Topics

– U.S. Electric Regulated Generation Trends
– Duke Energy Regulated Generation Portfolio
– Challenges / Mitigation Measures
– Questions
U.S. Electric Generation Trends – All Sources

US Electric Production by Source: 1990 through 2018
Source: Energy Information Administration as of July 1, 2019

Coal | Oil | Natural Gas | Nuclear | Other | Renewable

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U.S. Electric Generation Trends – Gas Production & Price

Forward NYMEX Strip Annual Prices as of 7/5/19 close

5 Year Average: $2.61
Bal19: $2.48  2021: $2.57  2023: $2.67
2020: $2.56  2022: $2.60

Gas Production up ~10 Bcf/d YOY

Source: NYMEX / Platts / Baker Hughes
Confidential – For Discussion Only - Subject to Change
U.S. Electric Generation Trends - Renewables

U.S. monthly electricity generation from renewable energy sources (Jan 2005-Apr 2019)

million megawatt-hours

hydro

wind

solar
geothermal
biomass

Jan-15 Jul-15 Jan-16 Jul-16 Jan-17 Jul-17 Jan-18 Jul-18 Jan-19
Duke Energy Generation Portfolio – 2018 Jurisdictional View

- Targeting 40% reduction in CO₂ emissions by 2030 from 2005 levels¹
  - Retired ~6 GW of coal between 2011 and 2018

¹2030 carbon reduction influenced by customer demand, generation mix, weather, fuel availability and prices
²2018 data based on Duke’s ownership share of U.S. generation assets as of 12/31/18
³2018 data excludes 8.519 GWh of purchased renewables, equivalent to ~4% of Duke’s output

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Duke Energy Generation Portfolio – Solar

Planned capacity (MW)
- 1 - 50
- 51 - 100
- 101 - 200
- 201 - 300

Development stage
- Advanced development
- Under construction

As of May 17, 2017.
Source: S&P Global Market Intelligence
Map credit: Alip Artates
Forecasted gas burns for 2019 and beyond include owned and tolled generating units are estimates as of 3/15/2019 that are subject to change over time. Previous years are unaudited actuals of owned and tolled facilities gas usage.
Duke Energy Generation Portfolio – Gas Plant Additions

- **Asheville CC** (550 MW): COD Late 2019
  - Part of Western Carolinas Modernization Project
    - Includes adjacent solar array and battery storage
    - Combined Cycle project is ~80% complete

- **Clemson CHP** (21 MW): COD Late 2019
  - Will produce 100,000 lbs of steam per hour and can island university

- **Lincoln CT** (402 MW): COD Early 2020
  - Partnering with Siemens on new generation of turbines
Duke Energy Generation Portfolio – Coal Consumption Trend
Duke Energy Generation Portfolio – Future Jurisdictional View

- Targeting 40% reduction in CO₂ emissions by 2030 from 2005 levels
- Plan to retire additional ~1GW of coal by 2024

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**MidWest**

- 2018 MWh Output
  - Coal/Oil: 91%
  - Natural Gas: 9%
- 2030 MWh Output
  - Coal/Oil: 44%
  - Natural Gas: 56%

**Carolinas**

- 2018 MWh Output
  - Coal/Oil: 54%
  - Natural Gas: 25%
  - Nuclear: 19%
- 2030 MWh Output
  - Coal/Oil: 38%
  - Natural Gas: 62%

**Florida**

- 2018 MWh Output
  - Coal/Oil: 69%
  - Natural Gas: 31%
- 2030 MWh Output
  - Coal/Oil: 82%

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(1) 2030 carbon reduction influenced by customer demand, generation mix, weather, fuel availability and prices
(2) 2018 data based on Duke’s ownership share of U.S. generation assets as of 12/31/18
(3) 2018 data excludes 8.519 GWh of purchased renewables, equivalent to ~4% of Duke’s output

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Challenges

1. Additional Gas Infrastructure
   - “Transitional Fuel”

2. Increased Fleet Flexibility
   - Renewables Driven

3. Coal Viability
   - Represents a substantial portion of capacity need
   - Fuel Diversity
Mitigation – Additional Pipeline Infrastructure

