

Energy Academy

Session #3: Energy Business

Metropolitan Mayors Caucus |
The Power Bureau

February 15, 2023



AGENDA

HOUSEKEEPING

- Course-related items

RESOURCES

- Readings
- Website of the Week

LECTURE

- The Early Utilities
- Retail Energy Markets & Operations

DISCUSSION

- Open



HOUSEKEEPING

HOUSEKEEPING

Announcements from MMC

Cheryl and Edith

Post Course Project

We have some time allocated after the courses are completed to work on community plans or projects. It might be a good idea to start thinking about a project topics that could be applicable to multiple communities (i.e., solar + storage for municipal buildings, energy efficiency programming, renewable energy purchasing, etc.)

Recommendations

As always, please feel free to share any ideas and recommendations for improvements to the course and its content!



RESOURCES

RESOURCES

Weekly Readings

Long Term Renewable Resources Procurement Plan (LTRRPP)

Link: [Long Term Renewable Resources Procurement Plan](#)

Source: Illinois Power Agency

Description: Statewide plan for utility procurement of renewable energy credits (RECs) from behind-the-meter, community-scale, and utility-scale renewable energy resources.

ComEd Distribution Rate Case

Link: [ICC Docket 23-0055](#)

Source: Illinois Commerce Commission

Description: Current ICC docket regarding ComEd's requested distribution rate increases for the next four years.

Green Power Partnership

Link: [Green Power Partnership Program](#)

Source: US Environmental Protection Agency

Description: Program to recognize

WEBSITE OF THE WEEK: [STATE AND LOCAL PLANNING FOR ENERGY \(SLOPE\)](#)

Energy cost, consumption and data modeling provided by the National Renewable Energy Laboratory

Aggregate Electricity & Natural Gas Consumption by City



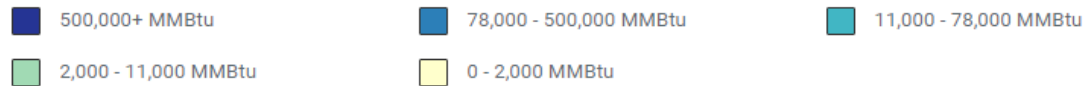
Map & Graph Resolution: City

State: Illinois

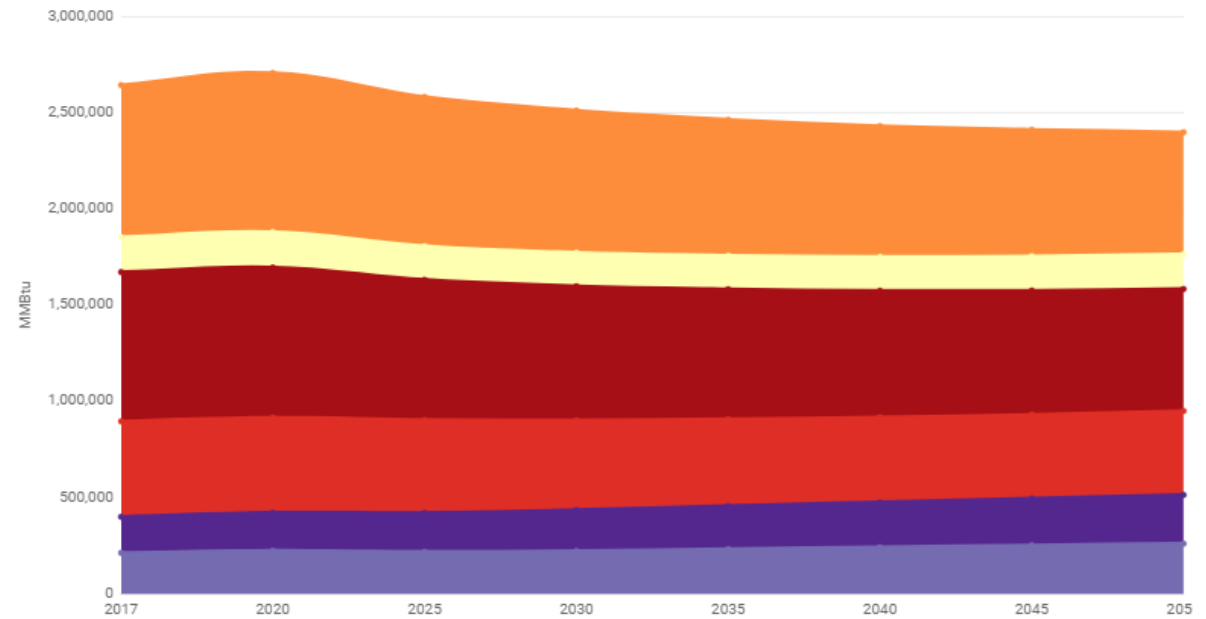
City: Deerfield

Map Legend

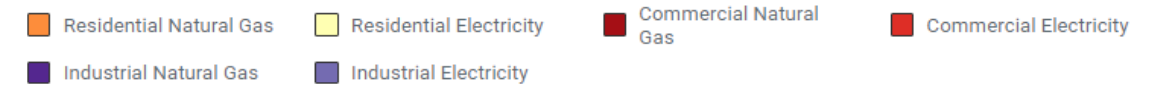
(MMBtu)



Projected Energy Consumption by City, Business as Usual Case - Deerfield



Data Filters



WEBSITE OF THE WEEK: [STATE AND LOCAL PLANNING FOR ENERGY \(SLOPE\)](#)

Energy cost, consumption and data modeling provided by the National Renewable Energy Laboratory

