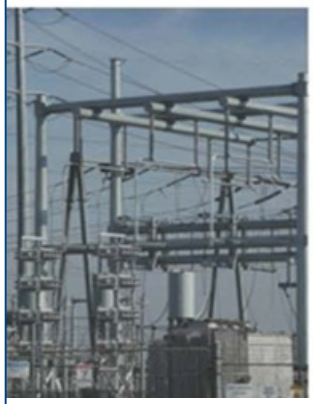
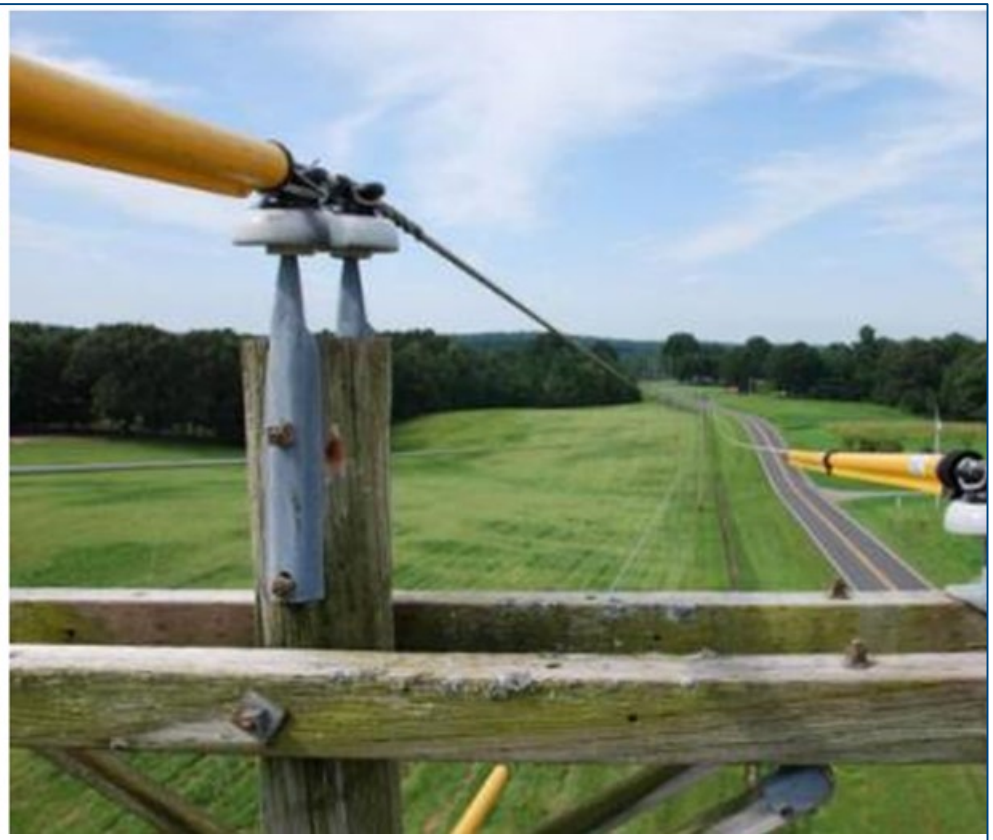
U.S. DEPARTMENT OF ENERGY

