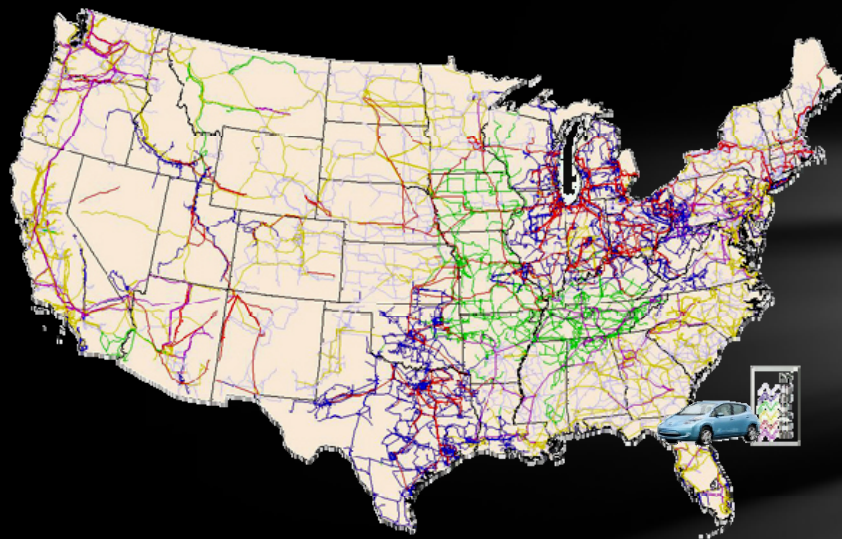


# CMU's 8<sup>th</sup> Annual Electricity Conference



*Jay Caspary*

*Senior Policy Advisor*

*US DOE Office of Electricity Delivery and Energy Reliability*

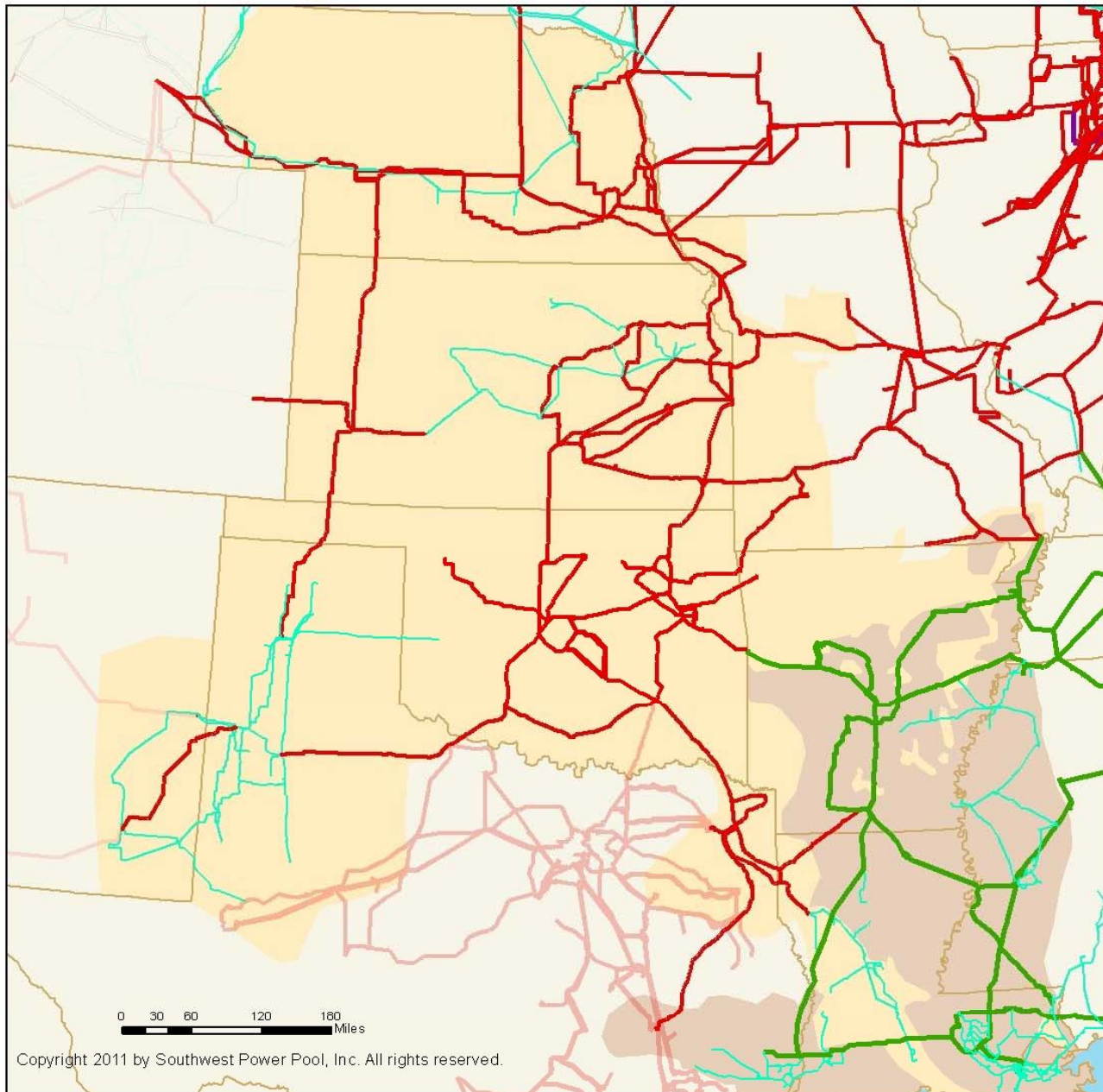
*14 March 2012*

# Grid Modeling is Top Priority






- *One of OE's focus is "Grid Modeling - Develop and implement an advanced energy infrastructure and modeling program focused on contingency analysis and analysis related to environmental regulations."*
- *Draft white paper on grid analytics, framing DOE's strengths/ weaknesses, addressing gaps and making recommendations on DOE efforts regarding tools/skills, leveraging capabilities of national labs, other agencies, e.g., FERC, DOD, etc. to provide long term value from OE in support of national needs*

# FY13 Advanced Modeling Grid Research \$10M Request

- *Advanced Modeling Grid Research develops sophisticated algorithms, models and capabilities to better analyze and predict grid behavior*
- *The program applies this understanding using real-time electric system data to improve grid planning and operations*
- *Specifically, the research focuses on:*
  - Accelerating performance – improving grid resilience by developing dynamic state estimation and contingency analysis at a sub-second level
  - Enabling predictive capability – relying on real-time measurements and improved models to more accurately represent the electric system and better predict system behavior, thus reducing margins and equipment redundancies needed to cover uncertainties



**230 kV + Transmission  
In Service**  
(August 2011)

- Operating Voltage**
-  230 kV
  -  345 kV
  -  500 kV
  -  Southwest Power Pool
  -  Entergy ICT



## NTC All Expansion Overview

(March 2012)

All SPP Transmission Expansion Plans are subject to change.

### Upgrade Type

- New Double Circuit
- Convert/Rebuild/recond.
- New Single Circuit
- Transformer