Aggregate Electricity & Natural Gas Dollars Spent by City



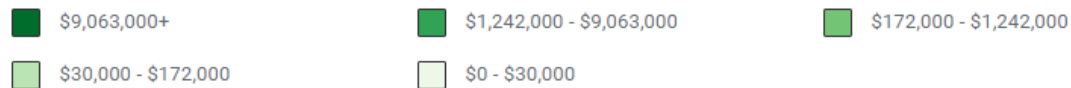
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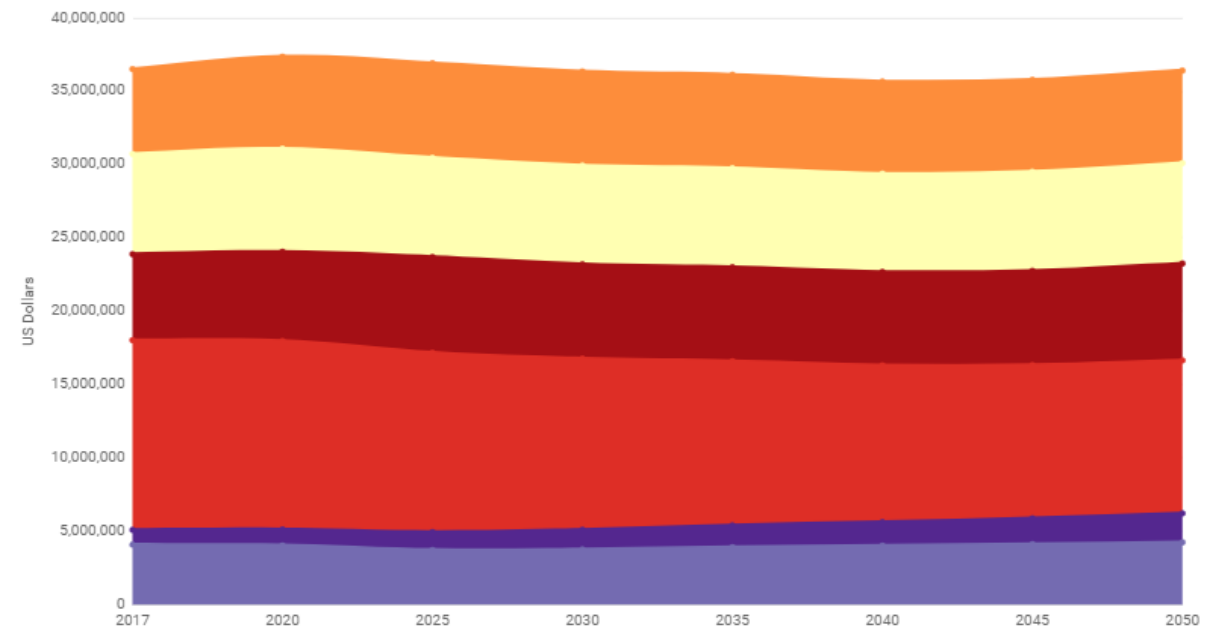
City: Deerfield

Map Legend

(US Dollars)



Projected Energy Expenditures by City, Business as Usual Case - Deerfield



Data Filters





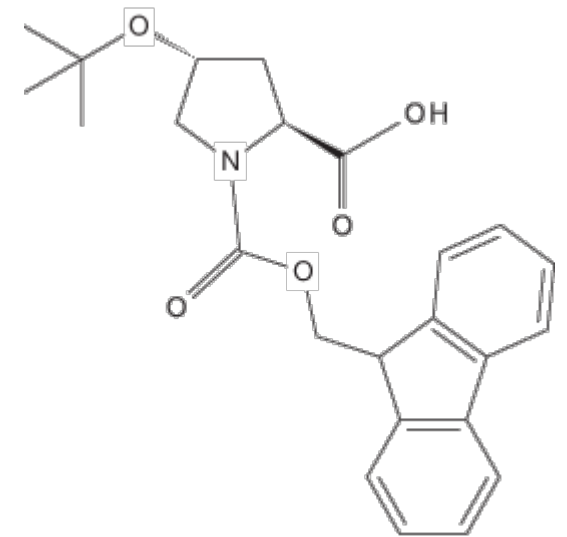
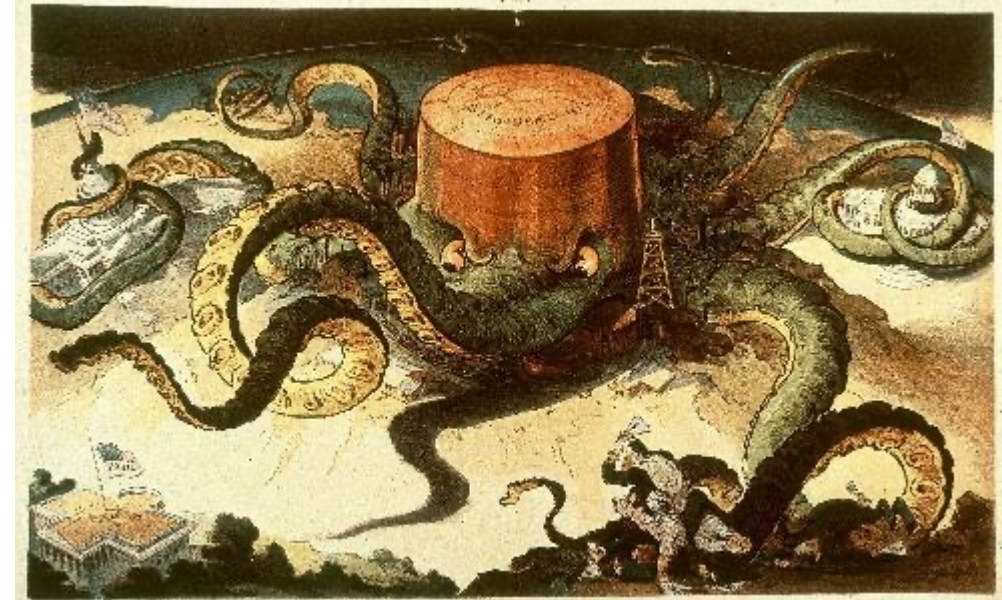
LECTURE

The electricity story begins with demand for artificial light, Rockefeller, and Kerosene

THE ENERGY BUSINESS

EARLY DAYS

- In the beginning...
- Technology: Edison, Tesla, Westinghouse
- The first electric services
- Scale & Growth



Electricity was a better alternative to kerosene for lighting (safer, better, cheaper)