Office of Electricity





Integrated Planning for the Electric Grid

Joe Paladino, DOE

DOE Electricity Advisory Committee

May 29, 2020

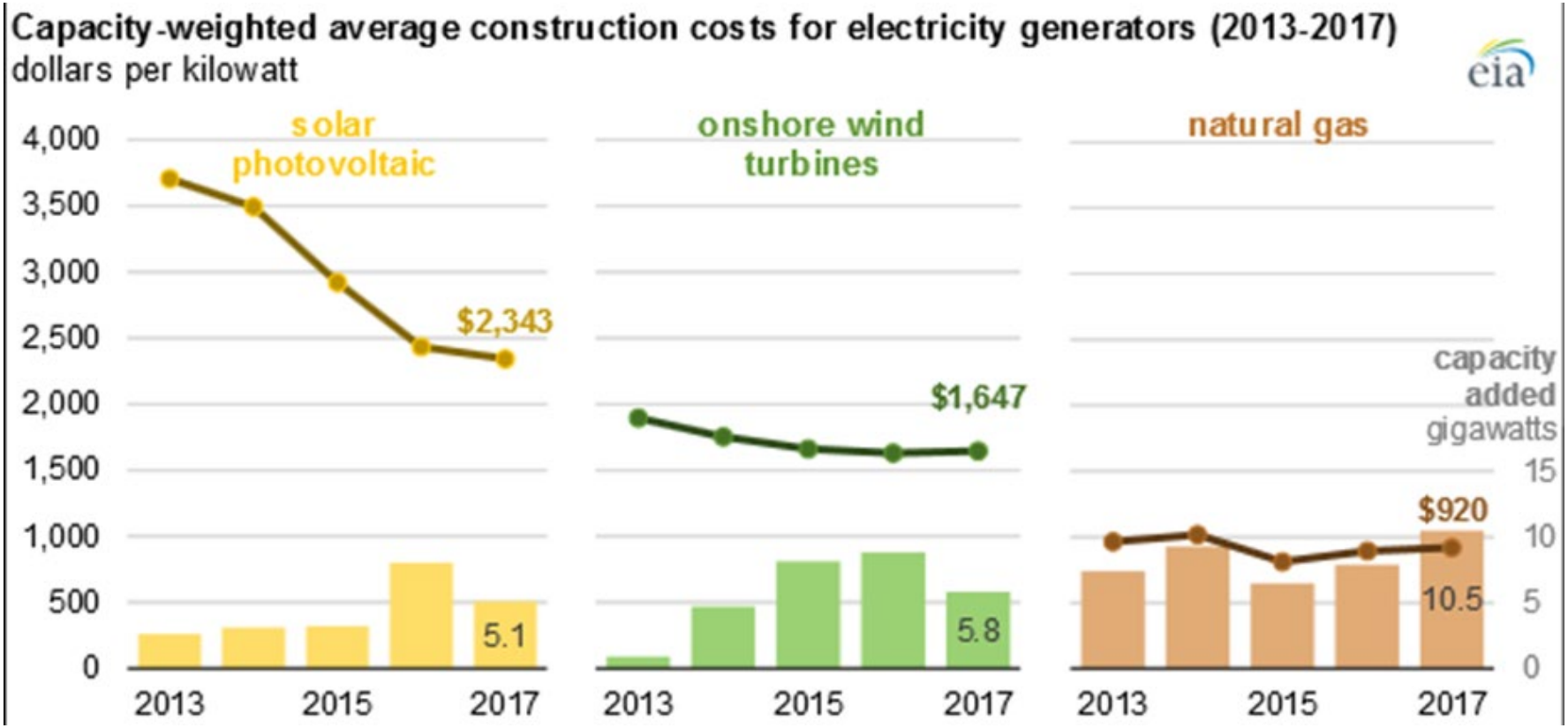
Session Purpose

Purpose:

- Review DOE efforts on advancing planning methods and tools to address issues posed by increasing levels of renewable and distributed energy resources.
- Initiate a discussion to explore gaps and recommend further efforts by DOE to advance planning methods and tools to address the changing resource mix while sustaining security, resilience, and reliability objectives.

Changing Resource Portfolio

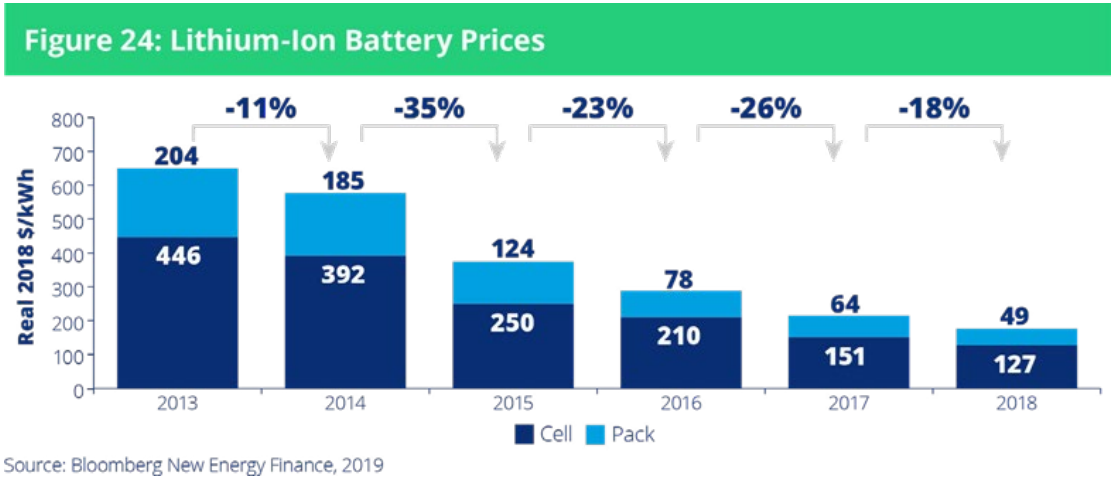
Increasing use of variable resources; natural gas with 35% share and renewables (non-hydro) at 10%



Source: U.S. Energy Information Administration, *Construction Cost Data for Electric Generators*

Energy Storage

US energy storage market to grow from 523 MW in 2019 to 7.3 GW in 2025 driven largely by utility procurements and accelerating residential markets[1]



Geographic breadth and diversity (range of services):

