



Office of the Oklahoma  
Secretary of Energy

## A Natural Partnership for Economic Development: Wind & Gas

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American Wind Energy Association  
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# Why Oklahoma?



An Historic Energy State



National Hub For Natural Gas Resource Development



World-Class Wind Resource



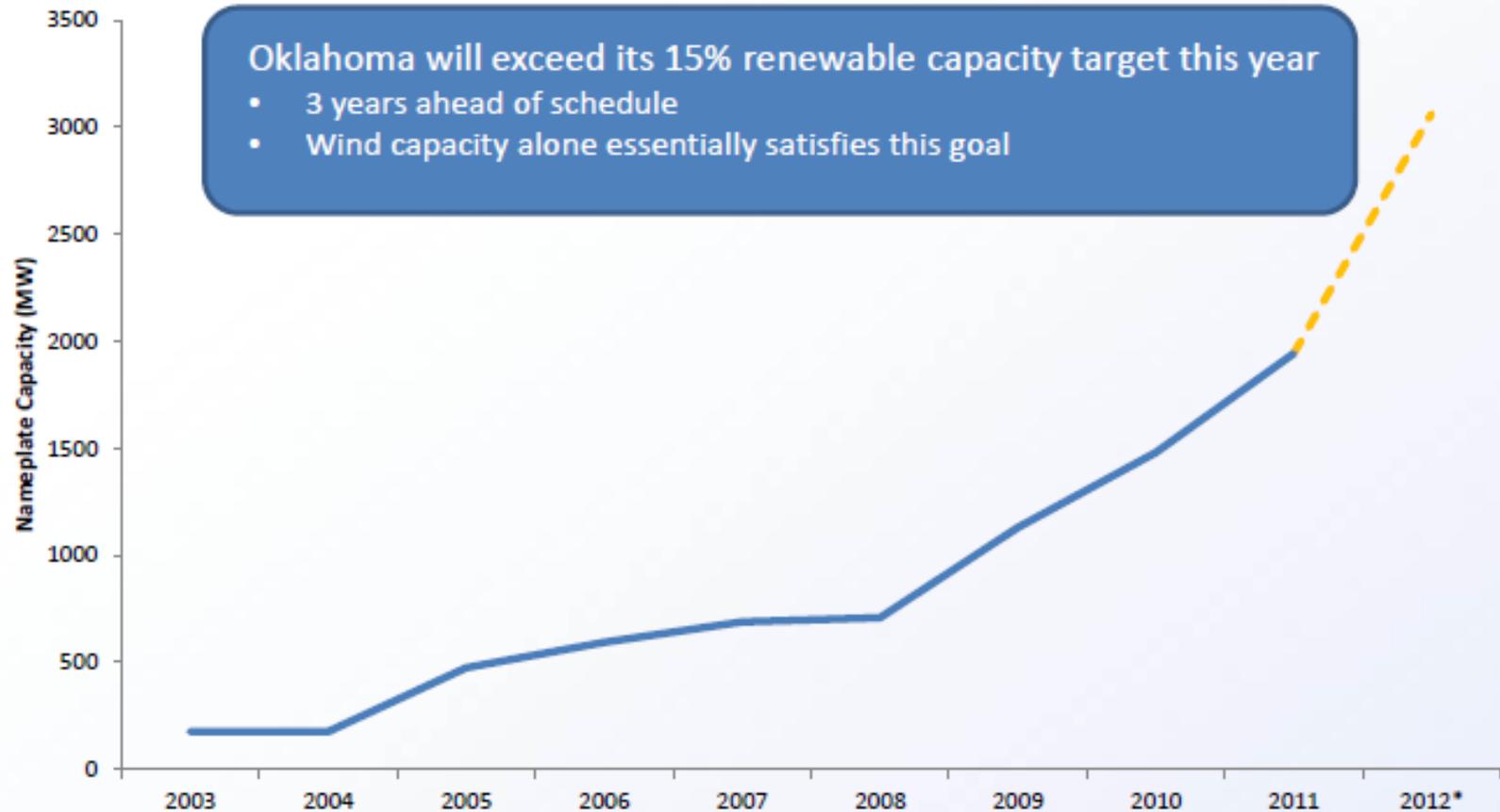
SPP Integrated Transmission Planning



Prioritized In The Oklahoma First Energy Plan



# Oklahoma Wind Capacity

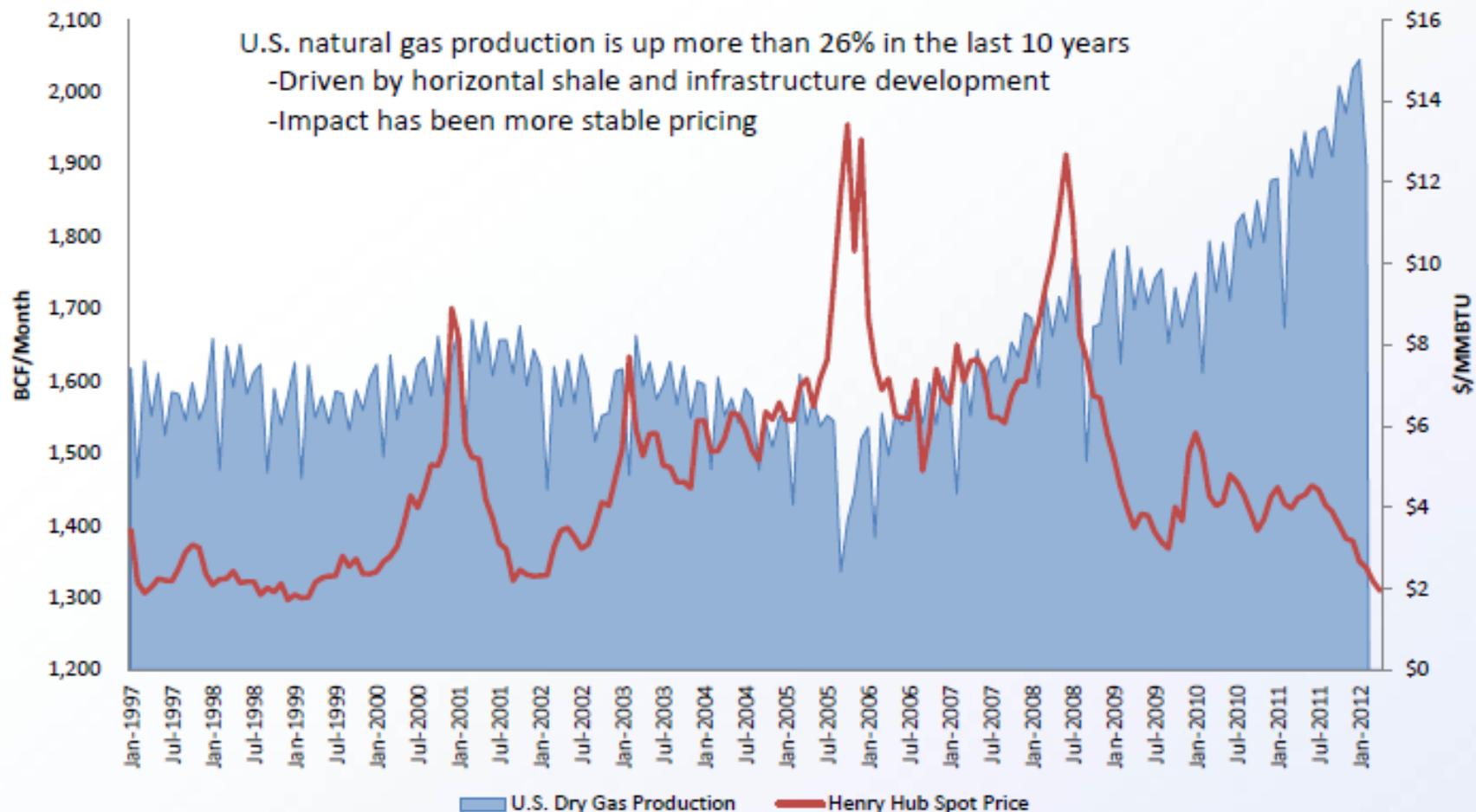


\*Projects Under Construction

Source: U.S. Energy Information Administration, Electric Power Annual, November 2011;  
Oklahoma Department of Commerce, Oklahoma Wind Farms Operational & Under Construction, 2012