### Upgrade Voltage

- 230 kV
- 345 kV
- 500 kV

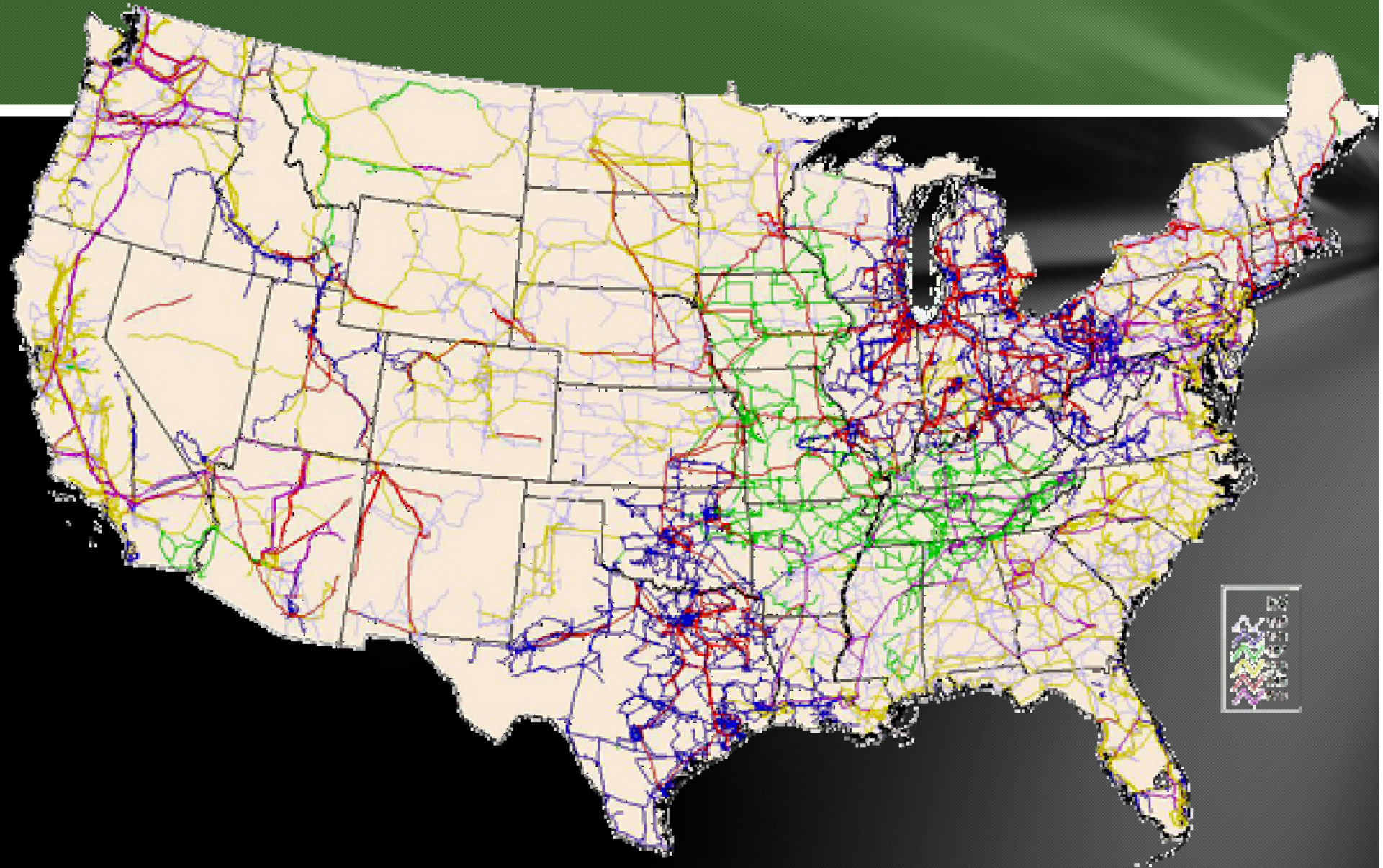
# Future in SPP

*Renewable development beyond member needs of 10-14GW in SPP will depend on level of exports. While focus to date has been wind, solar will be next, then...*

