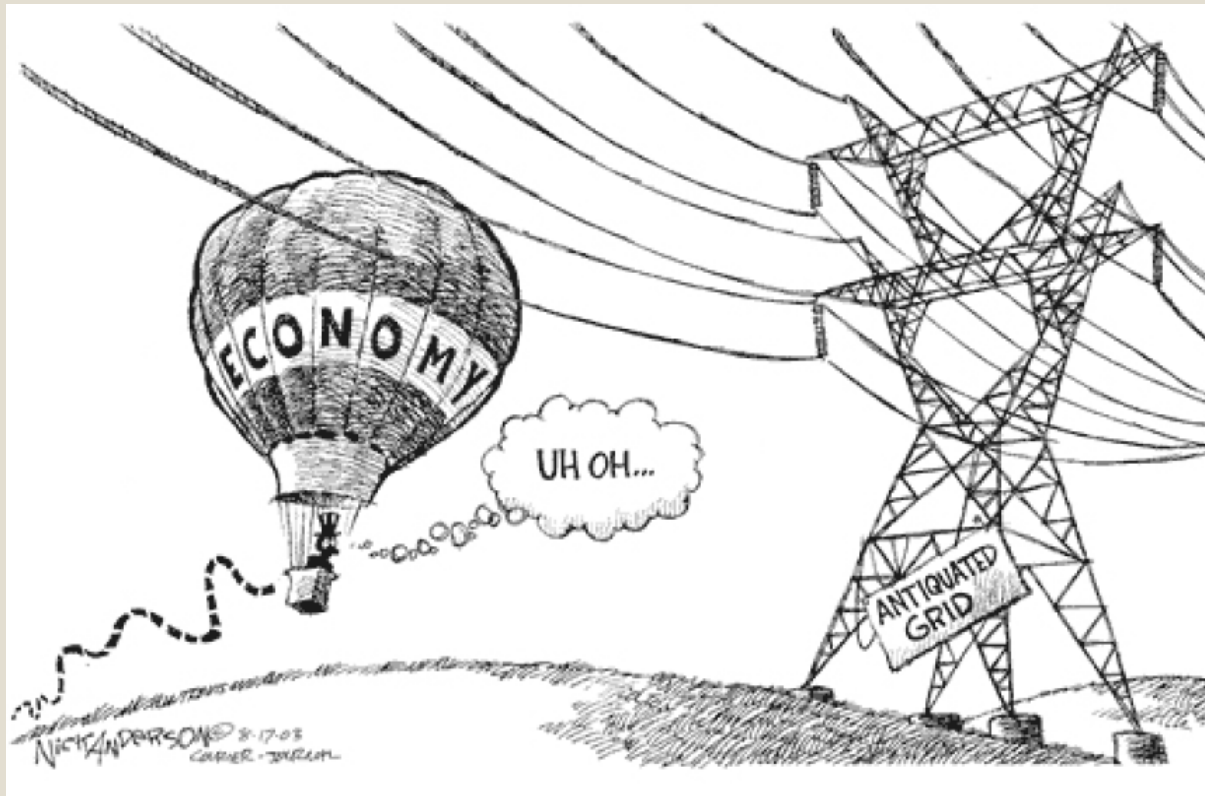


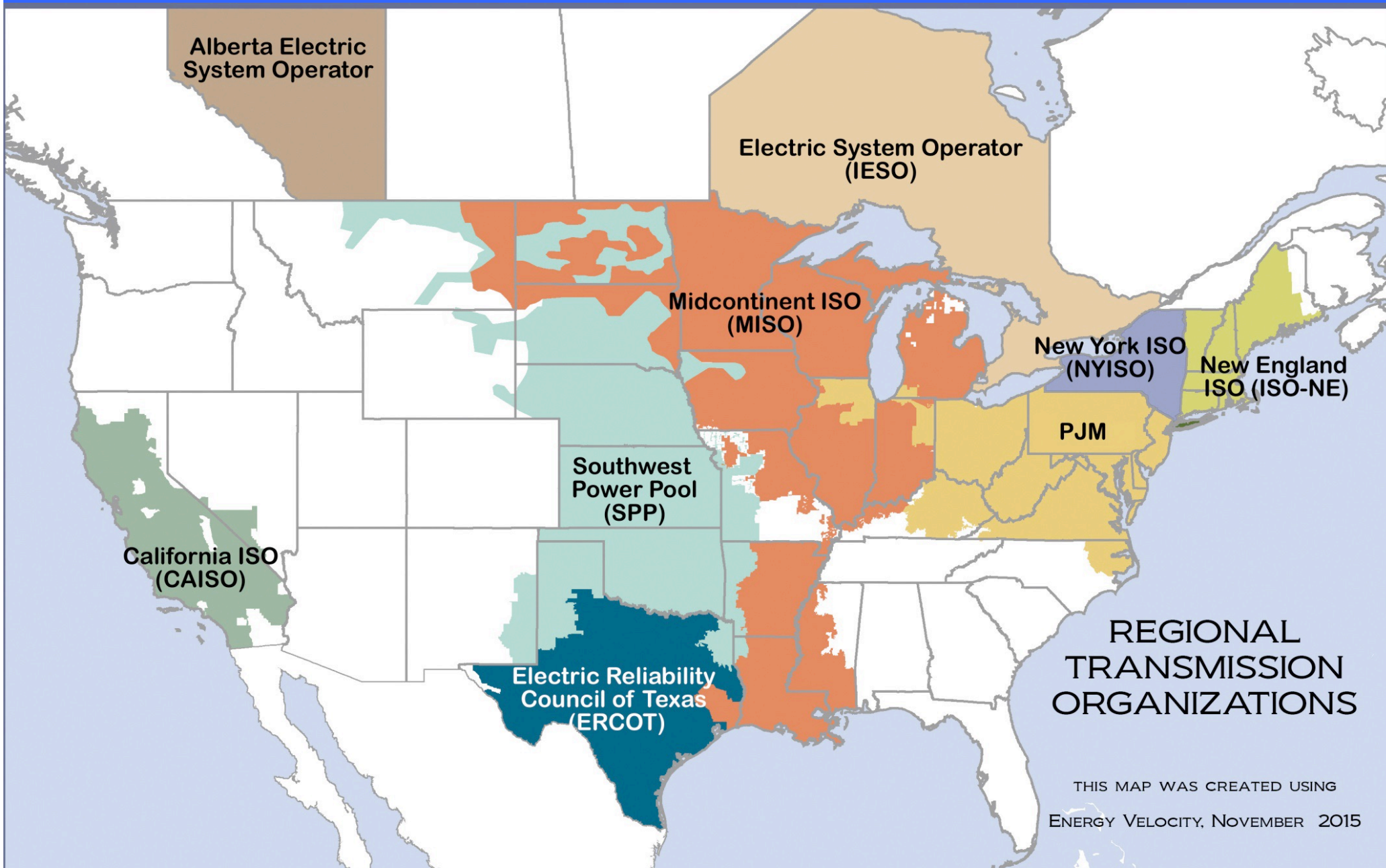
Federal and Regional Policy Drivers



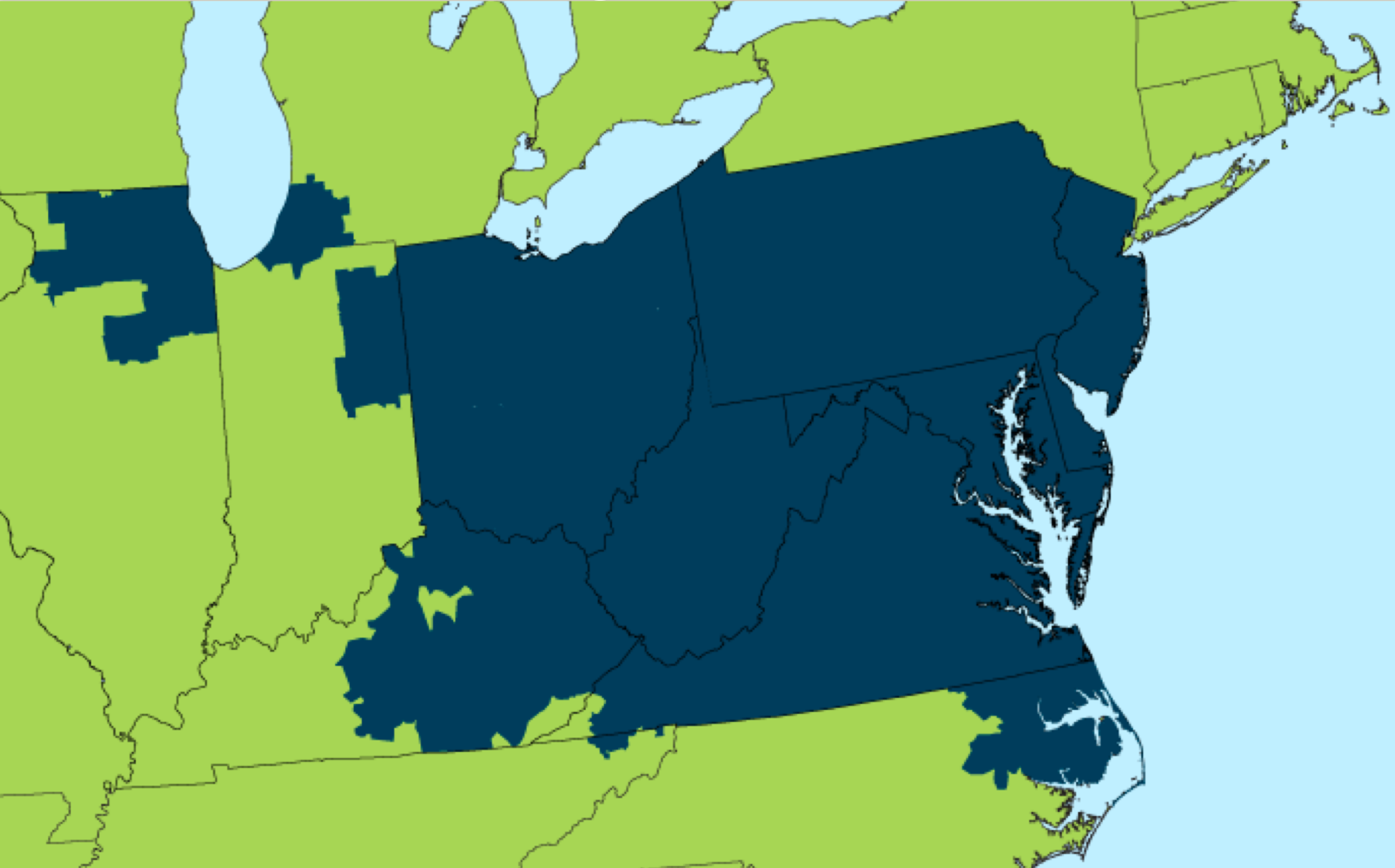
Seth Blumsack
Director, Center for
Energy Law and
Policy, Penn State
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17 June 2021

