

Asia-Pacific Energy Regulatory Forum



Federal Energy Regulatory Commission Theme 1: Disruptive Technologies

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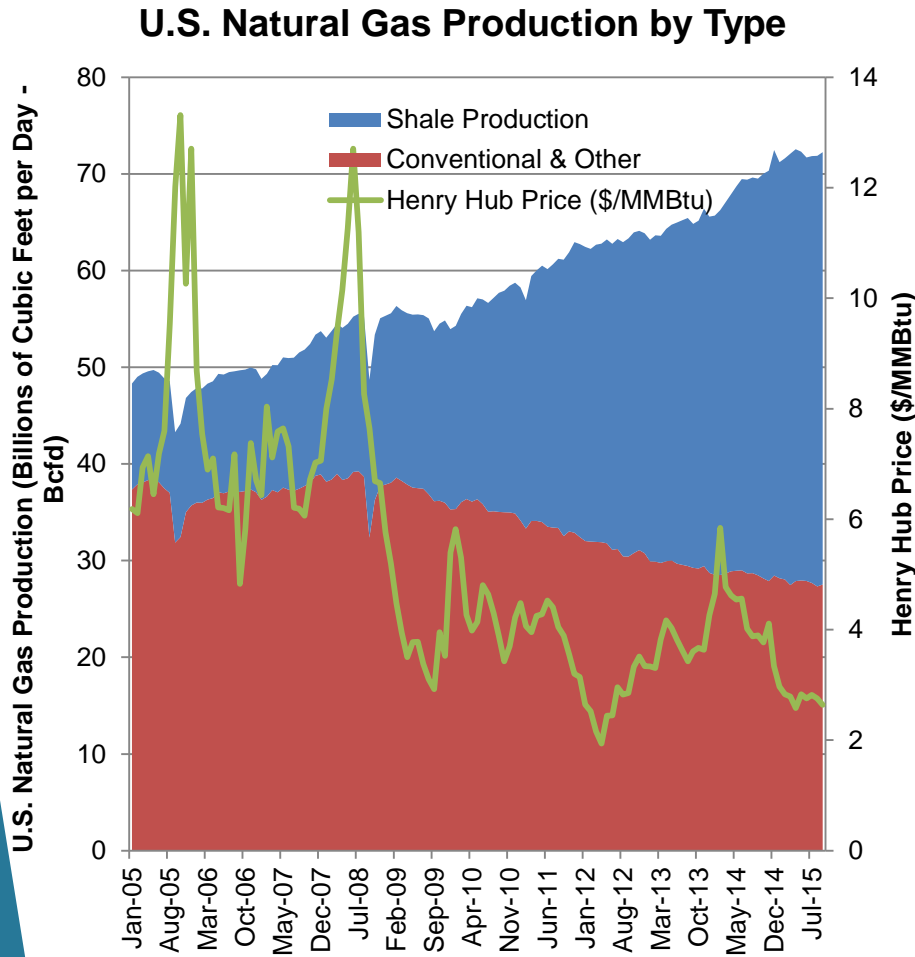
Technological Innovations Driving the 21st Century Grid in the United States

- ▶ Shale revolution and cheap natural gas
- ▶ Increased penetration of renewable energy
- ▶ On the horizon...
 - ▶ Distributed energy resources (DERs)
 - ▶ Microgrids
 - ▶ Electricity storage

Each of the above innovations promises significant benefits—but integration of these resources within the grid can also present challenges.