THE ENERGY BUSINESS

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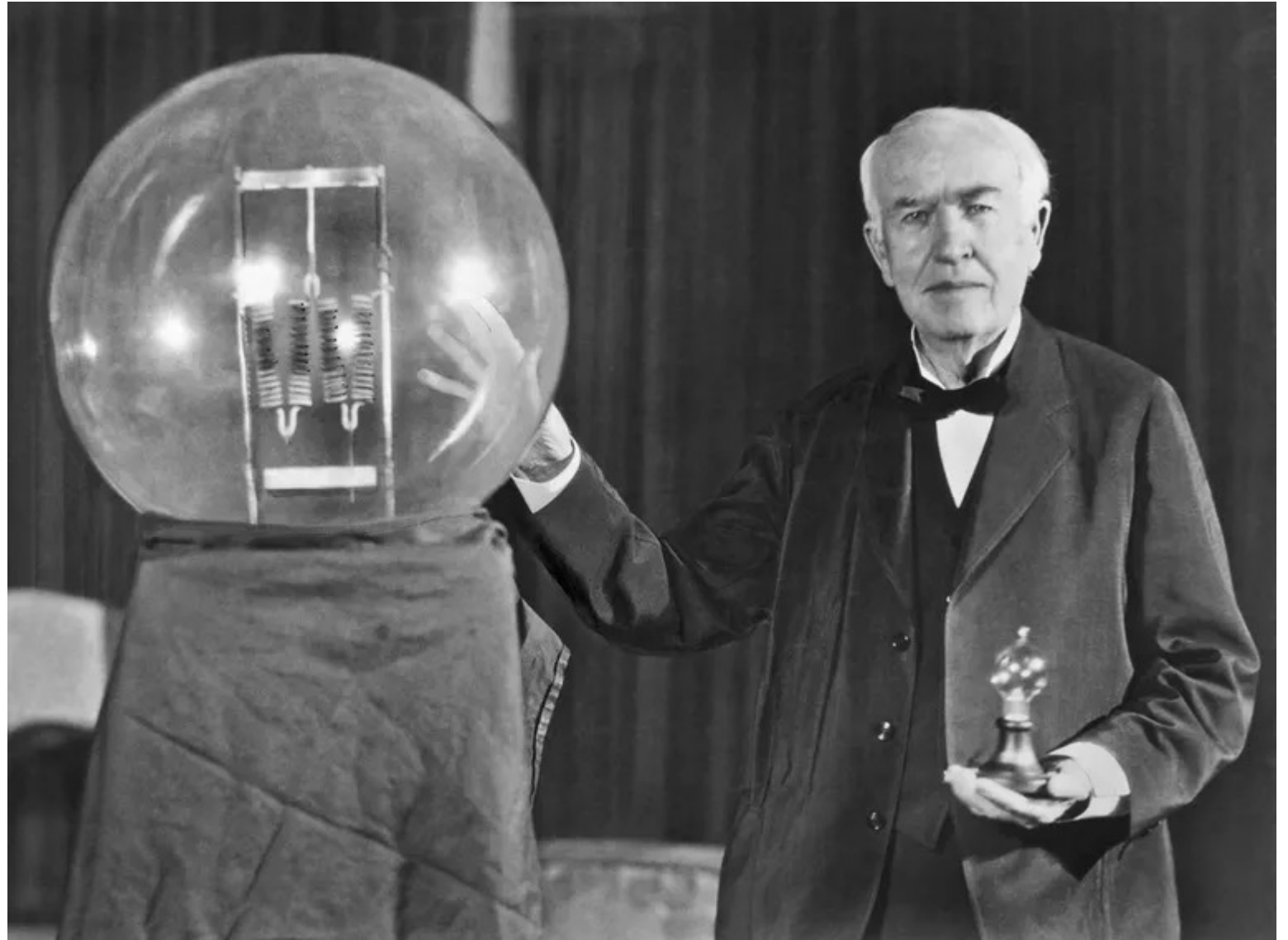


Image Credit: Underwood Archives / Getty Images

Electricity scaled quickly and became an option for more consumers

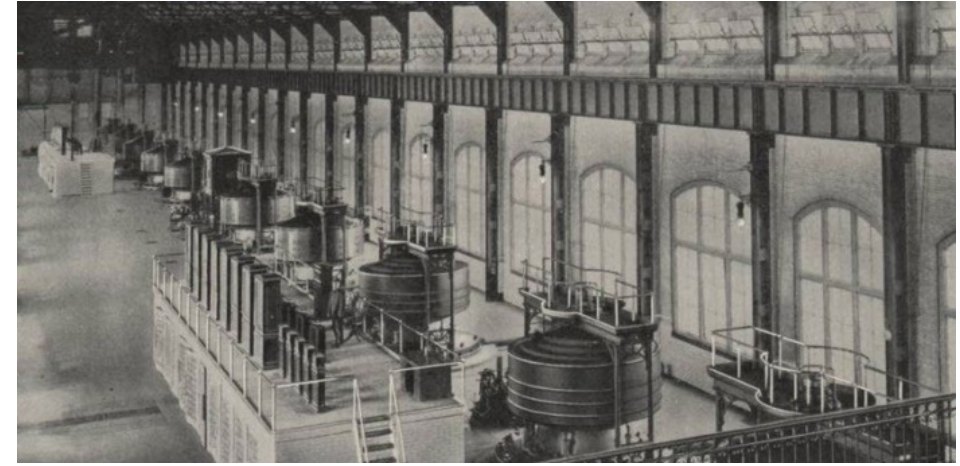
THE ENERGY BUSINESS

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Edison's Sault Sainte Marie Plant



Edward Dean Adams Power Plant, Niagara Falls



Nikola Tesla



George Westinghouse

THE ENERGY BUSINESS

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The first electric service in the US were really selling lighting – not electricity

California Electric Company (1879)

The California Electric Company (now PG&E) in San Francisco used two direct current generators from Charles Brush's company to supply multiple customers with power for their arc lamps. This San Francisco system was the first case of a utility selling electricity from a central plant to multiple customers via transmission lines. CEC soon opened a second plant with 4 additional generators. Service charges for light from sundown to midnight was \$10 per lamp per week.

Grand Rapids Electric Light & Power Company (1880)

Grand Rapids Electric Light & Power Company (now Consumers Energy) began operation of the world's first commercial central station hydroelectric power plant with the Wolverine Chair and Furniture Company's water turbine. It operated a 16-light Brush electric dynamo lighting several storefronts in Grand Rapids, Michigan.