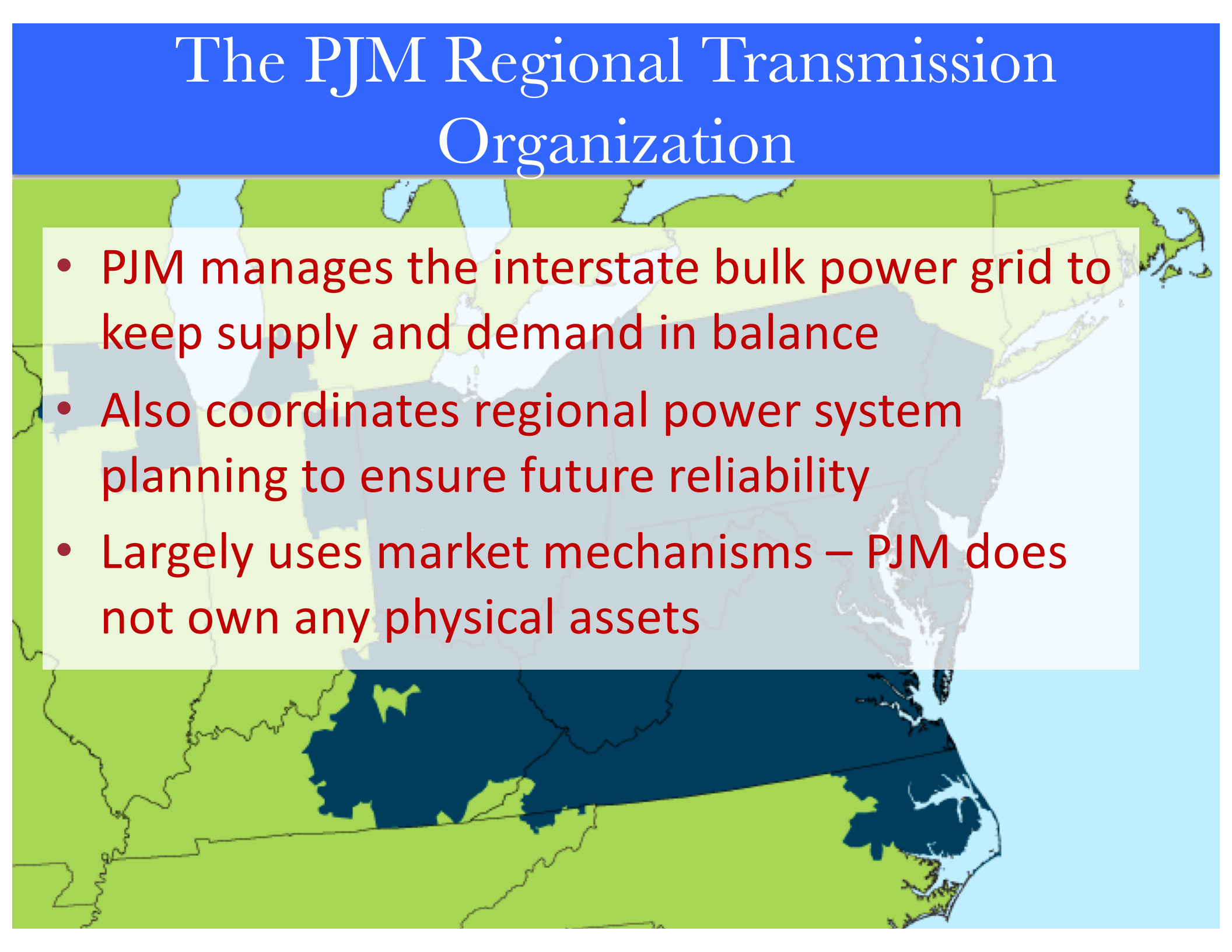
Pennsylvania is Part of a Regional Electric Grid



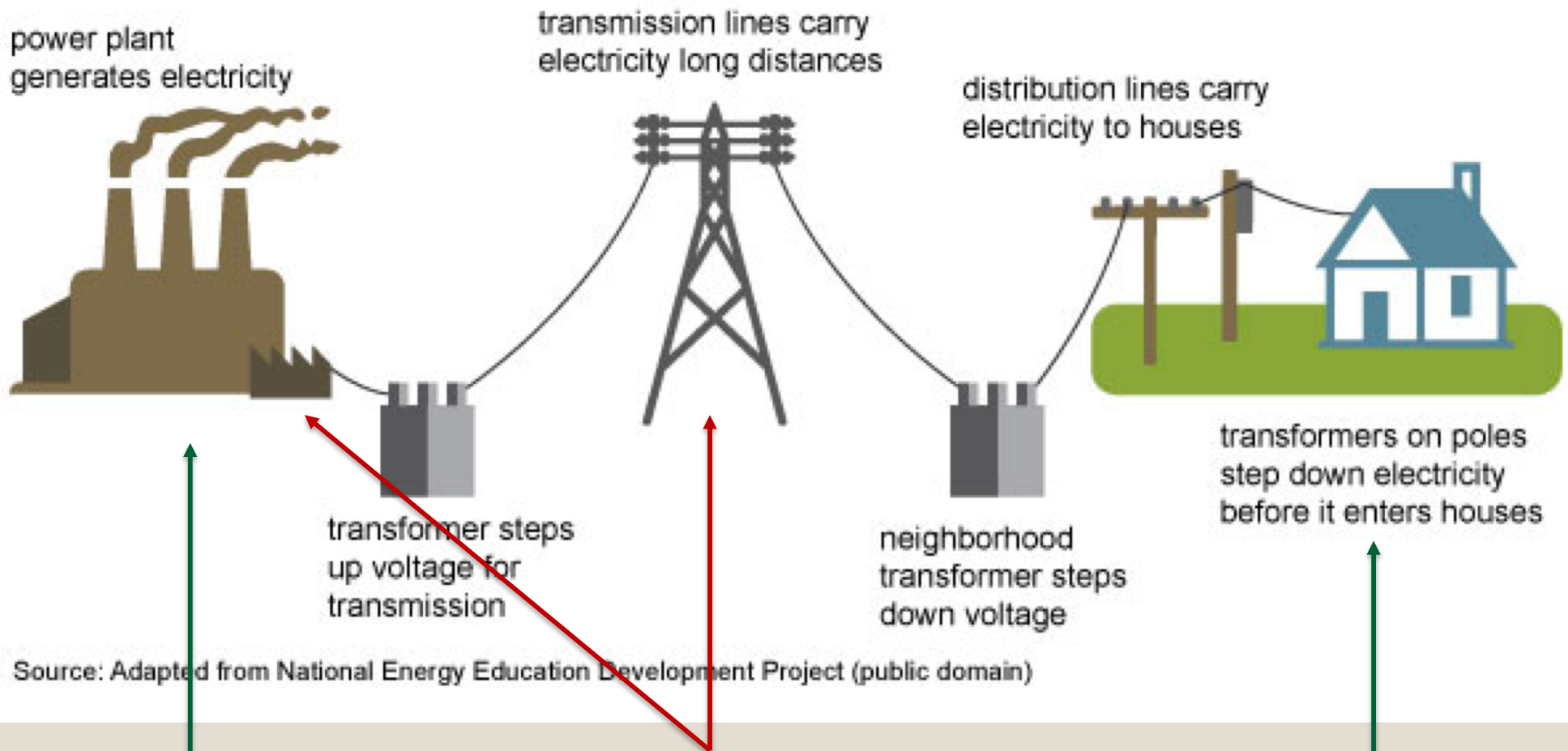
The PJM Regional Transmission Organization



