Commitment and Dispatch of Dual Fuel Generating Units

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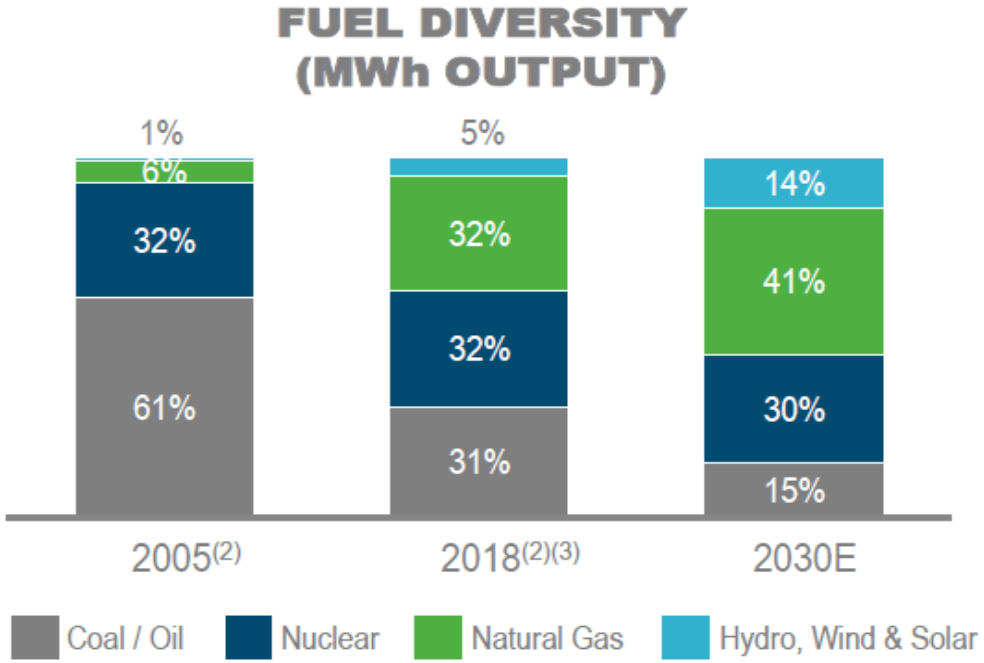
costs and effects of legal and administrative proceedings, settlements, investigations and claims; industrial, commercial and residential growth or decline in service territories or customer bases resulting from sustained downturns of the economy and the economic health of our service territories or variations in customer usage patterns, including energy efficiency efforts and use of alternative energy sources, such as self-generation and distributed generation technologies; federal and state regulations, laws and other efforts designed to promote and expand the use of energy efficiency measures and distributed generation technologies, such as private solar and battery storage, in Duke Energy's service territories could result in customers leaving the electric distribution system, excess generation resources as well as stranded costs; advancements in technology; additional competition in electric and gas markets and continued industry consolidation; the influence of weather and other natural phenomena on operations, including the economic, operational and other effects of severe storms, hurricanes, droughts, earthquakes and tornadoes, including extreme weather associated with climate change; the ability to successfully operate electric generating facilities and deliver electricity to customers including direct or indirect effects to the company resulting from an incident that affects the U.S. electric grid or generating resources; the ability to complete necessary or desirable pipeline expansion or infrastructure projects in our natural gas business; operational interruptions to our gas distribution and transmission activities; the availability of adequate interstate pipeline transportation capacity and natural gas supply; the impact on facilities and business from a terrorist attack, cybersecurity threats, data security breaches, and other catastrophic events such as fires, explosions, pandemic health events or other similar occurrences; the inherent risks associated with the operation and potential construction of nuclear facilities, including environmental, health, safety, regulatory and financial risks, including the financial stability of third party service providers; the timing and extent of changes in commodity prices and interest rates and the ability to recover such costs through the regulatory process, where appropriate, and their impact on liquidity positions and the value of underlying assets; the results of financing efforts, including the ability to obtain financing on favorable terms, which can be affected by various factors, including credit ratings, interest rate fluctuations and general economic conditions; the credit ratings may be different from what the company and its subsidiaries expect; declines in the market prices of equity and fixed income securities and resultant cash funding requirements for defined benefit pension plans, other post-retirement benefit plans, and nuclear decommissioning trust funds; construction and development risks associated with the completion of Duke Energy and its subsidiaries' capital investment projects, including risks related to financing, obtaining and complying with terms of permits, meeting construction budgets and schedules, and satisfying operating and environmental performance standards, as well as the ability to recover costs from customers in a timely manner or at all; changes in rules for regional transmission organizations, including changes in rate designs and new and evolving capacity markets, and risks related to obligations created by the default of other participants; the ability to control operation and maintenance costs; the level of creditworthiness of counterparties to transactions; employee workforce factors, including the potential inability to attract and retain key personnel; the ability of subsidiaries to pay dividends or distributions to Duke Energy Corporation holding company (the Parent); the performance of projects undertaken by our nonregulated businesses and the success of efforts to invest in and develop new opportunities; the effect of accounting pronouncements issued periodically by accounting standard-setting bodies; substantial revision to the U.S. tax code, such as changes to the corporate tax rate or a material change in the deductibility of interest; the impact of potential goodwill impairments; the ability to successfully complete future merger, acquisition or divestiture plans; the ability to successfully integrate the natural gas businesses following the acquisition of Piedmont Natural Gas Company, Inc. and realize anticipated benefits; and the ability to implement our business strategy.