Others

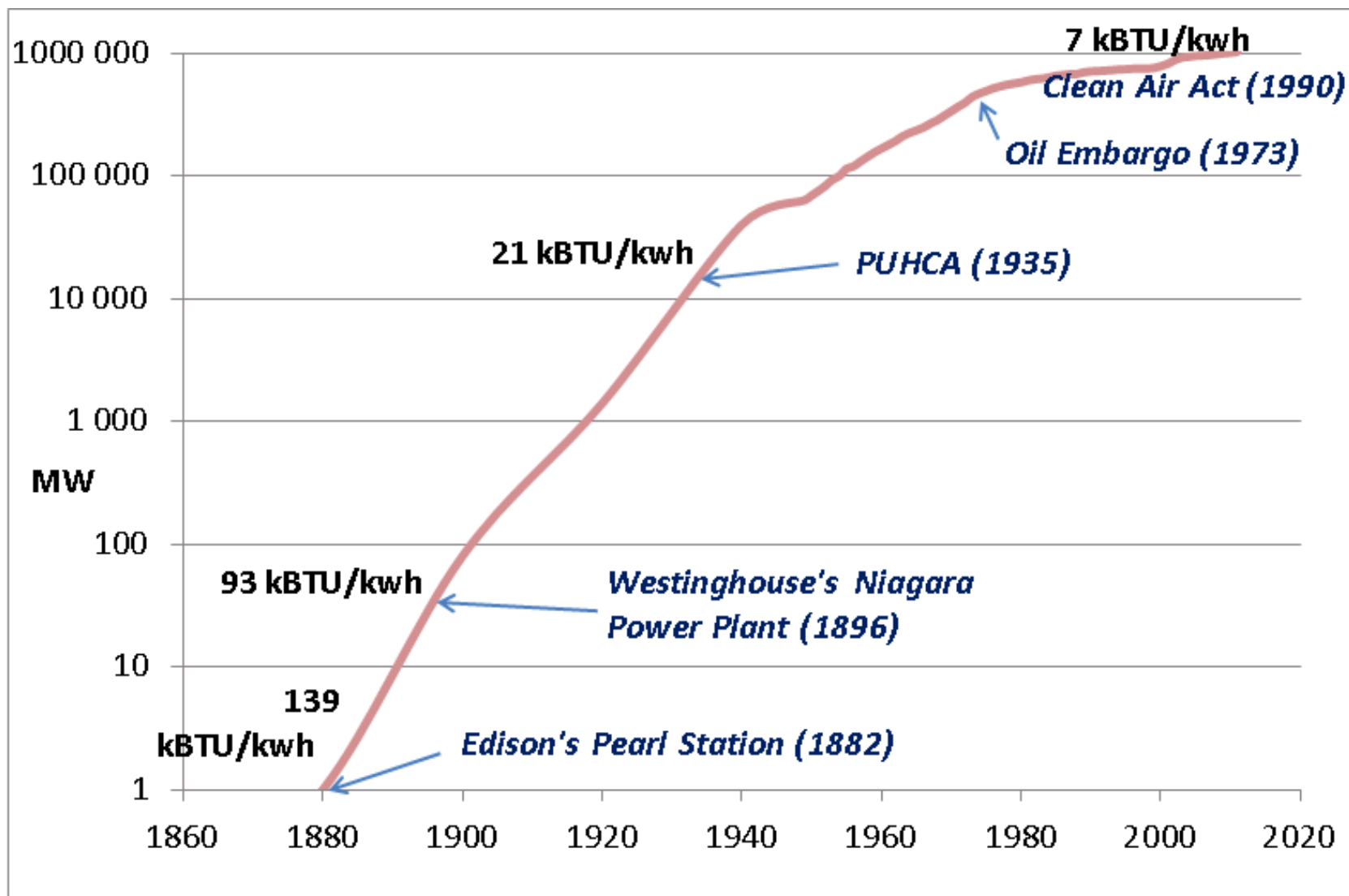
By the end of 1881, New York, Boston, Philadelphia, Baltimore, Montreal, Buffalo, San Francisco, Cleveland and other cities had Brush arc lamp systems for public streets. By 1893 there were 1500 arc lamps illuminating the streets of New York City.

Electricity scaled quickly and became an option for more consumers

THE ENERGY BUSINESS

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Very localized grids: 400 customers served by Edison General Electric Company (Pearl Street Station) in 1882

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PUBLIC & PRIVATE SECTOR POWER

- Early days
- Market realities
- Investor-Owned Power
- Public Sector Power
 - Municipal Utilities
 - Electric Cooperatives
 - Federal Power Marketing Entities