The PJM Regional Transmission Organization

- 
- A map of the PJM (Piedmont and Potomac) region, which includes parts of Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, and West Virginia. The map is color-coded: green for land, blue for water, and yellow for the PJM region. The text is overlaid on a semi-transparent white box.
- PJM manages the interstate bulk power grid to keep supply and demand in balance
 - Also coordinates regional power system planning to ensure future reliability
 - Largely uses market mechanisms – PJM does not own any physical assets

Electricity generation, transmission, and distribution



**State
Regulations
Affecting
Generation**

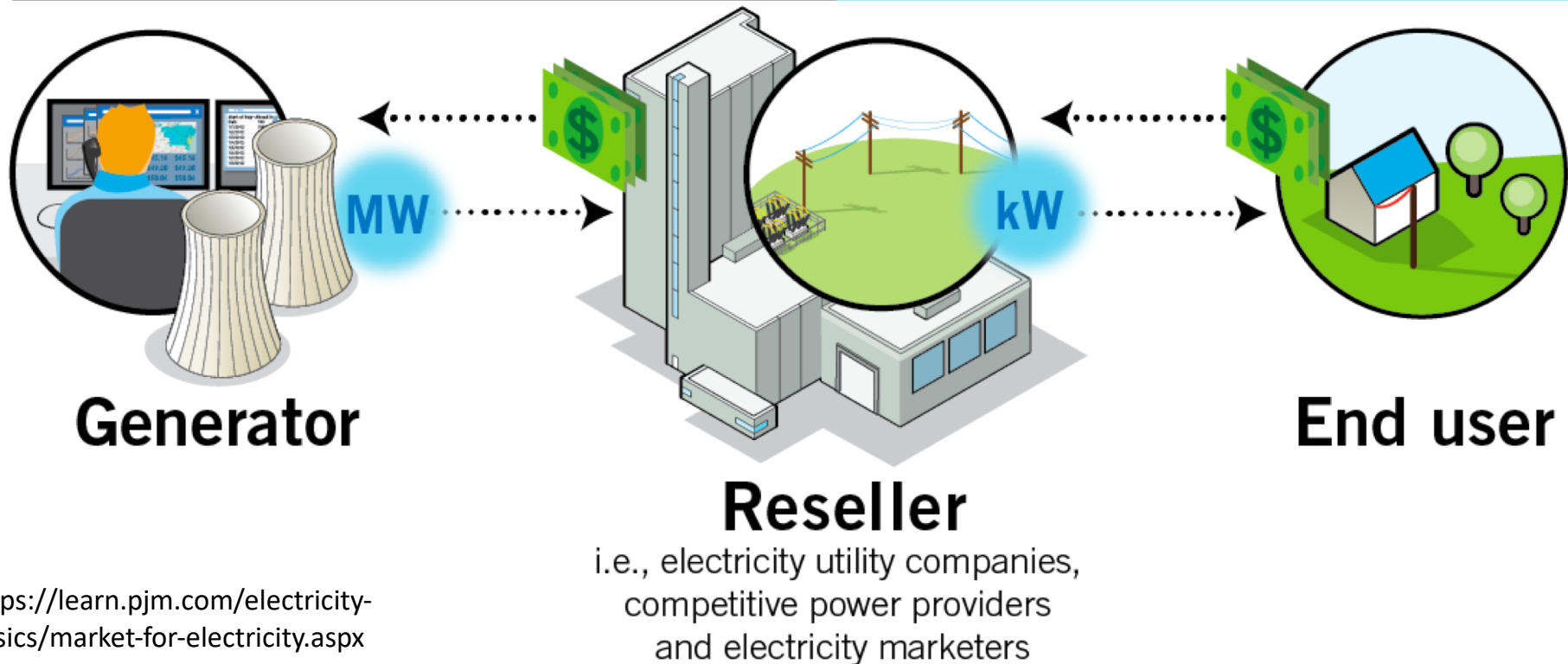
**Regional Grid
Planning and
Operation, Federal
Regulation**

