Analytics - Midwest

Closing Comments, Stakeholder Comments
Closing Comments

- Please complete comment cards or send by June 26th to Scott at: scott.park@duke-energy.com

- Meeting summary and other materials will be posted on website by June 30th