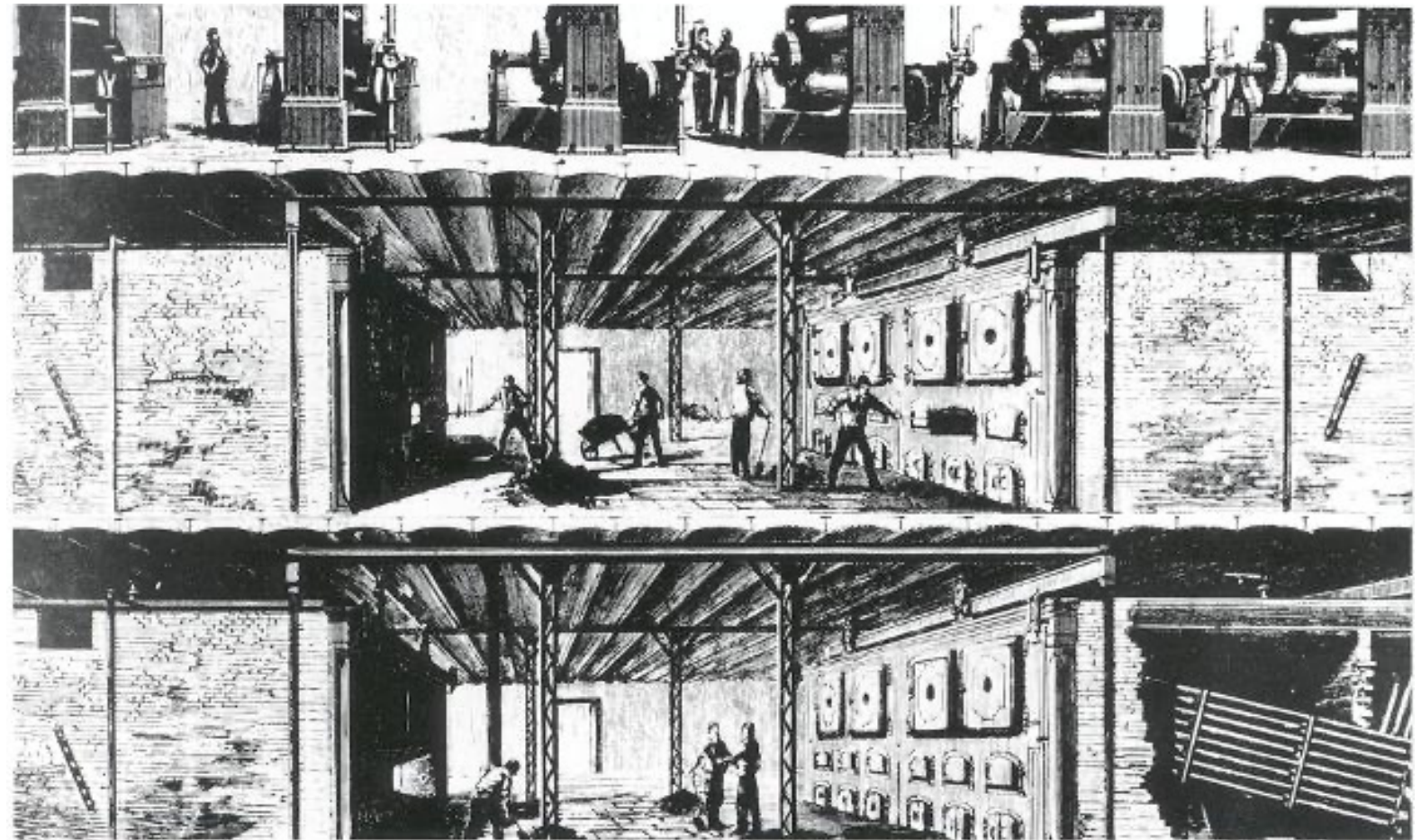


Utility infrastructure required massive capital investment. Pearl Street Station cost \$300,000 in 1882, equivalent to \$102,000,000 today

THE ENERGY BUSINESS

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Market Realities: The economics of building new generation and distribution caused uneven and sometime overlapping and abutting electricity utility territories in the US

Counties served by U.S. utilities, by type of ownership (2017)



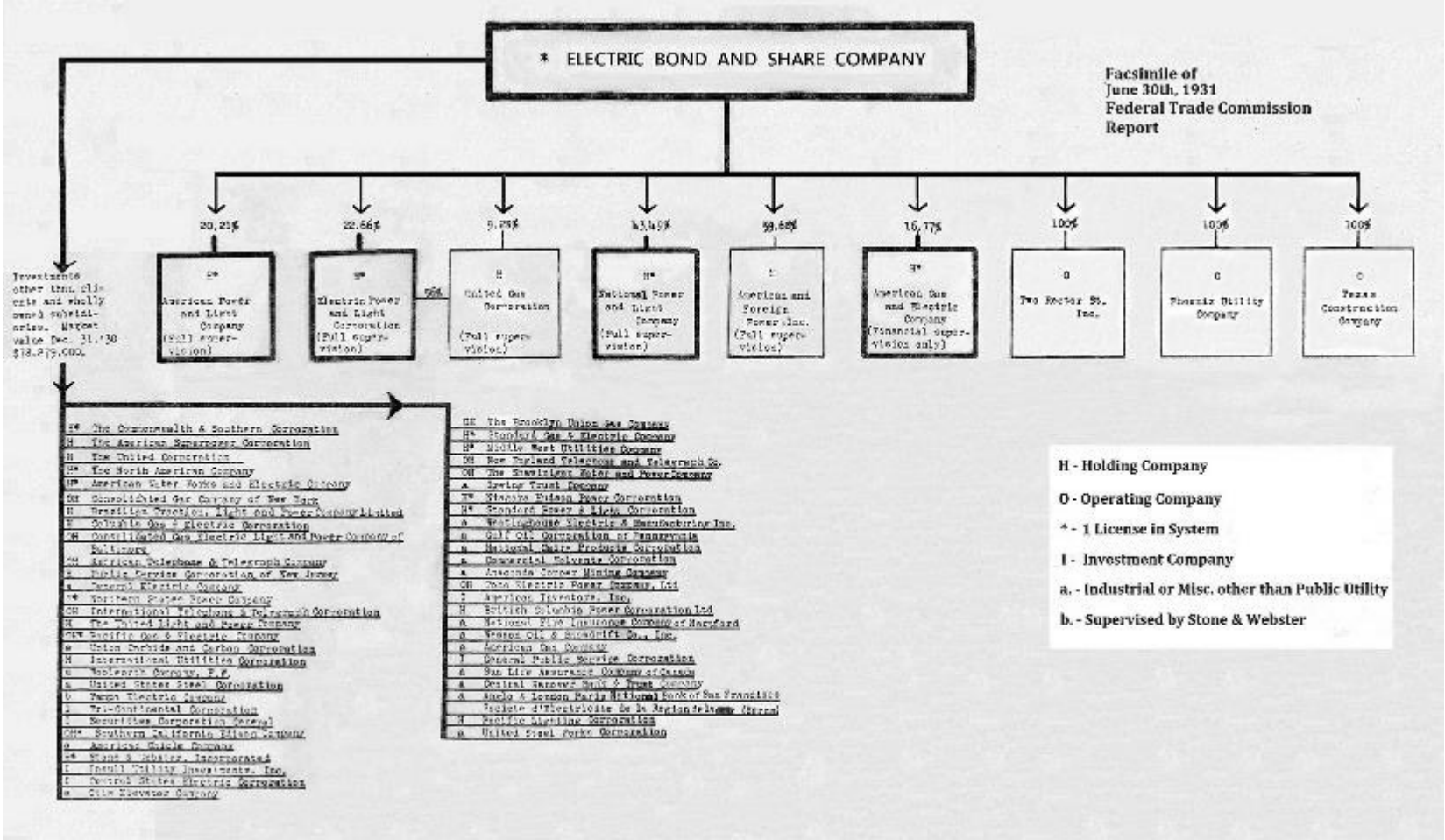
Image Credit: [Energy Information Administration](https://www.eia.gov)