Project Scope:
- ~600 mile FERC regulated pipe extending from Marcellus/Utica shale to VA and NC
- Initial pipeline capacity of 1.5 Bcf/day with potential expansion to 2 Bcf/day

Construction / Regulatory Update:
- On 5/9/19 the 4th Circuit Court heard oral arguments in regards to the stay of the Fish & Wildlife Service’s re-authorized Biological Opinion (“BO”) and Incidental Take Statement (“ITS”), it is expected that the court will issues its opinion on the stay by August
- Resolution of the Appalachian Trail and Blue Ridge Parkway crossings; per Dominion, targeting a filing with the Supreme Court in Q2-19
  - The U.S. Solicitor General (DOJ) filed a motion to join appeal

Target:
- ACP is pursuing late-2021 full in-service of entire project
Mitigation – Increased Fleet Flexibility

DEP Winter BA Load Shape (2200 MW Solar)

- High risk of excess energy
- High risk of deficit energy
- 1100 MW/hr
- 400 MW/hr
- 1900 MW/hr
- 1250 MW/hr

Legend:
- A - Nuc
- B - Gas CC
- C - Fos
- D - Purchase
- E - Hydro
- F - CT
- G - Solar
Mitigation – Increased Fleet Flexibility

Duel Fuel Operation (DFO) Benefits

- Customer savings
- Renewable Accommodation: Improved ramp rates and lower minimum loads
- Lower Emissions: No Hg, SO2, or Ash from gas. Lower NOx & CO2
- Capitalize on optionality: Hedge on gas / coal price while maintaining full coal operational capabilities for capacity certainty

<table>
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<tr>
<th>Steam Unit</th>
<th>MW¹</th>
<th>Vintage</th>
<th>Co-Fire %</th>
<th>LDC</th>
<th>DFO In-Service</th>
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<tr>
<td>Cliffside 5</td>
<td>544</td>
<td>1972</td>
<td>10-40%</td>
<td>PSNC</td>
<td>In-Service</td>
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<td>2012</td>
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<td>Belews Creek 1</td>
<td>1,110</td>
<td>1974</td>
<td>50%</td>
<td>PNG</td>
<td>~Early 2020</td>
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<td>1975</td>
<td>50%</td>
<td>PNG</td>
<td>~Early 2021</td>
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<tr>
<td>Marshall 1</td>
<td>370</td>
<td>1965</td>
<td>10-40%</td>
<td>PNG</td>
<td>~Late 2021</td>
</tr>
<tr>
<td>Marshall 2</td>
<td>370</td>
<td>1966</td>
<td>10-40%</td>
<td>PNG</td>
<td>~Late 2021</td>
</tr>
<tr>
<td>Marshall 3</td>
<td>658</td>
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<td>PNG</td>
<td>~Mid-to-Late 2020</td>
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<tr>
<td>Marshall 4</td>
<td>660</td>
<td>1970</td>
<td>50%</td>
<td>PNG</td>
<td>~Mid-to-Late 2020</td>
</tr>
</tbody>
</table>

¹Net Summer Capability Megawatt ratings pre-conversion

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Mitigation – Coal Viability

- Sustained Low Natural Gas Prices
- Increase in Gas Generation
- Transportation Performance
- Regulatory Uncertainty
- Growing Renewable Generation Portfolio
- Coal Industry Supply Correction
- Lower Domestic Demand/Volatile Export Market

Innovative rate structures that allow transportation providers to be competitive against natural gas (e.g. Fixed/Variable)

Optionality:
- Fuel Flex: reduces dependency on one coal region
- DFO: coal/gas switching

Mitigation – Coal Viability

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- DFO: coal/gas switching
Key Take Aways

Targeting 40% reduction in CO₂ emissions by 2030 from 2005 levels¹

1. Natural gas consumption for generation is expected to continue to increase
   - Drivers: New gas generation / pipeline projects under development including:
     - Asheville CC (target in service late 2019)
     - Dual-fuel projects at Belew and Marshall;
     - Targeted in service of Q4 2021 of ACP which provides access to lower commodity cost gas

2. Renewable penetration expected to continue to increase

3. Despite lower coal generation expectations, coal capacity remains a critical part of Duke’s capacity needs

¹ 2030 carbon reduction influenced by customer demand, generation mix, weather, fuel availability and prices
Questions?