The Shale Revolution

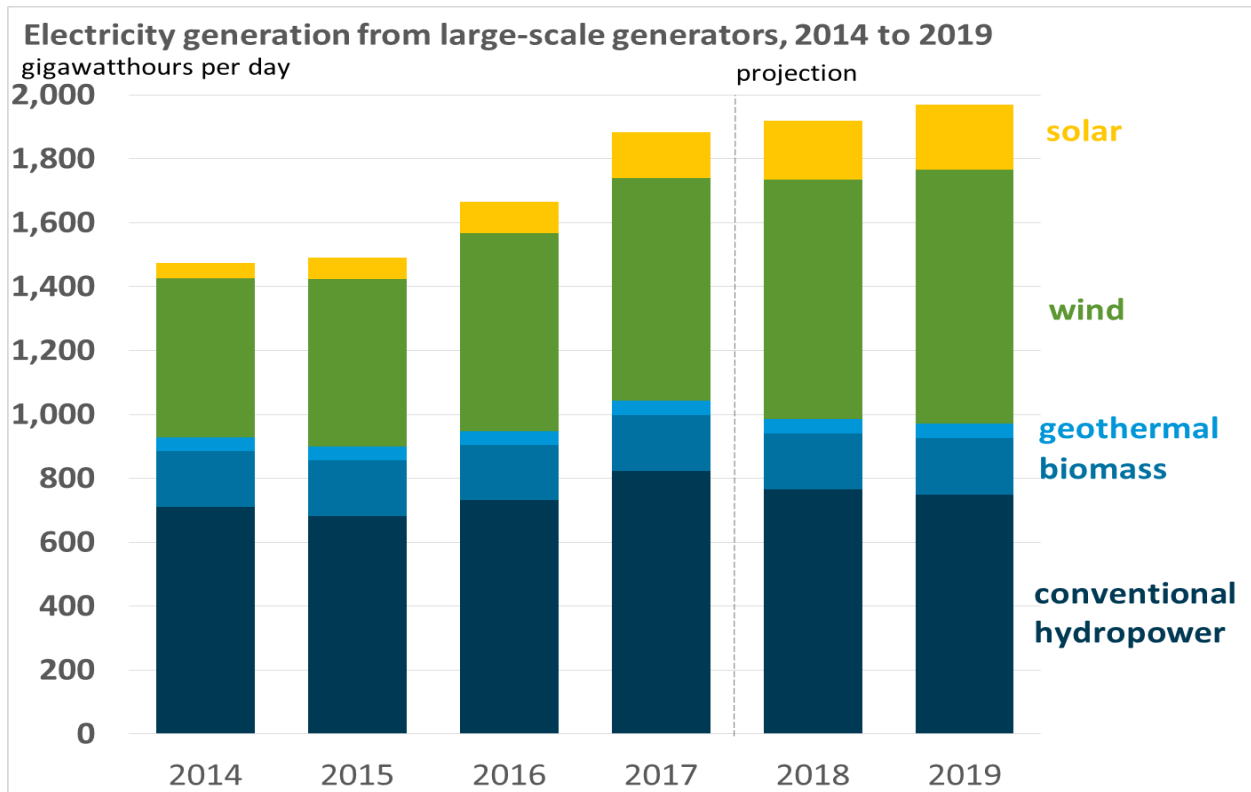


- ▶ Abundant shale-sourced gas has helped drive down U.S. electricity prices
- ▶ Natural gas was once suitable for peaking units only—now it's baseload generation in some parts of the United States
- ▶ Cheap natural gas is increasingly squeezing legacy coal and nuclear generation out of markets