# As Natural Gas Supply Grows, Price Remains Low & Stable

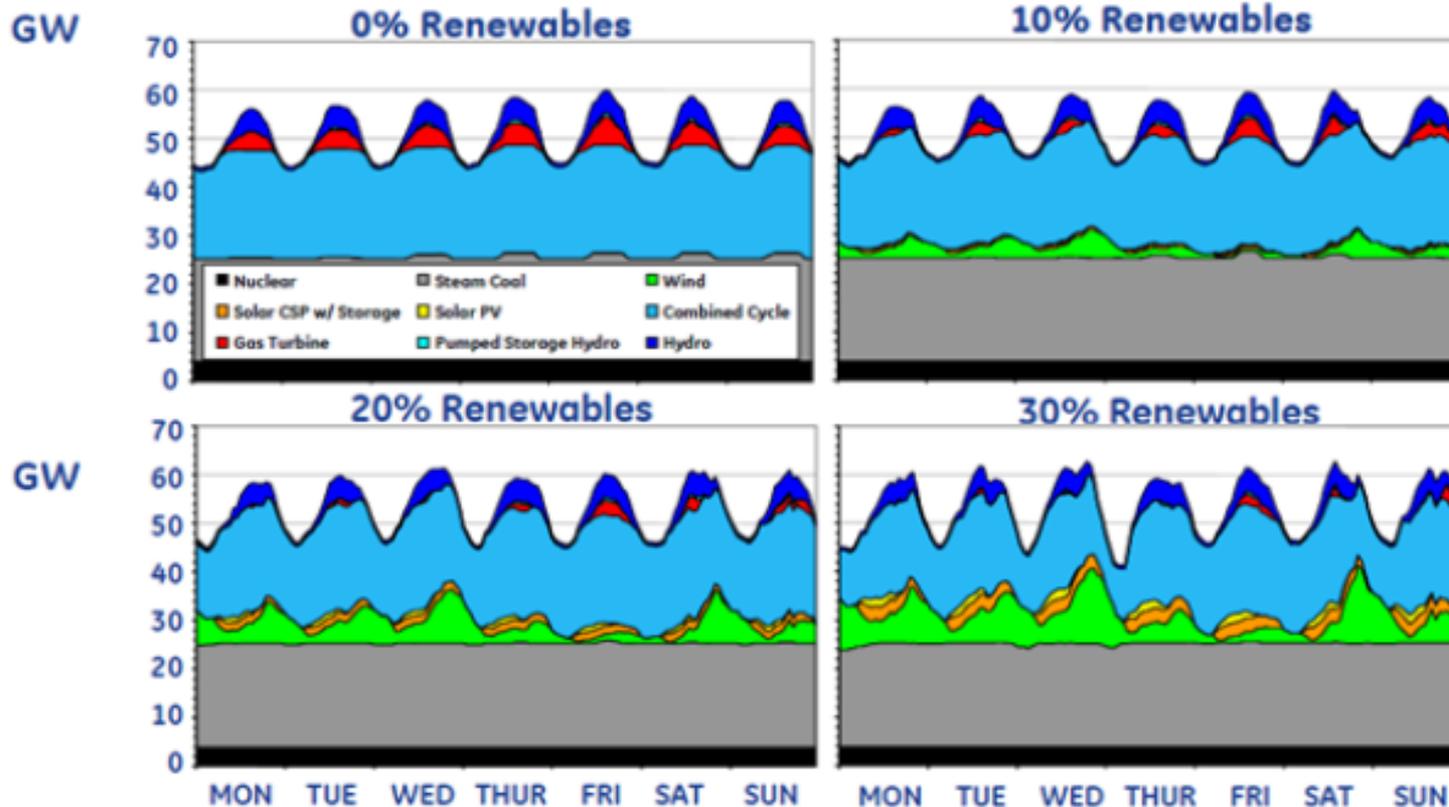


Source: U.S. Energy Information Administration, U.S. Dry Natural Gas Production, April 30, 2012;  
U.S. Energy Information Administration, Henry Hub Gulf Coast Natural Gas Spot Price, May 23, 2012