**Local Grid,
State
Regulation**

Wholesale vs Retail

WHOLESALE

RETAIL

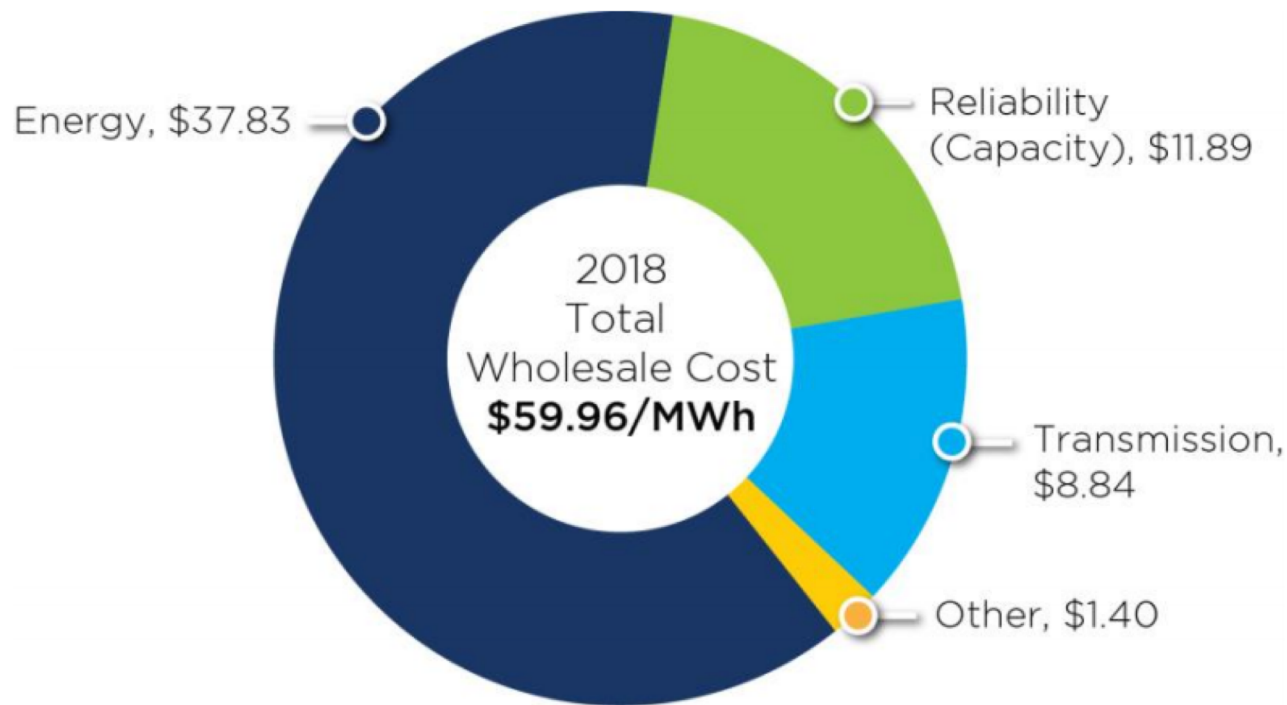


<https://learn.pjm.com/electricity-basics/market-for-electricity.aspx>

- PJM's jurisdiction is only on the wholesale side of the market.
- State policy choices about generation can impact the wholesale market, which has caused some regulatory tension.

PJM Markets

Relative Size of Components of Wholesale Cost (2018)



<https://learn.pjm.com/-/media/about-pjm/newsroom/fact-sheets/understanding-the-difference-between-pjms-markets-fact-sheet.ashx>

PJM Energy Market

- **Function:** Secures electricity to meet consumer demand in real time and near-term
- **Includes:** Real-Time and Day-Ahead markets
- **Portion of wholesale electricity cost:** 63 percent (2018)

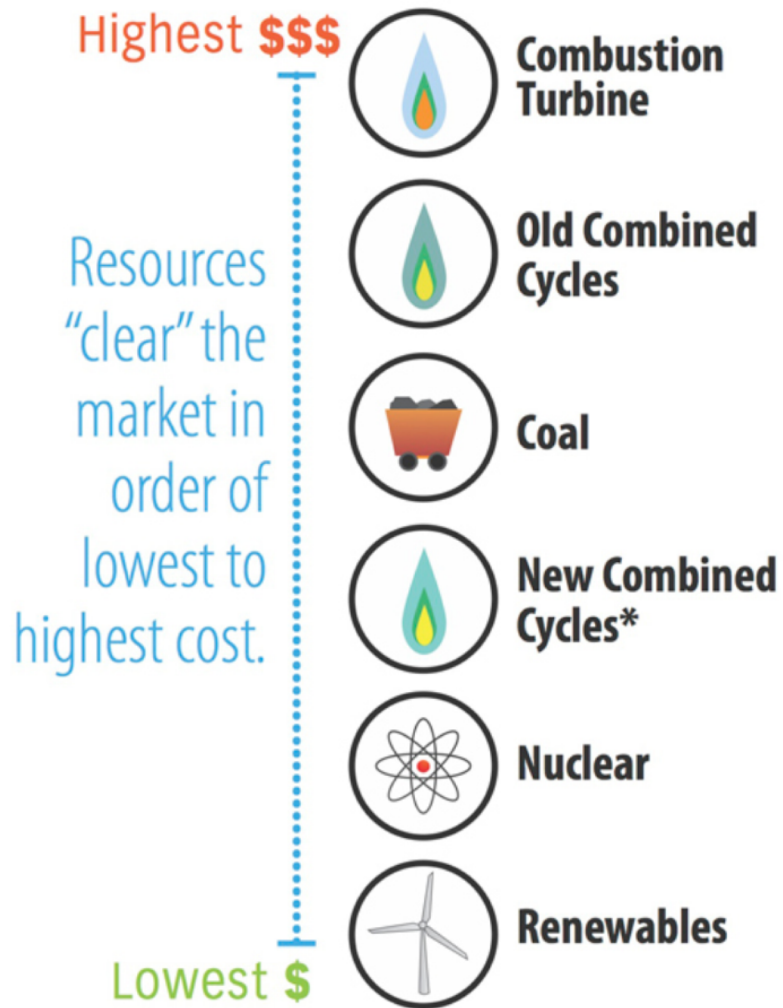
PJM Capacity Market

- **Function:** Ensures the future availability of power supplies three years in advance
- **Portion of wholesale electricity cost:** 20 percent (2018)