Source: Bentek Energy & Intercontinental Exchange



Increased Penetration of Renewable Energy

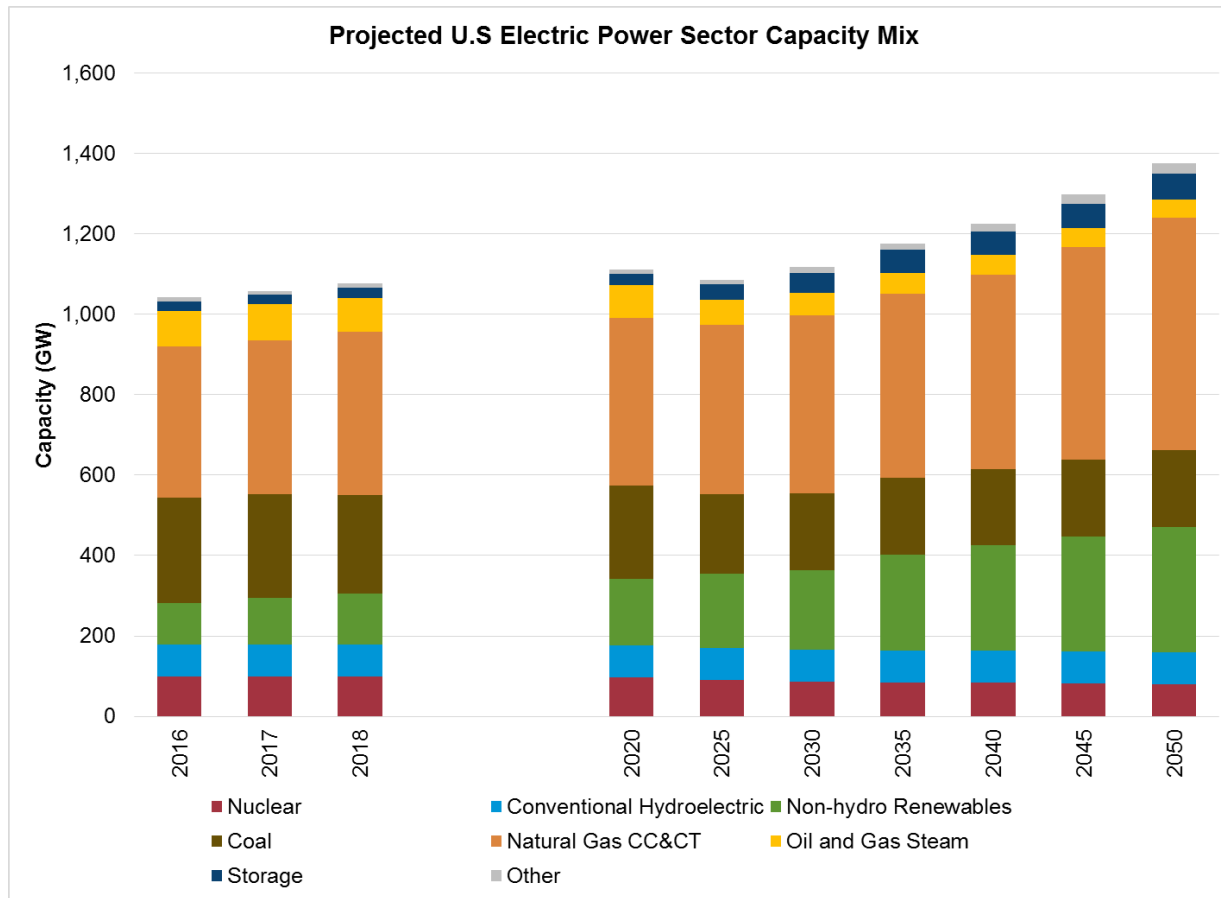


Source: U.S. Energy Information Administration (EIA), Short Term Energy Outlook

- ▶ Increasingly, renewables are an attractive business proposition
- ▶ More and more industrials are directly procuring renewable energy
- ▶ EIA expects wind, solar, and other non-hydropower renewables to provide more than 10 percent of electricity generation in the U.S. in 2018
- ▶ In some parts of the U.S. (e.g., California) renewable power is driving energy prices during large portions of the day



More Innovations to Come....



- ▶ Distributed Energy Resources (DERs) and microgrids could allow consumers to design tailored energy solutions
- ▶ Electric storage is a potential game-changer that could facilitate more rapid integration of renewables, serve as an alternative to new transmission infrastructure, and improve grid reliability and resilience.



Benefits – But Also Challenges

- ▶ Benefits
 - ▶ Reducing greenhouse gas emissions
 - ▶ Reducing energy costs
 - ▶ Empowering customers to control their own energy destiny
- ▶ Challenges
 - ▶ Maintaining integrity of market price signals
 - ▶ Managing grid reliability and resilience
 - ▶ Encouraging significant investment in new enabling transmission infrastructure
 - ▶ Protecting the grid from cybersecurity threats
 - ▶ Addressing social/economic challenges for affected communities



Questions?