# Integrating Renewables Into The System

## The Week of July 10, 2006

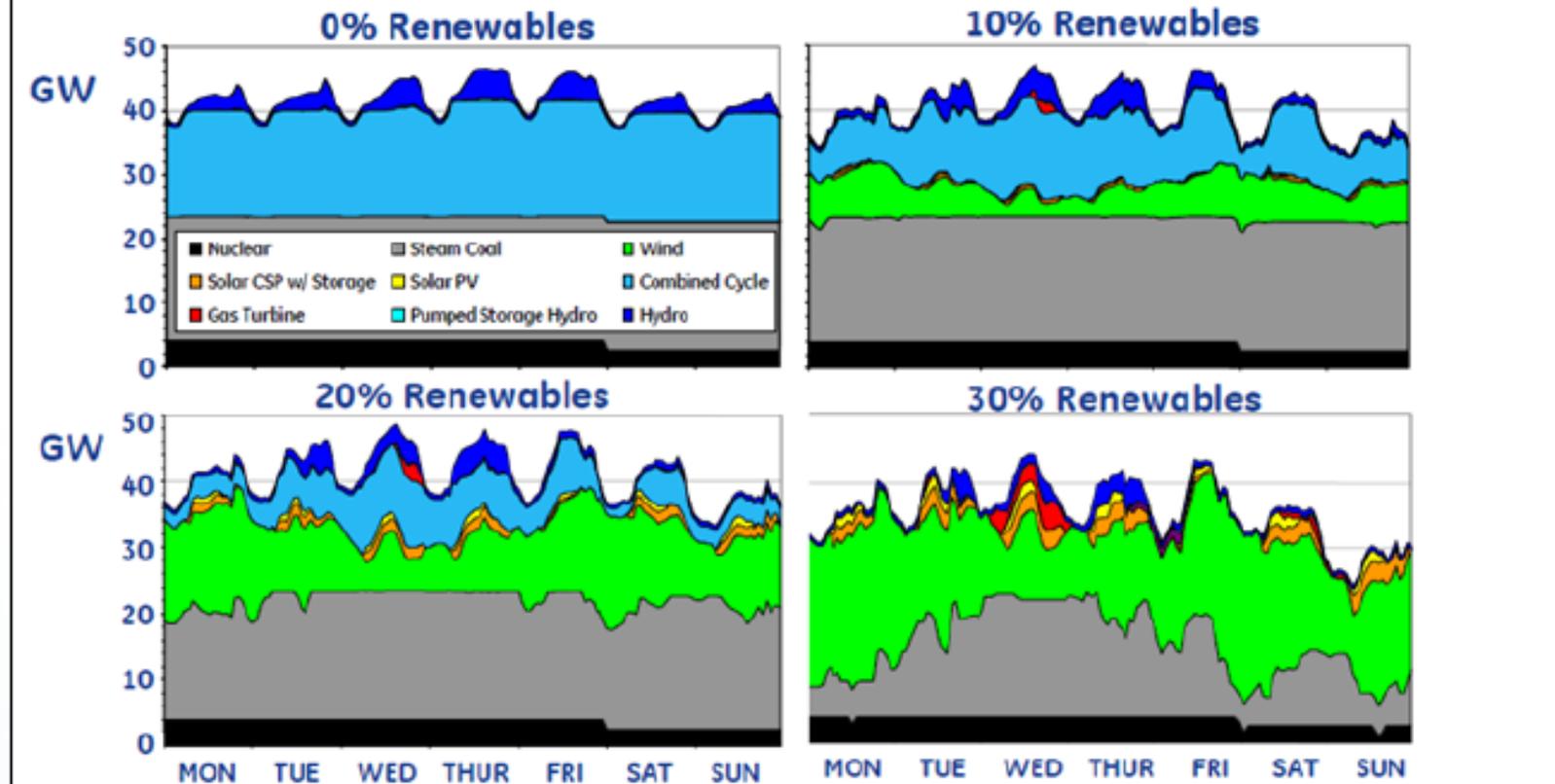


Source: GE Energy, 2010. Western Wind and Solar Integration Study. NREL Report No. SR-550-47434  
<http://www.nrel.gov/docs/fy10osti/47434.pdf>