PJM Ancillary Services Markets

- **Function:** Helps balance the system as it moves electricity from generating resources to consumers
- **Includes:** Regulation, Reserve Markets
- **Portion of wholesale electricity price:** Less than 1 percent (2018)

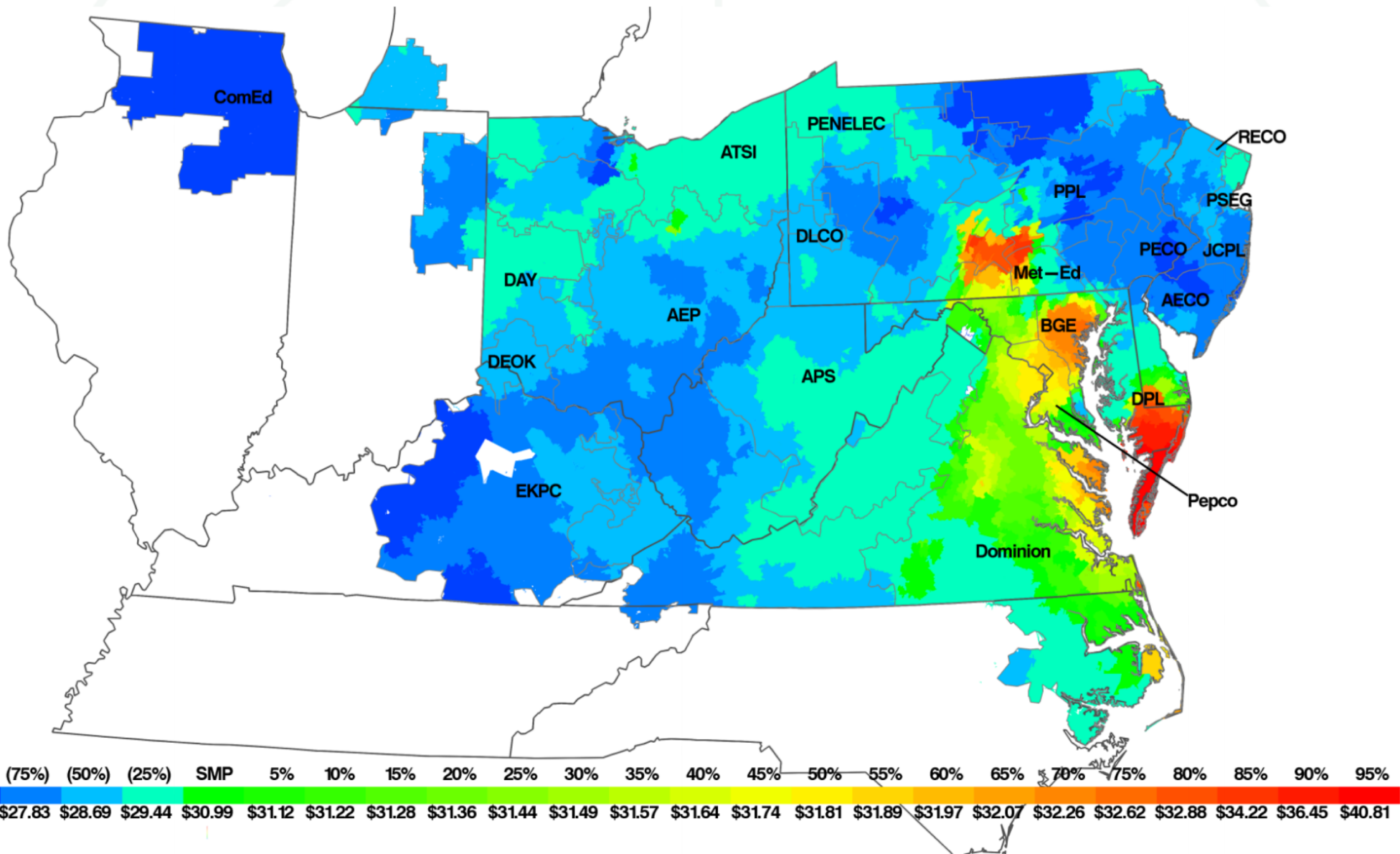
PJM Market Pricing



*New combined cycles are more fuel efficient.

- PJM's markets are run as auctions, with a single "clearing price" determining which resources are dispatched.
- Lower cost resources will be dispatched more frequently.
- PJM calculates location-specific wholesale prices ("Locational Marginal Prices") in the energy market that reflect energy and transmission congestion costs.