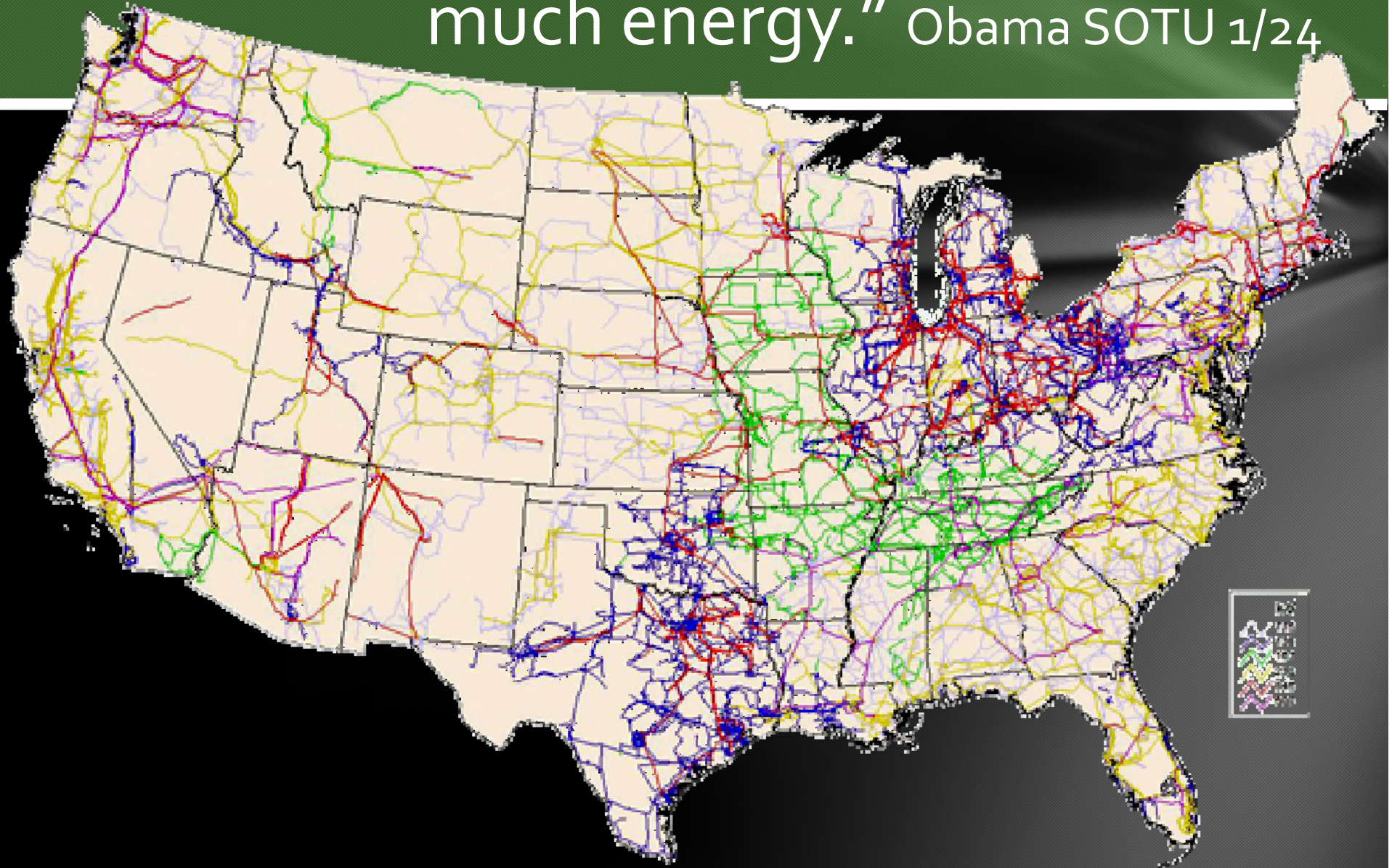
*Asset management with aging infrastructure will be a challenge. Effective use of new and existing Rights-Of-Ways (ROWs) will be key success factor in getting the best lines in the best corridors*