# Natural Gas Is Displaced On The Margin & Coal & Nuclear Cycle

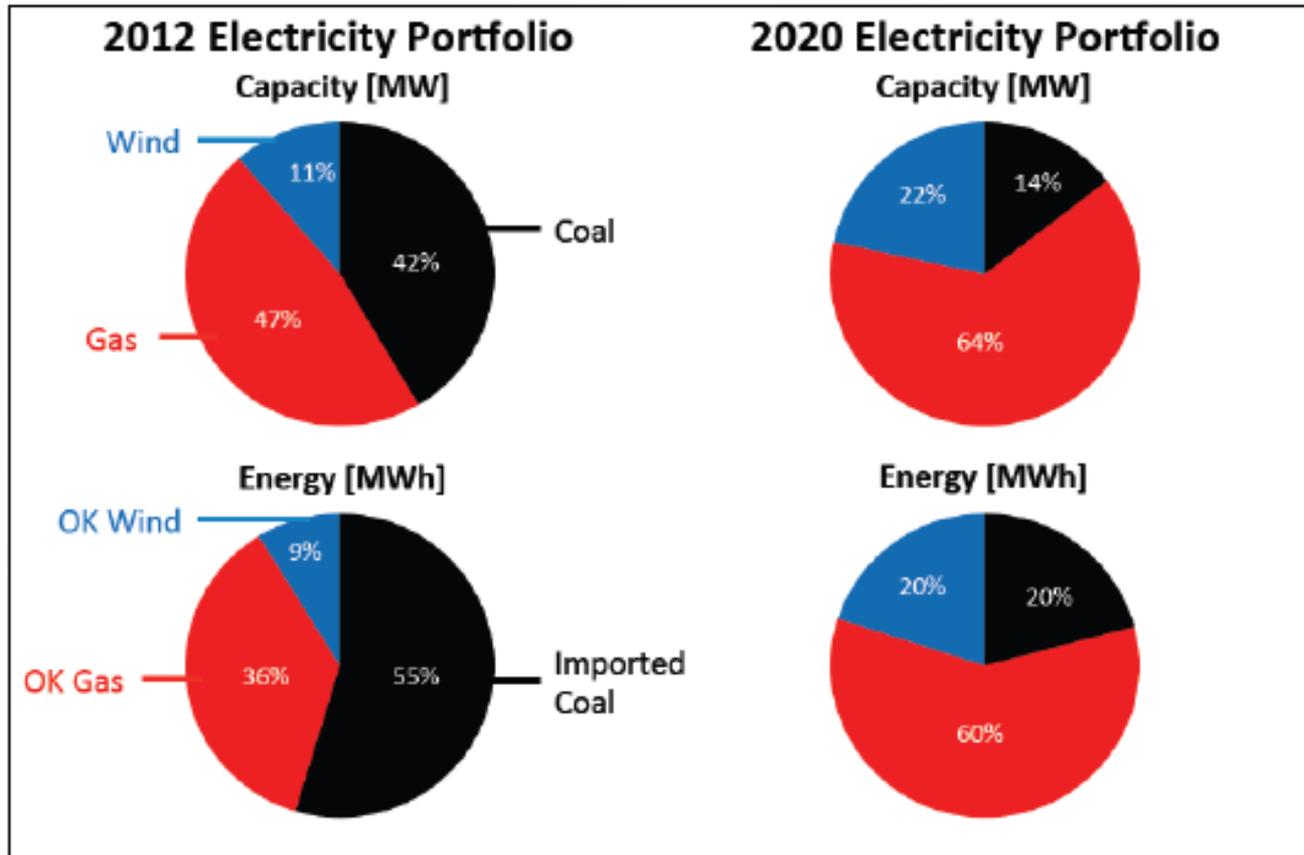
## A Different Week... April 10, 2006



Source: GE Energy, 2010. Western Wind and Solar Integration Study. NREL Report No. SR-550-47434  