PJM Market Pricing



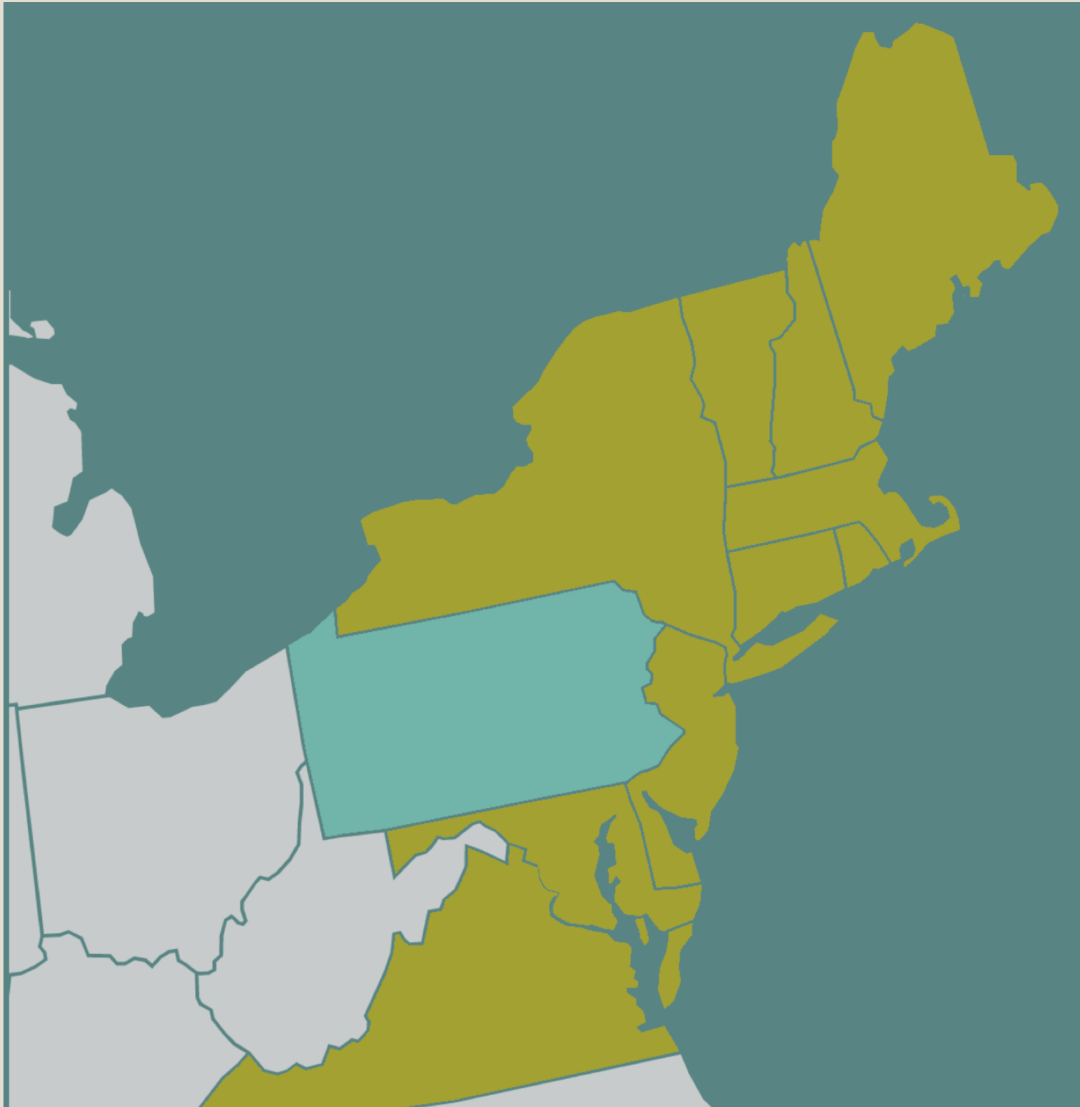
FERC Initiatives

- PJM is regulated by the Federal Energy Regulatory Commission (FERC), not the states
- Backstop siting authority for transmission
- Order 841 to support integration of energy storage into PJM's power market
- Gas transmission permitting

FERC, States and the MOPR

- A critical and obscure role of FERC is to balance state versus federal jurisdiction over electric generation.
- States can make generation policy, but these policy decisions affect wholesale market outcomes (which have federal jurisdiction)
- The “Minimum Offer Price Rule” was a controversial proposal by PJM to keep state generation subsidies (mostly for renewables and nuclear) from depressing PJM’s capacity prices. How FERC resolves these state/federal tensions – especially in PJM – is one of the most critical issues for utility-scale renewables.

Regional Greenhouse Gas Initiative (RGGI)



- Voluntary, multi-state compact to reduce greenhouse gas emissions from the electric power sector; it operates as a cap-and-trade system for CO₂ emissions.
- Pennsylvania is poised to join RGGI starting in 2022.

Prospects for PA in RGGI



PennState

Center for Energy Law and Policy

Prospects for Pennsylvania in the Regional Greenhouse Gas Initiative

Working Paper, December 2020

Project Team:

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- Interdisciplinary report from the Center for Energy Law and Policy (celp.psu.edu/rggi)
- Examines the legal, environmental and energy market prospects of PA in RGGI
- RGGI has the potential to moderately increase wholesale energy costs in PJM while providing substantial climate and air quality benefits in PA.