*Future is bright with more robust planning and certainty of cost allocations, but we may need smart grid applications to minimize renewable curtailments in advance of grid build-out and to manage flows using new technology, e.g., HVDC, as well as system reconfiguration/ optimization tools*

# US Bulk Power System is Patchwork Quilt

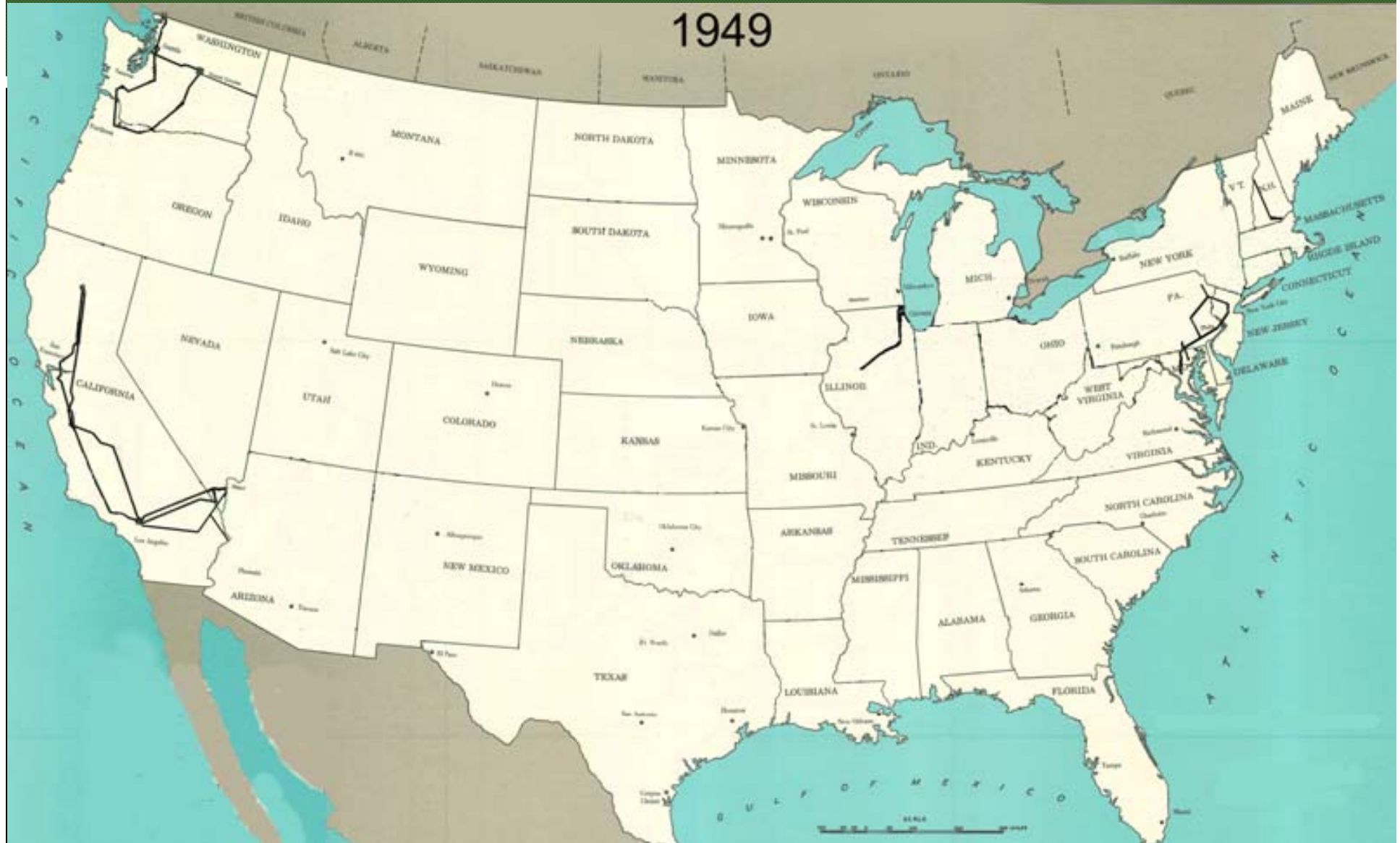


“We have a power grid that wastes too much energy.” Obama SOTU 1/24