<http://www.nrel.gov/docs/fy10osti/47434.pdf>

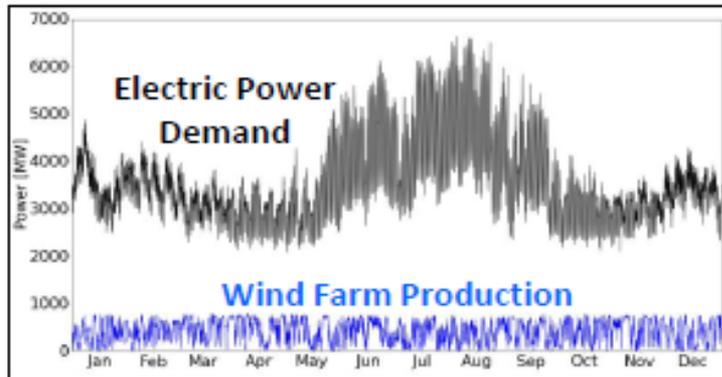


# Oklahoma Electricity Future: A Hypothetical Scenario

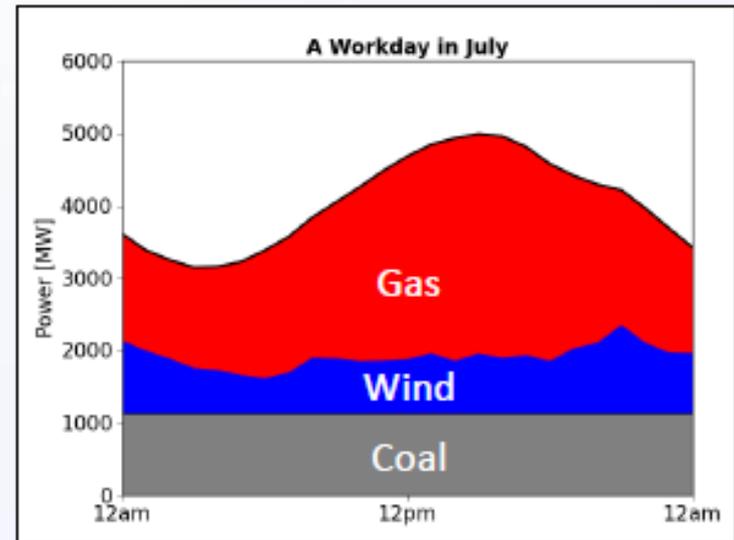
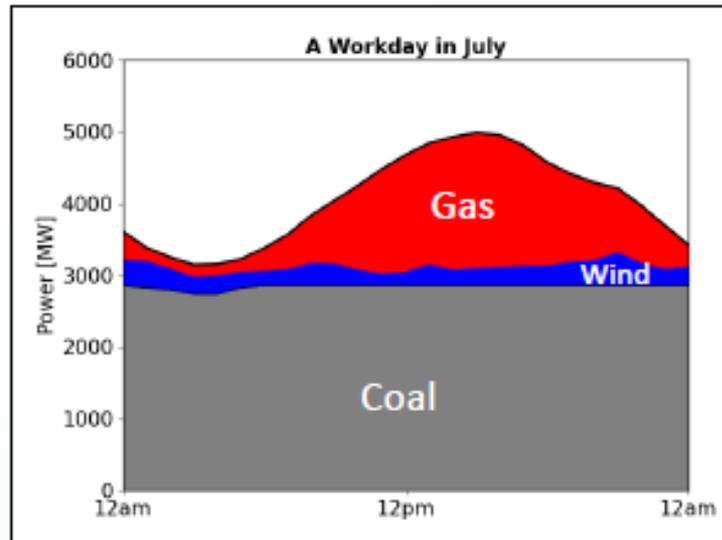
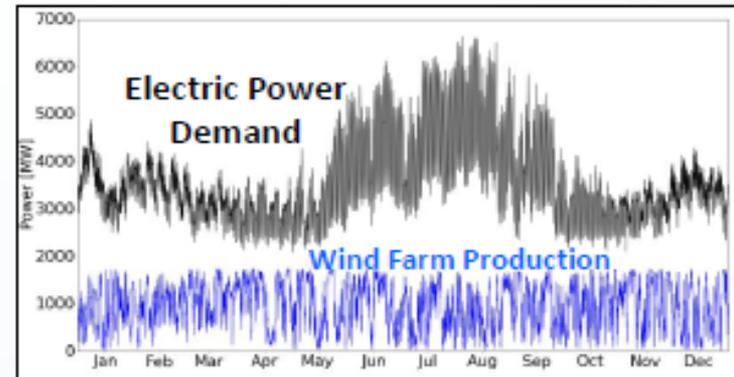