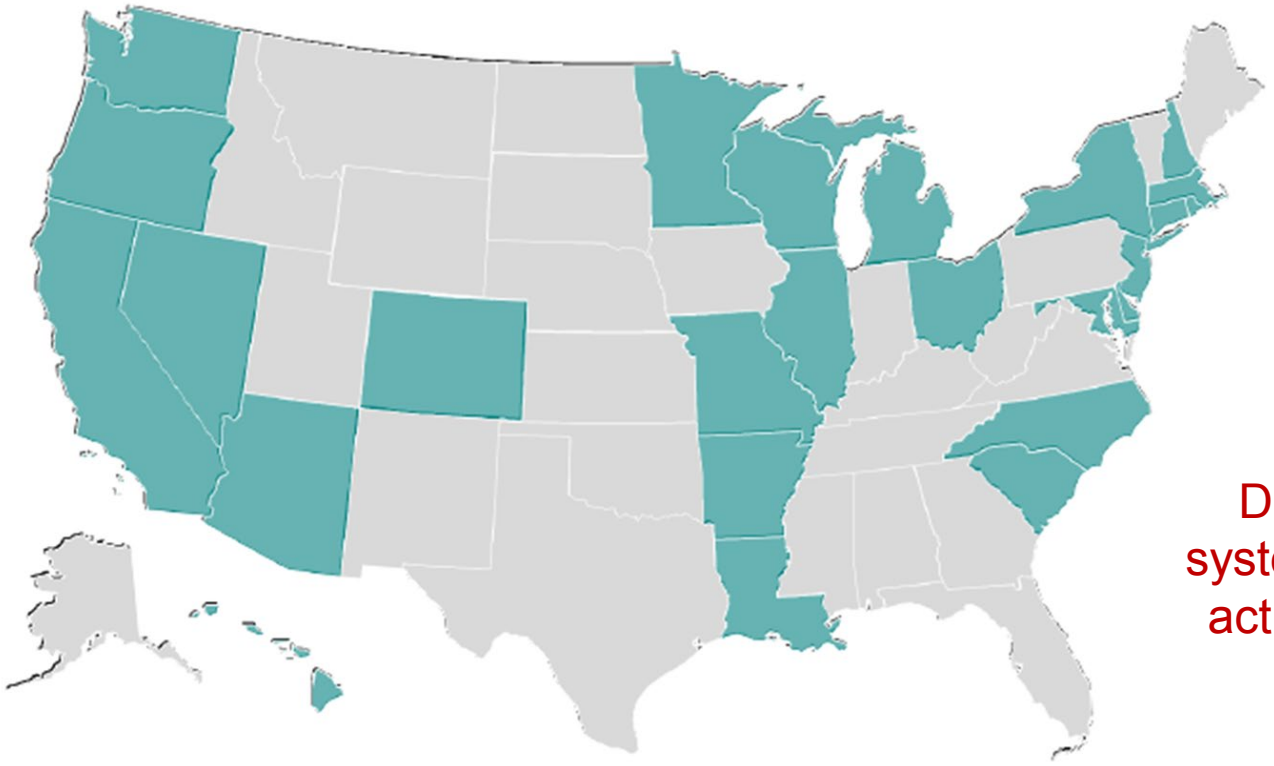
- Ancillary services in PJM, NYISO, ERCOT, ISO-NE, and CAISO
- Stand-alone and solar-paired capacity applications across the US
- Supporting federal and state policy initiatives, e.g., pilot programs, storage targets, consideration in IRPs and IDPs, funding incentives (CA SGIP and NYSERDA programs), and DOE Energy Storage Grand Challenge
- Distribution upgrade deferral and NWAs

In general, the load shape is becoming less predictable

1 – Wood Mackenzie U.S. Energy Storage Monitor, 2019 Year in Review Executive Summary, March 2020

Integrated Distribution System Planning

An IDP provides an opportunity to develop a rational technology implementation strategy to meet grid modernization, DER utilization, and resilience objectives; IDP use lagging behind IRP use



Distribution system planning activities in 25 states

Source: EPRI, *Modernizing Distribution Planning: Benchmarking Practices and Processes as They Evolve*. November 2019

Remaining Challenges

There is more work to do

1. Integrating planning cycles, assumptions, and analytical findings across disparate processes (IRP, distribution, and transmission planning)
   a) Planning coordination
   b) Centralized vs distributed (system or point solutions)
2. Incorporating resilience into planning processes
   a) Methodology for translating threat-based risk assessment into planning objectives and criteria
   b) Ability to consider a variety of grid configurations
3. Multi-objective planning (balancing priorities)
4. Planning for uncertain futures and risk
5. Tools to assess active load-curve management (for utilities and regulators)
6. Predictable technology adoption pathways
7. Consistent valuation practices (determining core resources)

Thank You

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