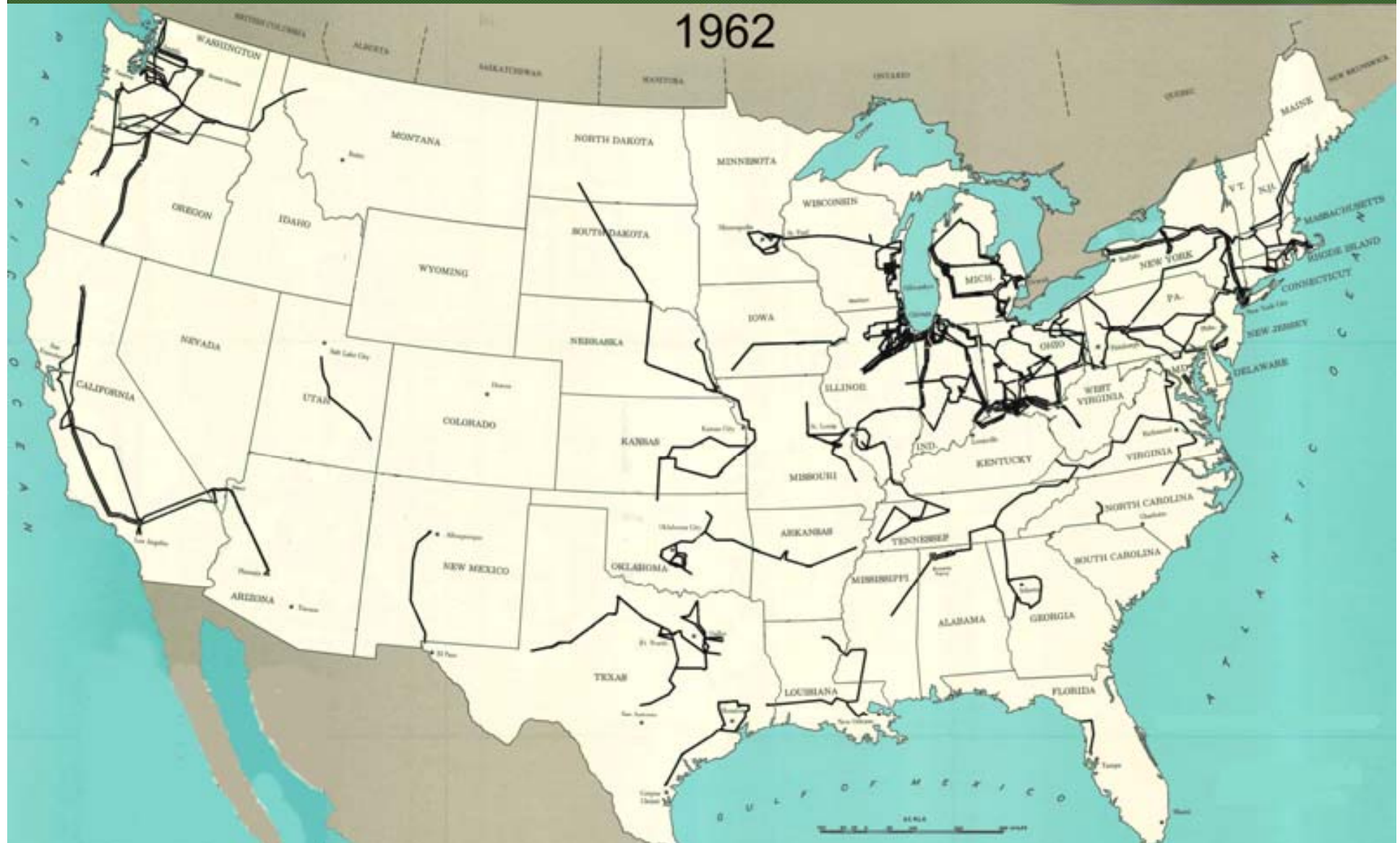




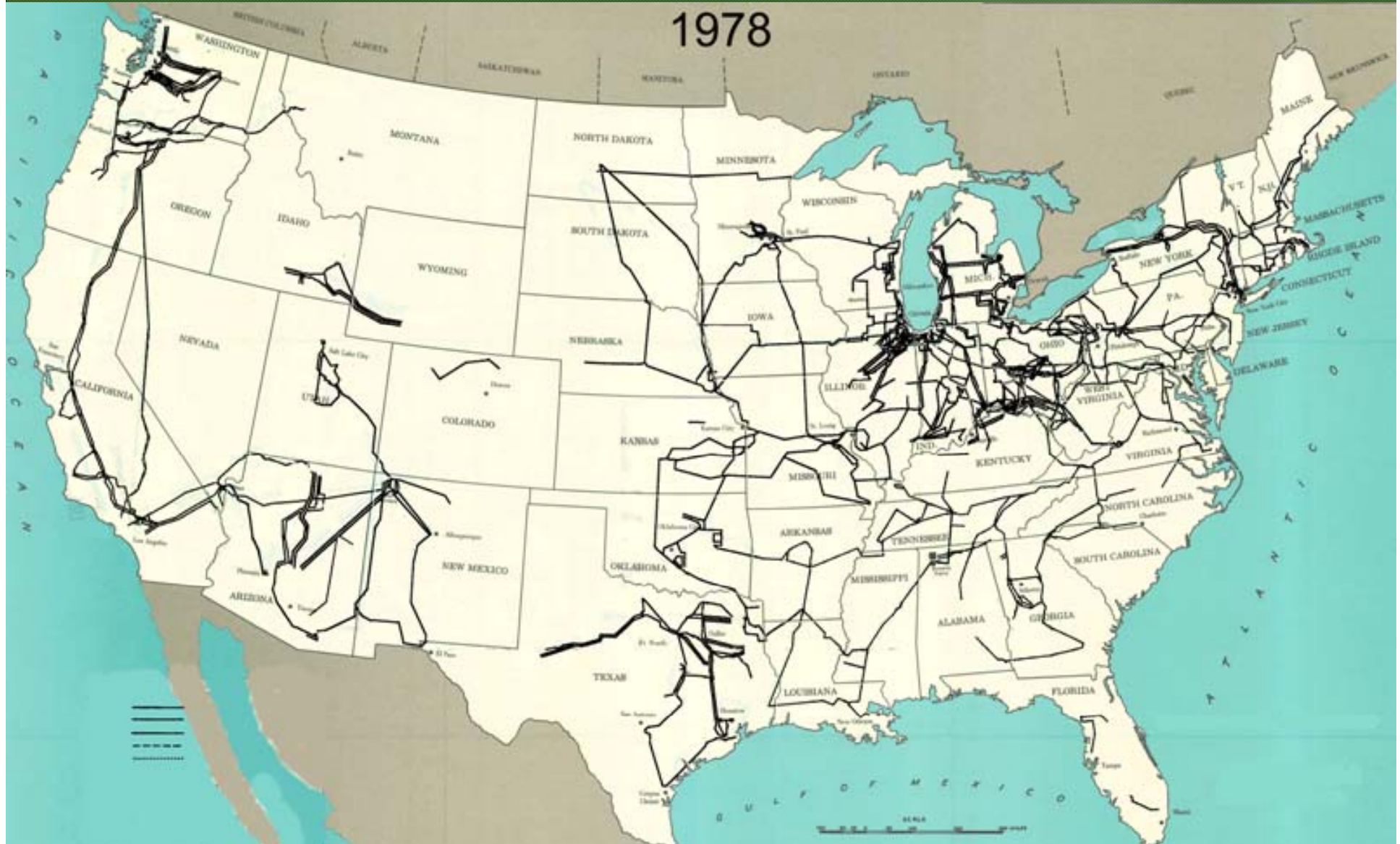
# EHV Transmission Growth at a Glance



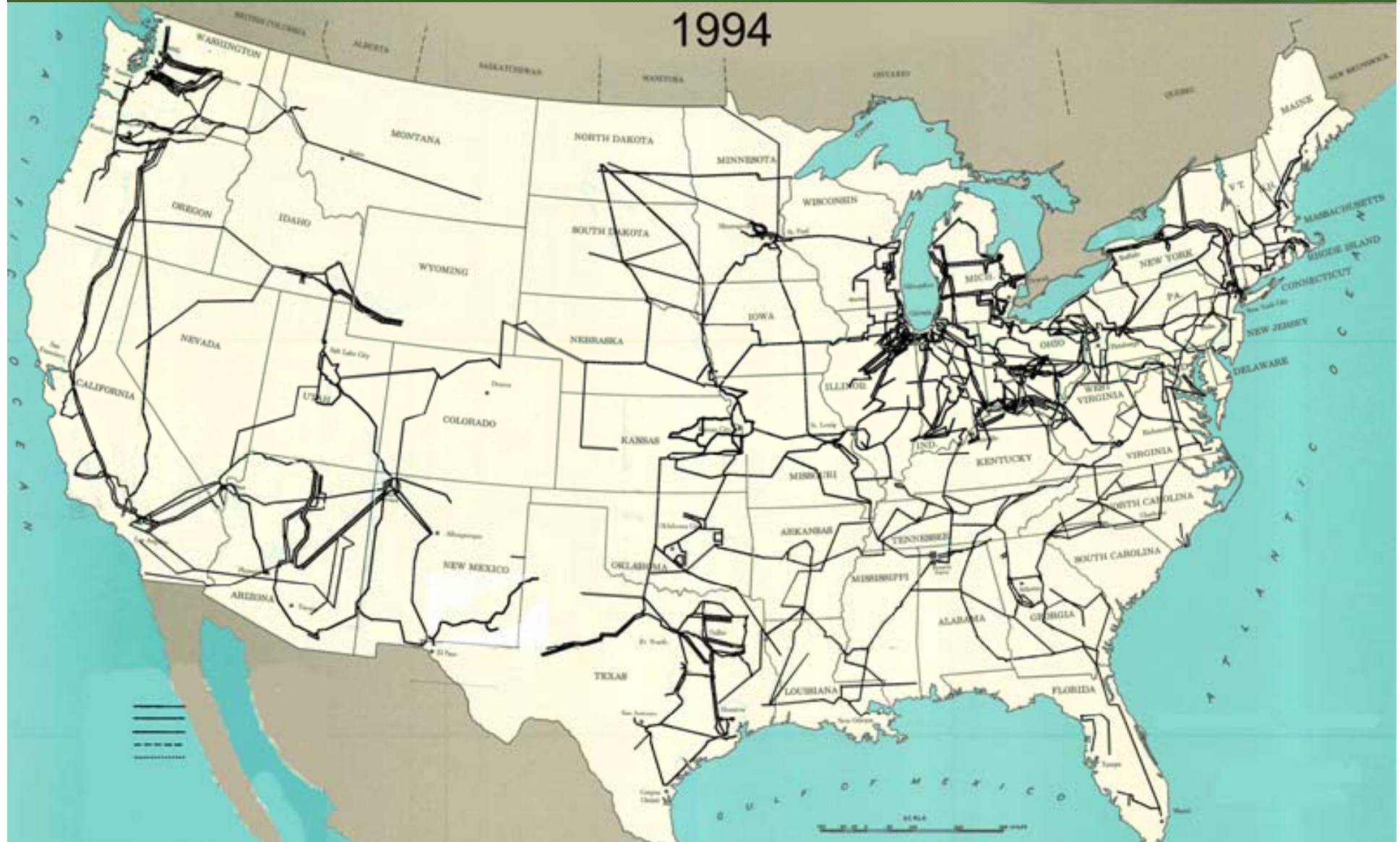
# EHV Transmission Growth at a Glance



# EHV Transmission Growth at a Glance



# EHV Transmission Growth at a Glance



# EHV Transmission Growth at a Glance



# Interregional Studies of Interest

*EIPC Phase I report posted, Phase II in process with initial Transmission Options Task Force focusing on model development and transmission buildouts to support 3 scenarios*

*DOE's 2012 Congestion Study underway with regional workshops complete, initial input posted and deadline for comments in March*

*Power System Engineering Research Center (PSERC) National Grid Initiative focusing on energy infrastructure needs for 2050*

# Interregional Planning Works

*In the 1960s, 11 South Central Electric Companies (SCEC) built first 500 kV network in US with 345 kV extensions to facilitate 1,500 MW seasonal diversity interchange with TVA using common design standards*

*The benefits of this expansion were grossly underestimated, e.g., planners and transmission / substation design engineers assumed only a fraction of 500 kV line thermal capacity would be needed and utilized in operations. Difficult to comprehend any line ever loading over 1,000 MVA*