Private capital was raised on the strength of demand for electric service

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THE ENERGY BUSINESS

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 - **Municipal Utilities**
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Municipalities developed electric generation and delivery services to meet local economic development, safety and convenience

- Used public funding to establish power plants and distribution systems
- Governed by elected officials
- Eventually connected to surrounding distribution systems to enhance reliability and flexibility
- Some have sold their systems to investor-owned utilities
- Tend to organize themselves through statewide associations to share resources and enhance purchasing power



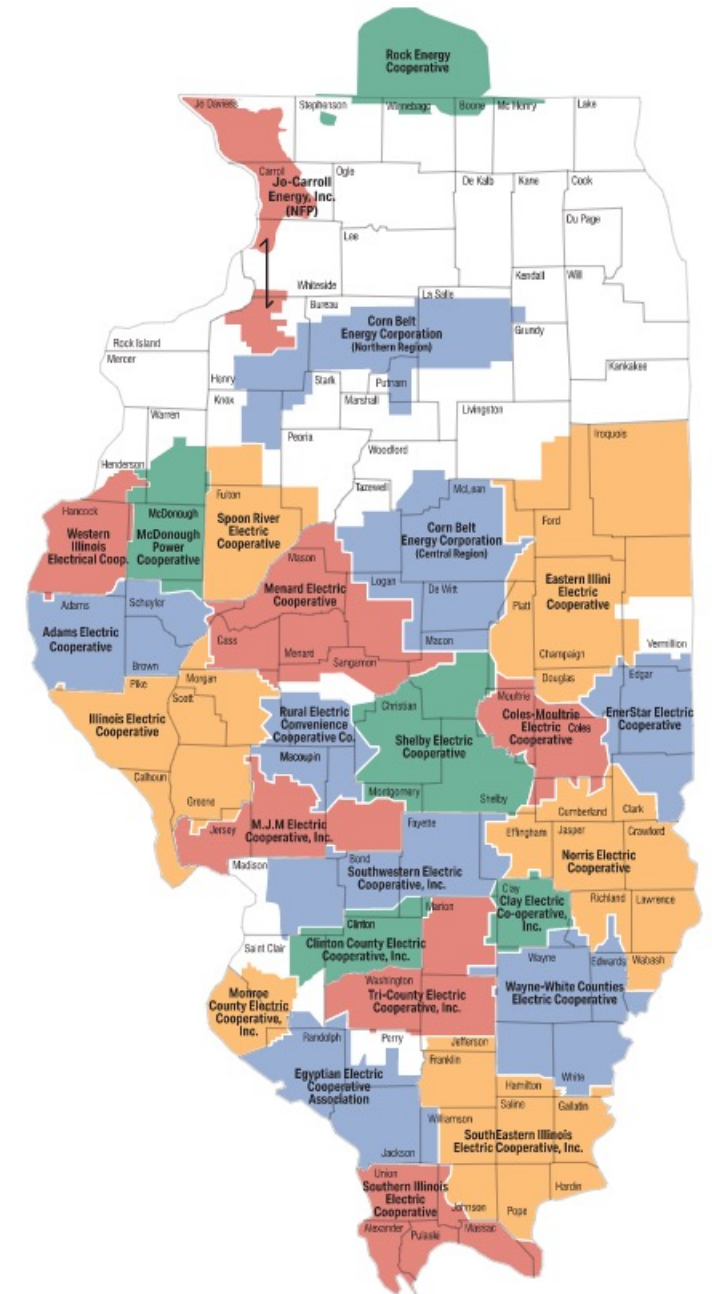
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PUBLIC & PRIVATE SECTOR POWER

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New Deal era legislation provided financial support to allow the development of member-owned electric cooperatives in rural regions of the US

- Member-owned, non-profits
- Governed by elected boards who are also members
- Very focused on economic development of rural communities
- Eventually connected to surrounding distribution systems to enhance reliability and flexibility
- Tend to organize themselves regional associations to share resources and enhance purchasing power