RGGI Prices

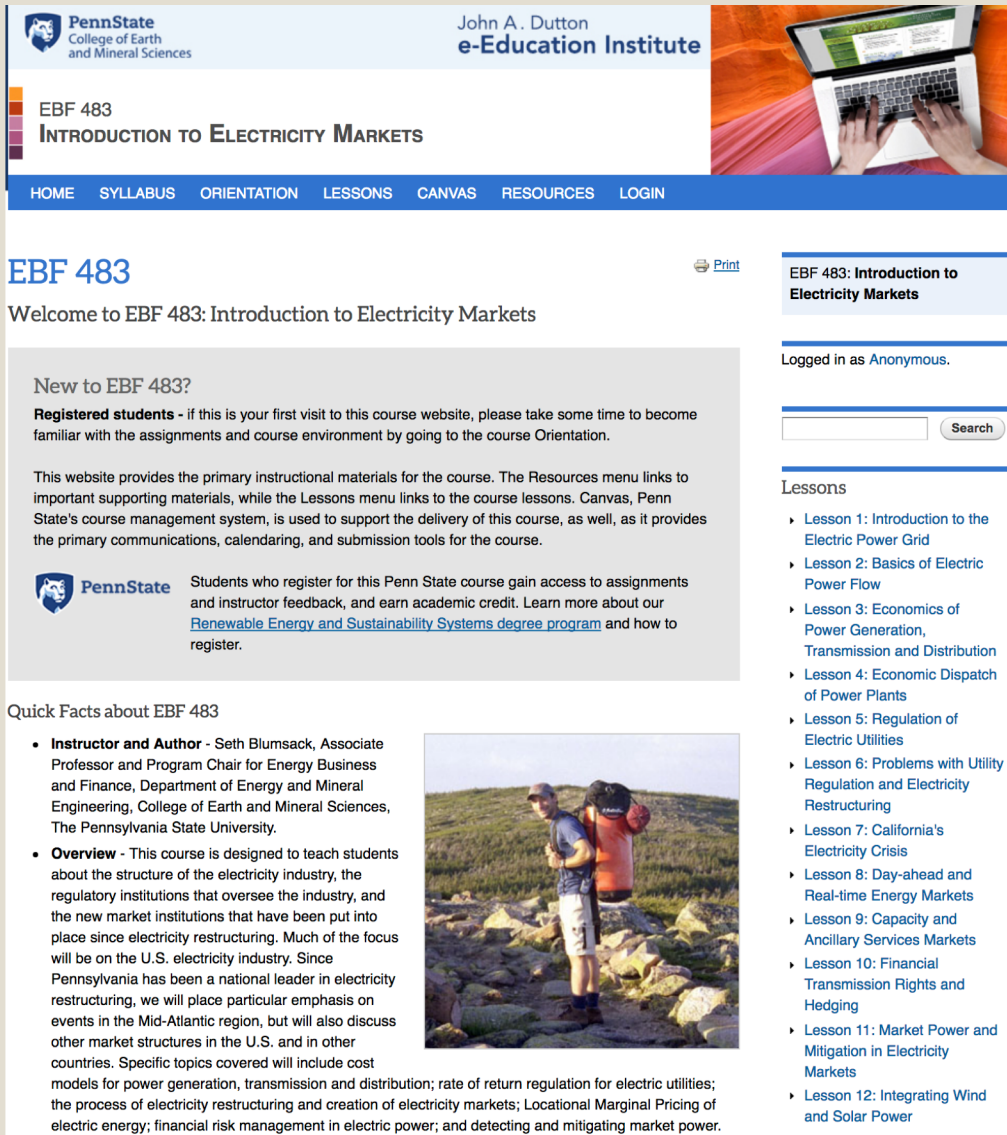
Regional Greenhouse Gas Initiative (RGGI) allowance clearing price (Jan 2008-Dec 2019)
dollars per short ton of carbon dioxide (CO₂)



Source: U.S. Energy Information Administration, based on [Regional Greenhouse Gas Initiative](#)

- Future RGGI cost projections in the Center for Energy Law and Policy report amount to wholesale cost increases of a few dollars per MWh.
- Potentially beneficial for solar projects, but unlikely to be a major economic driver for new solar.

If You Want to Learn More



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EBF 483
INTRODUCTION TO ELECTRICITY MARKETS

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EBF 483

Welcome to EBF 483: Introduction to Electricity Markets

New to EBF 483?

Registered students - if this is your first visit to this course website, please take some time to become familiar with the assignments and course environment by going to the course Orientation.

This website provides the primary instructional materials for the course. The Resources menu links to important supporting materials, while the Lessons menu links to the course lessons. Canvas, Penn State's course management system, is used to support the delivery of this course, as well, as it provides the primary communications, calendaring, and submission tools for the course.

PennState Students who register for this Penn State course gain access to assignments and instructor feedback, and earn academic credit. Learn more about our [Renewable Energy and Sustainability Systems degree program](#) and how to register.

Quick Facts about EBF 483

- Instructor and Author** - Seth Blumsack, Associate Professor and Program Chair for Energy Business and Finance, Department of Energy and Mineral Engineering, College of Earth and Mineral Sciences, The Pennsylvania State University.
- Overview** - This course is designed to teach students about the structure of the electricity industry, the regulatory institutions that oversee the industry, and the new market institutions that have been put into place since electricity restructuring. Much of the focus will be on the U.S. electricity industry. Since Pennsylvania has been a national leader in electricity restructuring, we will place particular emphasis on events in the Mid-Atlantic region, but will also discuss other market structures in the U.S. and in other countries. Specific topics covered will include cost models for power generation, transmission and distribution; rate of return regulation for electric utilities; the process of electricity restructuring and creation of electricity markets; Location Marginal Pricing of electric energy; financial risk management in electric power; and detecting and mitigating market power.

EBF 483: Introduction to Electricity Markets

Logged in as Anonymous.

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Lessons

- Lesson 1: Introduction to the Electric Power Grid
- Lesson 2: Basics of Electric Power Flow
- Lesson 3: Economics of Power Generation, Transmission and Distribution
- Lesson 4: Economic Dispatch of Power Plants
- Lesson 5: Regulation of Electric Utilities
- Lesson 6: Problems with Utility Regulation and Electricity Restructuring
- Lesson 7: California's Electricity Crisis
- Lesson 8: Day-ahead and Real-time Energy Markets
- Lesson 9: Capacity and Ancillary Services Markets
- Lesson 10: Financial Transmission Rights and Hedging
- Lesson 11: Market Power and Mitigation in Electricity Markets
- Lesson 12: Integrating Wind and Solar Power

Penn State has an undergrad-level course online that is open to the world:

<https://www.e-education.psu.edu/ebf483/>

Or, just Google “EBF 483”

Thank You!
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