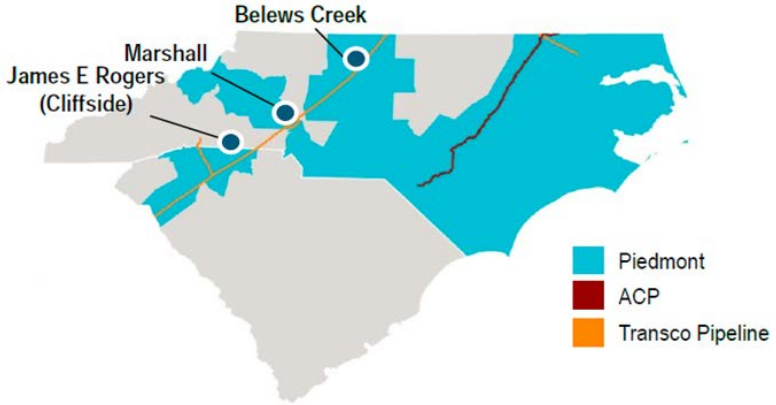
Additional risks and uncertainties are identified and discussed in Duke Energy's and its subsidiaries' reports filed with the SEC and available at the SEC's website at www.sec.gov. In light of these risks, uncertainties and assumptions, the events described in the forward-looking statements might not occur or might occur to a different extent or at a different time than described. Forward-looking statements speak only as of the date they are made; Duke Energy expressly disclaims an obligation to publicly update or revise any forward-looking statements, whether as a result of new information, future events or otherwise. Duke Energy, it subsidiaries, it employees, or contractors have no liability for the accuracy of any information communicated, presented or contained in this presentation.



- Duke is targeting a 40% reduction in CO_2 emissions from 2005 levels by 2030 (1)
- Retired ~6 GW of coal generation between 2011 and 2018. Plan to retire another ~1 GW by 2024.

(1) 2030 carbon reduction will be influenced by customer demand, generation mix, weather, fuel availability and prices
(2) 2005 and 2018 data based on Duke's ownership share of U.S. generation assets as of Dec. 31, 2018
(3) 2018 data excludes 8,519 GWh of purchased renewables, equivalent to ~4% of Duke's output

Carolinas Duel Fuel Optionality (DFO)



- DEC will economically dispatch the duel-fuel fleet to maximize fuel savings while ensuring reliability.

Steam Unit	MW[1]	Vintage	DFO / Co-Fire %	LDC	DFO In-Service[1]
Cliffside 5	544	1972	10-40%	PSNC	In-Service
Cliffside 6	844	2012	100%	PSNC	In-Service
Belews Creek 1	1,110	1974	50%	PNG	~Early 2020
Belews Creek 2	1,110	1975	50%	PNG	~Early 2021
Marshall 1	370	1965	10-40%	PNG	~Late 2021
Marshall 2	370	1966	10-40%	PNG	~Late 2021
Marshall 3	658	1969	50%	PNG	~Mid-to-Late 2020
Marshall 4	660	1970	50%	PNG	~Mid-to-Late 2020

[1]Net Summer Capability Megawatt ratings pre-conversion

Benefits

- ↑ **Customer savings**
- ↑ **Renewable accommodation** with improved ramp rates and lower minimum loads
- ↓ **Emissions**: No Hg, SO_2, or Ash from gas. Lower NOx & CO_2
- ↓ **Cost Profile**: Lowered maintenance CapEx, VOM, FOM, reagent use
- ↓ **Environmental risk:** Possible removal of Fuel Oil Systems
- **Capitalize on optionality:** Hedge on gas / coal price
- **Maintain full coal operation capabilities** for capacity certainty

Challenge

- ↑ **Volatility:** Managing coal burn deviations

- Starts with Unit Commitment (UC)
  - Determine optimal commitment of generation via use of security constrained production costing model
    - Inputs: Forecasted demand, Market purchases/sales opportunities, Contractual obligations
    - Inputs: Commodity costs, Unit parameters (min load, max load, ramp rate, start cost), outages, derates
  - Reliability constrained = Must runs due to load level and transmission system configuration, and other criteria (regulation up/down, etc.)
  - End result: UC planning process determines most economic plan to reliably meet requirements
    - Additional units are sometimes committed in real-time due to unexpected changes
- UC, ECC and Trading may also commit / de-commit units in real-time
  - Changes in load, generation, economic market opportunities
  - ECC may also commit fast-start units in real time for transmission/reliability needs

- Goal is to operate on whichever fuel has the lowest variable production cost
  - Cost of delivered fuel ($/MMBtu)
  - Variable O&M
  - Reagents/Emission Allowances
- Fewer auxiliary loads with natural gas operation
  - Coal handling equipment
  - SO_2 scrubbers
- Is the heat rate lower with natural gas operation?
  - Needs to be quantified

Operational Challenges of Fuel Management with DFO

- Natural gas must be scheduled and delivered on a daily basis with pipelines
- Fuels and System Optimization will forecast how much gas will be needed for the next day
  - Actual system operations can differ from what was planned the day before
    - Load forecast differences
    - De-rates or forced outages
- If a pipeline is near full utilization it may issue an Operational Flow Order (OFO)
  - An OFO requires actual gas burns to be within a tolerance band (generally +/- 10%)
    - OFO applies to the collective gas burned by all Duke generators connected to the pipeline
    - Significant financial penalties if outside of tolerance band.
- Illustrative Scenarios
  - If a dual fuel unit burning gas trips off then there is a risk of under-burning gas
    - May need to burn more gas than planned at other units to stay within OFO tolerance
  - Conversely, if a combined cycle unit trips off then a dual fuel unit burning 100% coal might be able to switch to gas to help avoid an under-burn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