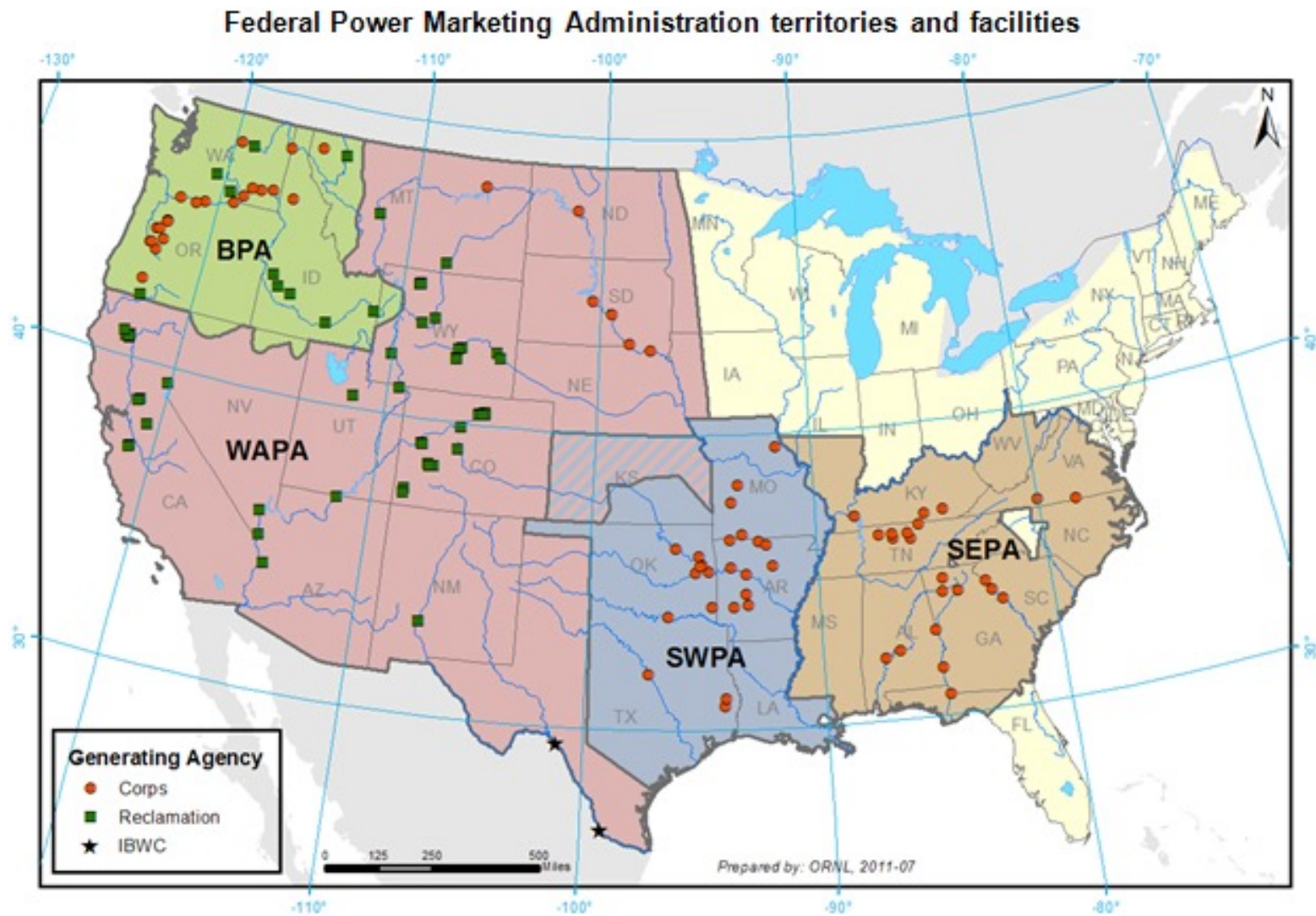


Federally-funded power generation projects sell power to investor-owned and public sector power entities

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PUBLIC & PRIVATE SECTOR POWER

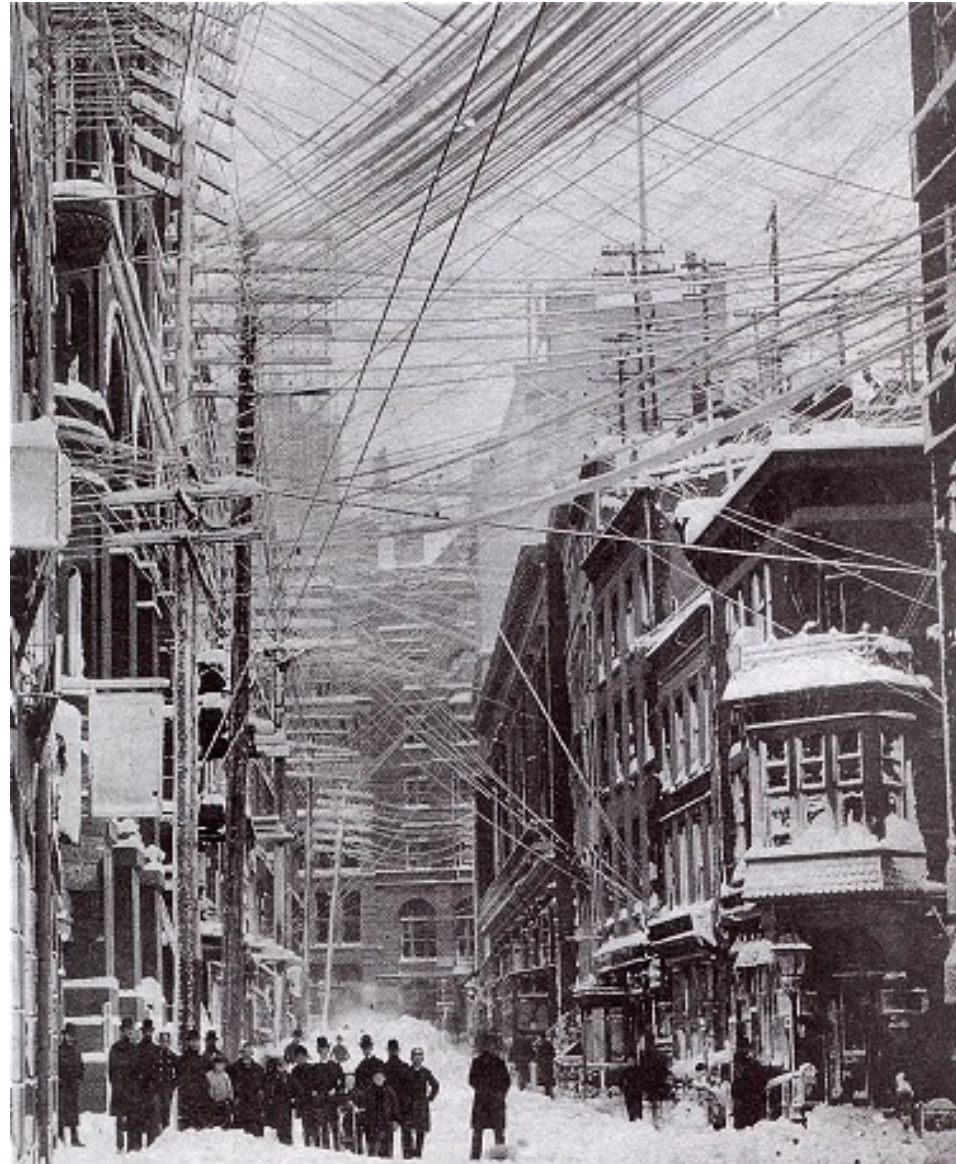
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THE ENERGY BUSINESS

THE INVESTOR-OWNED UTILITY MODEL

- **Raw Competition**
- The Natural Monopoly
- The Regulatory Compact
- Utility Regulation
- Rate of Return Ratemaking



THE ENERGY BUSINESS

THE INVESTOR-OWNED UTILITY MODEL

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- **The Natural Monopoly**
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Sam Insull (owner of Commonwealth Edison) promoted the concept of the “Natural Monopoly” within the power sector

- Competing utilities was wasteful and imposed high costs on consumers
- Believed that economies of scale benefitted companies and consumers

Also proposed that rates could be determined better by regulators who acted "scientifically" and who had exceptional "social consciences."

- By 1913, 27 states had regulating commissions
- ...and Insull had his monopoly in Illinois



Stateline Power Plant (Hammond, Indiana) connected to the local ComEd distribution system

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The Regulatory Compact: Investor-Owned utilities are granted a monopoly to provide consumers with electricity services. In return, the public (through the Public Utility Commission) has oversight of utility operations and must approve the rates the utility charges.

