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Course Syllabus – DRAFT
ver. 1.8

ISEN 404 *Resource Markets Design, Regulation, and Reform*
Winter 2020

Northwestern University

Instructors:
TBD
Christie Hicks - Environmental Defense Fund
Eric Stephens – MISO
Mark Pruitt -

Possible Guest Lecturers:
Doug Lewin - https://www.linkedin.com/in/douglewin/
Ken Colburn - https://www.linkedin.com/in/kenneth-colburn-63b79530/
Stacey Paradis - https://www.linkedin.com/in/stacey-paradis-5261946/
Sue Gander - https://www.linkedin.com/in/sue-gander-922374a/
Jane Park - https://www.linkedin.com/in/jane-s-park-14670514/
https://epic.uchicago.edu/scholars/
Eric Gimon, Michael O'Boyle or Sonia Aggarwal --Energy Innovation
Lorenzo Kristof - Electric System Market Design, LLC (formerly CAISO)
Warren Lasher, Dan Woodfin, or Paul Wattles – ERCOT
Cheryl Mele - ERCOT

Office Hours: By appointment
Class Room: TBD
Class Timing: Winter Quarter, Core, 1.0 credit

Course Synopsis: This course will explore the evolution of the natural resource markets in the United States through the lens of the regulatory and quasi-governing agencies that have shaped their structure. The course will focus electric power markets but will compare these market structures with those that govern water and other relevant systems. Students will also study current state and federal policy innovation creating or slowing current market reform.

Course Goals: This course will provide students with an understanding of federal, state, and regional policy and market stakeholders that impact the functioning of US wholesale and retail electric power markets. Students will develop a deeper understanding of the end-to-end transport of electricity, the multi-faceted value proposition of power and storage assets, and how public policy can drastically affect consumer pricing and the adoption of new technologies:

- Understand electric utility regulatory history, and its impact on market design, at both the wholesale and retail level
- Identify the role of key local, state, and federal regulators and market administrators, the interplay of their various authorities, and how various policies have increased or decreased their market relevance
- Analyze a variety of policy-based market-making tools to incentivize or dis-incentivize various forms of energy
- Compare and contrast the work of various state-level agencies to reinvent their markets design

Grading/Assessment:

Grading will be based 30% on class participation and 70% on exams and written assignments. Written assignments will include two short essays – roughly 3-5 pages (20% of total grade, 10% each), a mid-term exam (20%) and one final paper (30%). Class participation (30%) will include ownership and mastery of discussion topics.

All questions and problems regarding grades must be presented in writing within one week after the test, homework, or project has been returned. Grades will be assigned based on all the work you have completed during the semester following the traditional practice of A=90-100, B=80-89, C=70-79, D=60-69, F<60.

Course Readings:

Weekly discussions will draw on materials for the below texts, reports, and primers:

- Jeremiah Lambert, "The Power Brokers: The Struggle to Shape and Control the Electric Power Industry" (MIT Press, 2015)
- Gretchen Bakke, "The Grid: The Fraying Wires Between Americans and Our Energy Future" (Bloomsbury USA, 2017)
- Energy Innovation, "Whole Electricity Market Design for Rapid Decarbonization – A Collection of Policy Briefs" (2019)
- Stokes, Leah. Short Circuiting Policy, April 15, 2020.
- Students will expected to read key public policy laws, such as PURPA, the Clean Air and Water Acts, NEPA, etc.

Instructor may also assign a number of industry news services to discuss timely/current updates in Markets Design and Regulation that are illustrative of core course topics.

Supplemental Reading List

- Russell Gold, "Superpower: One Man's Quest to Transform American Energy" (Simon & Schuster, 2019)
- John Wasik, "The Merchant of Power: Sam Insull, Thomas Edison, and the Creation of the Modern Metropolis" (March 2006)
- Mason Willrich, "Modernizing America's Electricity Infrastructure" (MIT Press, 2017)

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CLASS OUTLINE

Week 1 (Date): From Edison to Enron: A history of the evolution of the electric power industry

Description/Topics:

- What is a US utility supposed to provide? Generation, Transmission, Distribution
- Edison and the revolution of the centralized power generation at economic scale: Pearl Station (1882)
- Insull and the birth of the modern electric grid, PUCs, and the natural monopoly model in exchange for cost-of-service regulation
- The Federal Power Act and the Public Utility Holding Company Act (1935)
- Oil Embargo and the Public Utility Regulatory Policies Act (1978) – Creation of IPPs
- Clean Water Act (1972) and the Clean Air Act (1967; additions, 1990), National Energy Policy Act (1992)
- State deregulatory policies-- SB 7 (1999) Texas; California and the Enron experience; etc. etc.

Week 2 (Date): Regulatory authorities

Description/Topics:

- Federal – FERC, EPA
- State - PUCs / EPAs
- Non-governmental - ISOs / RTOs

Week 3 (Date): The Move Towards Deregulation

Description/Topics:

- Order 888 (1996) – "open access non-discriminatory transmission services," effects on state deregulation policies
- Order 2000 (2000) – creation of RTOs
- Energy Policy Act (2005) – transfers utility regulation from SEC to FERC

Week 4 (Date): Wholesale Power Markets

Description/Topics:

- Cost-benefit analysis
- Stationary vs. mobile-source pollution
- Mechanisms to internalize environmental externalities (e.g. pigouvian taxation)
- Climate change and risk management
- Natural capital and ecosystem services
- Capacity vs. energy-only markets
- Energy imbalance markets vs. full markets (e.g. the West and California's push for a full wholesale market vs. EIM)

Week 5 (Date): Retail Power Markets

Description/Topics:

- Infrastructure investment, public good and public-private partnership
- Importance of Depreciation, amortization, and useful life; NPV, IRR, and risk
- The promise of innovation from competition
- Net metering policies in competitive retail markets

Week 6 (Date): Policy-based Market-Making

Description/Topics:

- RPS/carve-outs
- RECs
- Net Metering
- Efficiency Requirements
- Carbon pricing

Week 7 (Date): Regulatory Impact of Smart Grid

Description/Topics:

- Supply Chain – extraction, refining, distribution, storage
- Coal v. Oil v. Natural Gas markets
- Climate, carbon pricing, and stranded asset risk

Week 8 (Date): Current Case Studies in Market Reform

Description/Topics:

- CA (AB2514 Storage Mandates)
- NY (NYREV), IL (FEJA)
- HI (Electric's Grid Modernization Strategy)
- Puerto Rico
- TX (SB 1941 and PUCT project No. 48023)

Week 9 (Date): Water

Description/Topics:

- Water demand – residential vs. industrial vs. agricultural and varying pricing structures
- Water rights and priority access
- Social welfare and "basic rights"
- Privatization

Week 10 (Date): Transportation

Description/Topics:

- Fuel source – oil, ethanol and next-gen biofuels, EVs
- Fuel economy standards
- Infrastructure maintenance and taxation
- Case study: who owns charging infrastructure in competitive markets?