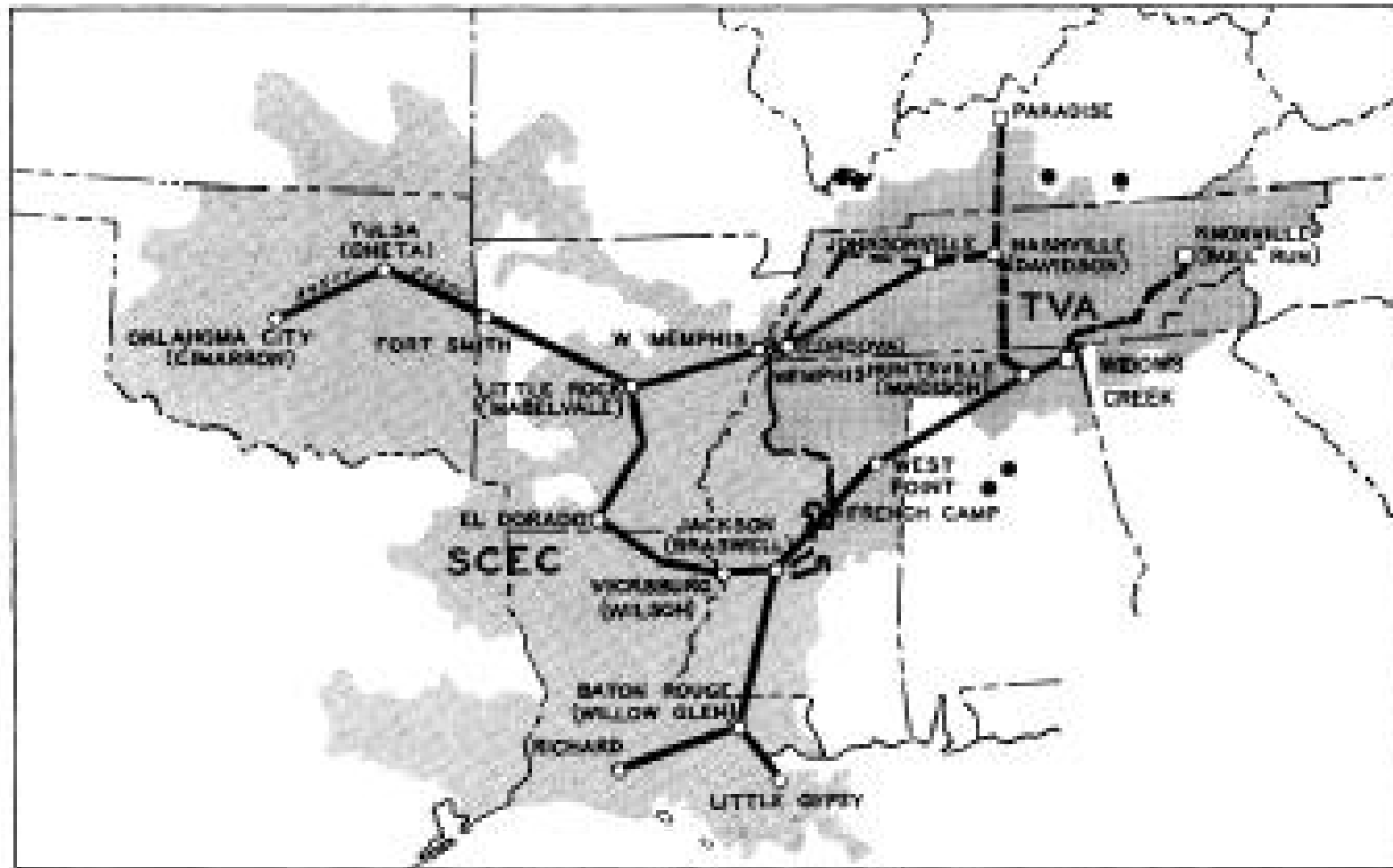


Fig. 1. TVA-SCEC transmission lines.



# Key Points

*Transmission enables, and defines, markets*

*Transmission provides benefits that are not easily quantified, e.g., resource optionality via robust and flexible plans provide tremendous value*

*Transmission is lumpy, with large economies of scope and scale*

*Smart grid applications for transmission could be game changers*

*Interregional planning needs to capitalize on replacement and rightsizing, where appropriate, of aging infrastructure in critical corridors*

# Data is Key

*Data is critical success factor for future grid modeling efforts not only for DOE, but throughout the bulk power industry*

*Information is power, and the lack of understanding and transparency regarding existing assets are impediments to collaborative, coordinated and cost effective grid planning and operations*

*Getting consensus on data and metrics are paramount with aging infrastructure and the challenges of building new facilities to enable future markets*

**“The world will not evolve past its current state of crisis by using the same thinking that created the situation.”**

**Einstein**