# Where We Are & Where We Might Be

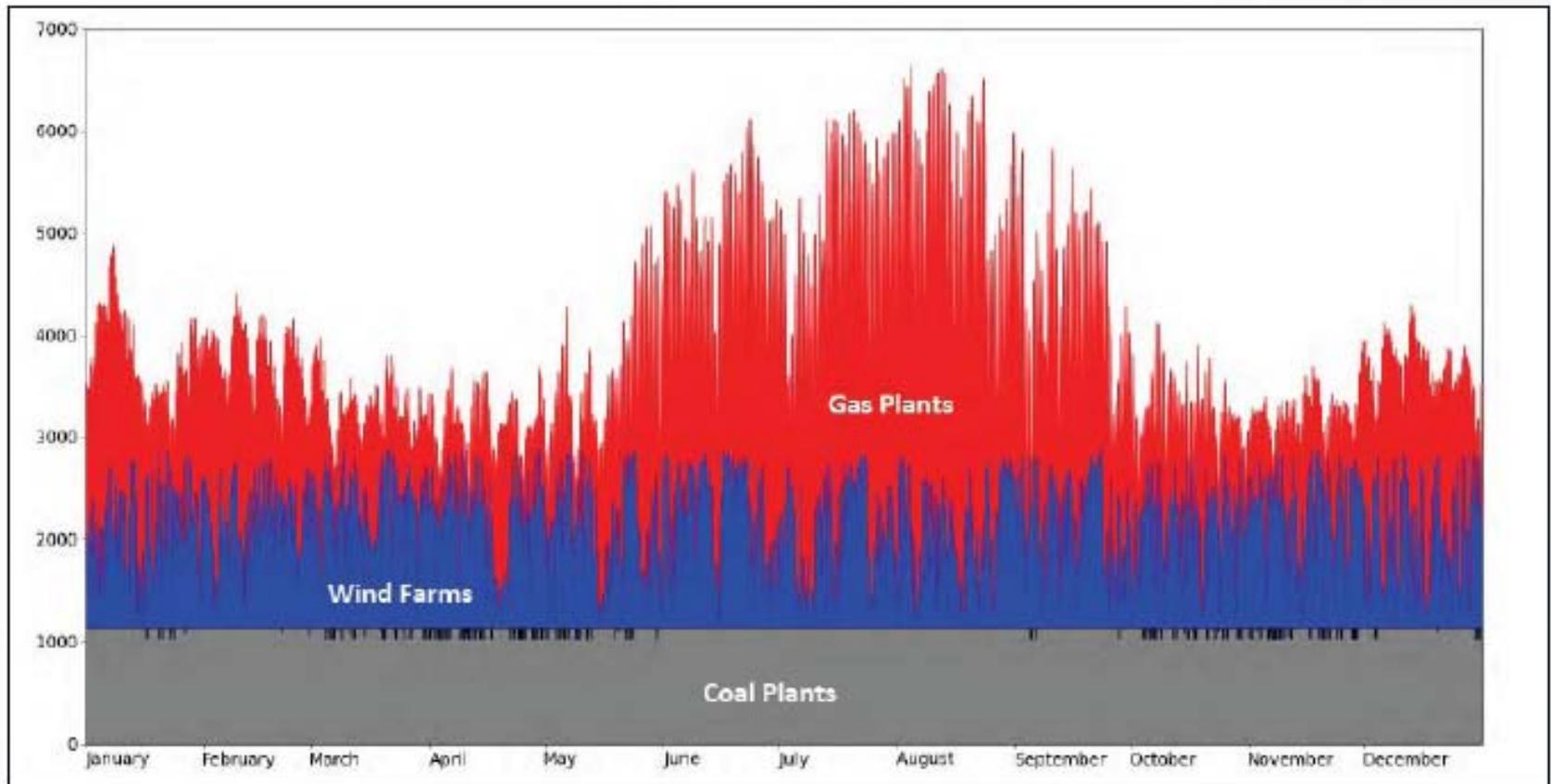
## Existing Portfolio



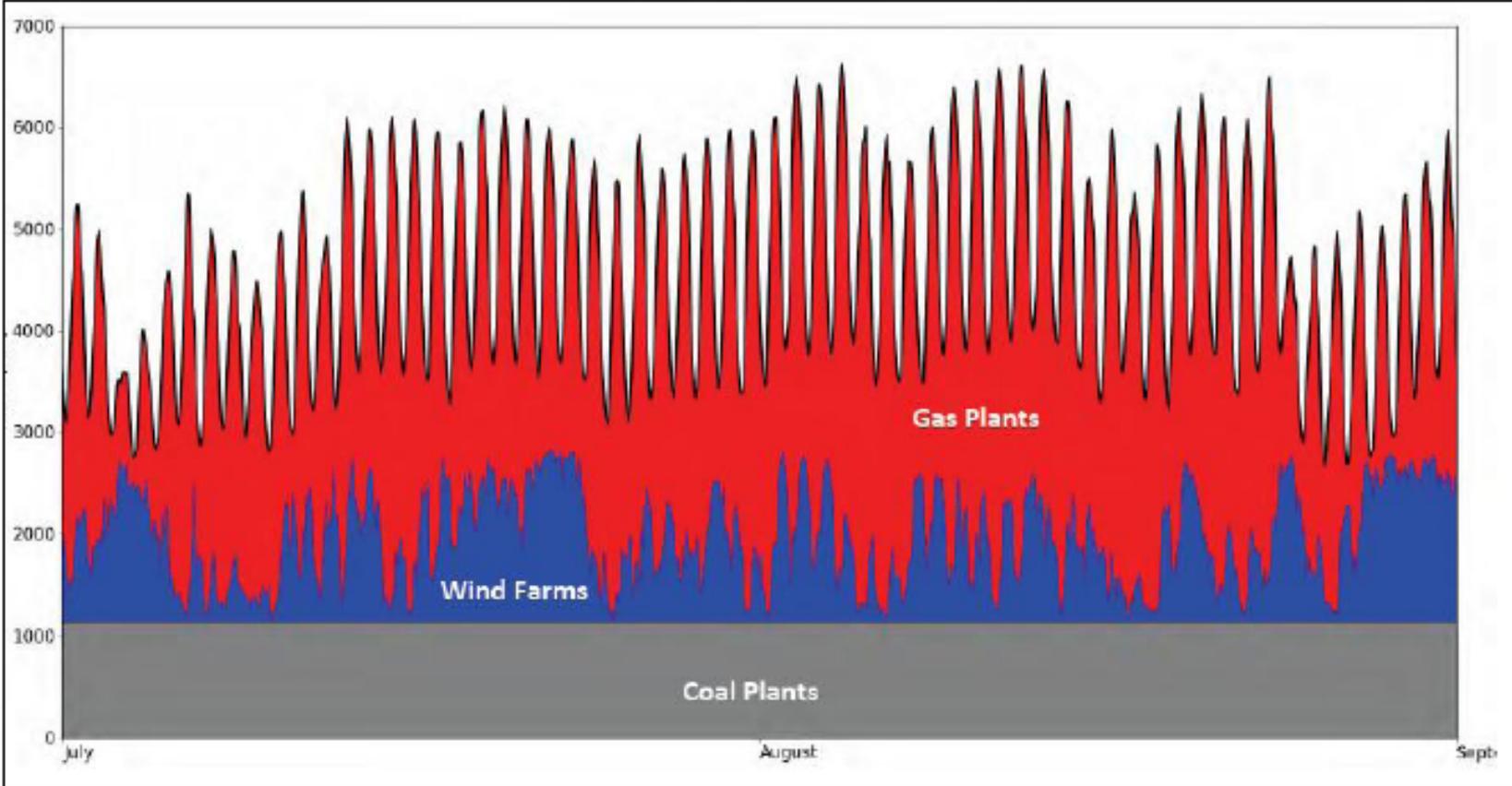
## 20% Wind Scenario



# The Model Requires Flexibility



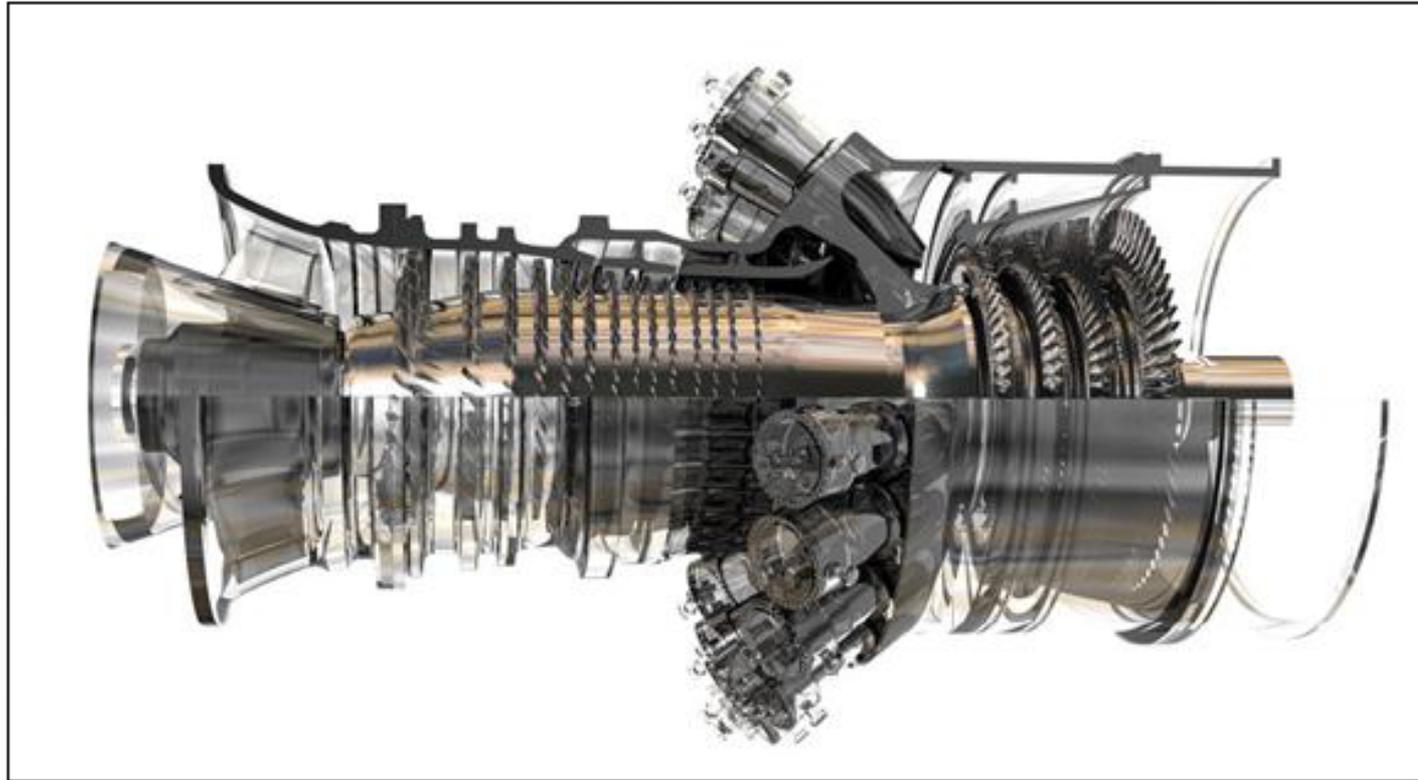
# Flexible Gas Generation Offers A Solution



# The Enabling Technology

## Smart, Flexible & Efficient

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*Image:* GE 9FB Gas Turbine for the FlexEfficiency\* 50 Combined Cycle Power Plant



# Partnership Strengths & Weaknesses



## Strengths

- Low Emission
- Domestic
- Fast-Ramp Natural Gas Pairs With Variable Wind
- Oklahoma Resource Mix
- Flexibility to Meet Market Conditions
- Low Natural Gas Prices Benefit Consumers

## Weaknesses

- If New Generation Outpaces Electric Demand Growth Something Has to Give
- The Best Wind Is Generally Off Peak
- Wind Often Displaces Gas in Dispatch
- Low Natural Gas Prices are Disruptive to New Project Developers
- Building Out Adequate Wind Capacity Necessarily Will Mean Curtailment



# Partnership Opportunities & Threats



## Opportunities

- Creates Jobs & Grows The Economy
- Substantial New Wind Opportunities
- Builds New Markets For Natural Gas
- Breaks Through The Integration Ceiling
- Provides Firm, Dispatchable, & Low Emission Power
- Maintains Fuel Diversity & Mitigates Fuel Cost Risk
- Offers Social Acceptance

## Threats

- Subsidy Battles
- Non-Integrated Development
- The Status Quo – Centralized Generation
- Multiple Regulatory Jurisdictions





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