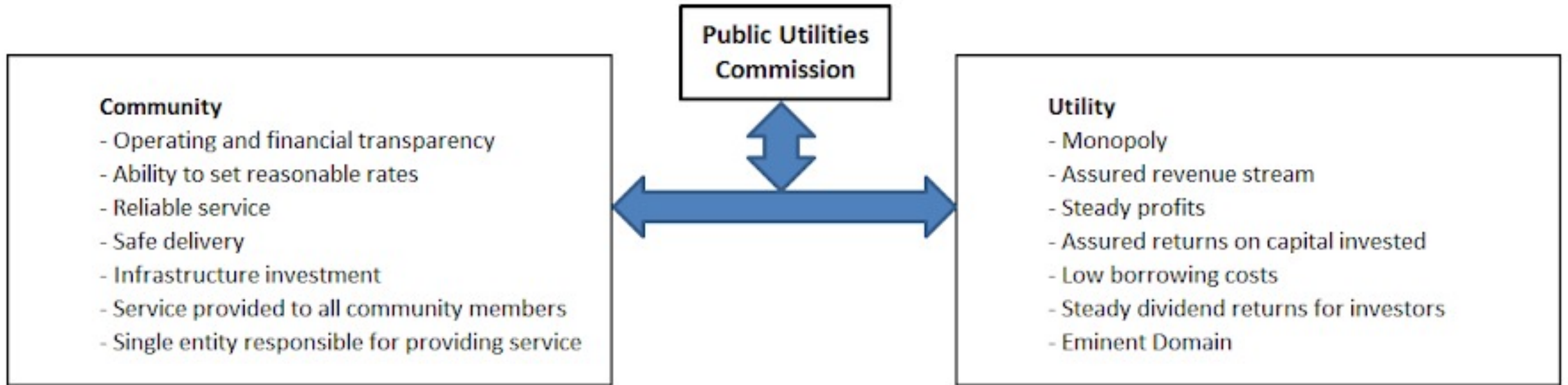


Image Credit: [Energy Information Administration](#)

Utility regulation occurs at the state level; the utility regulator in Illinois is the Illinois Commerce Commission (ICC)

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Illinois Commerce Commission

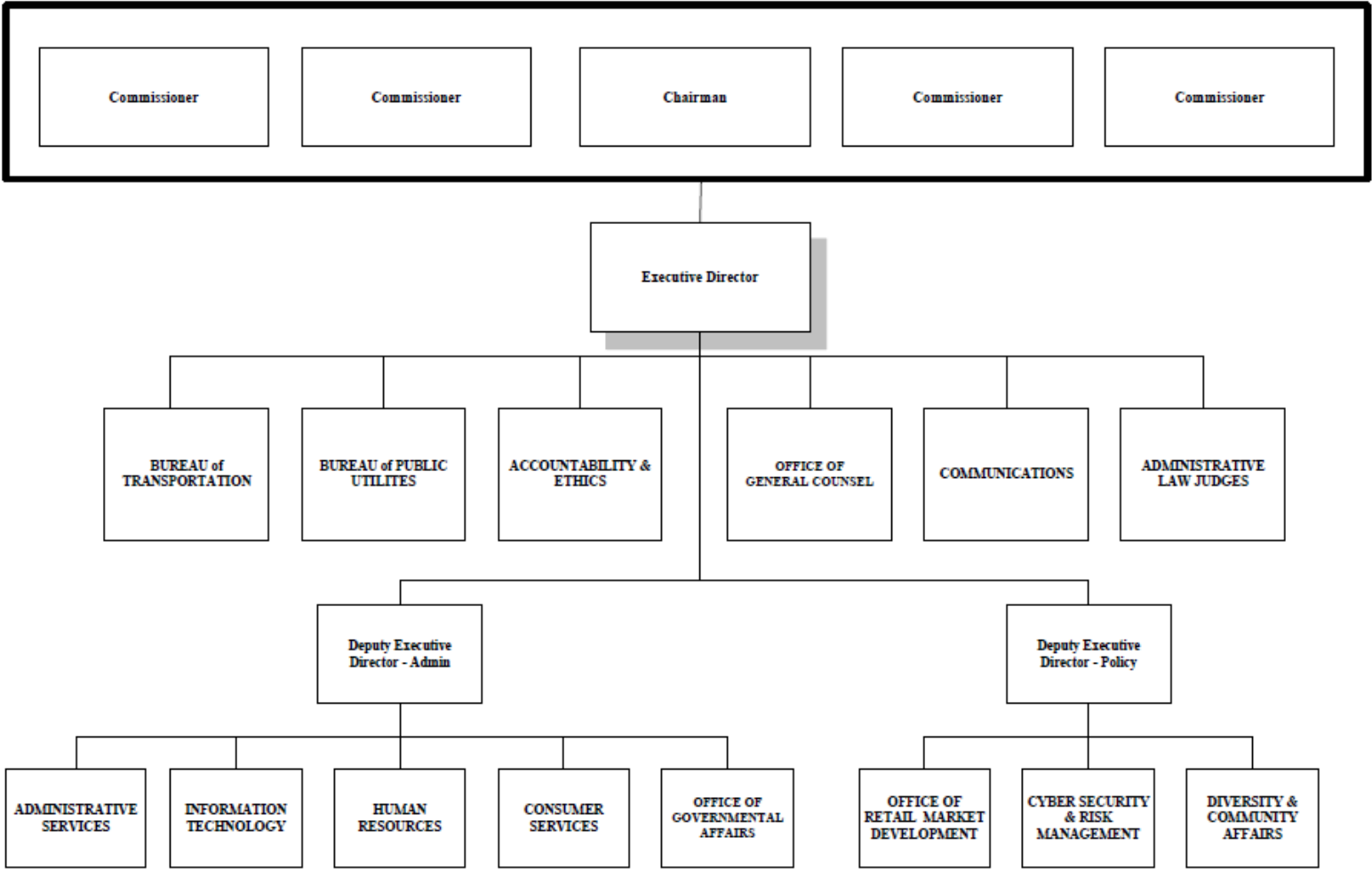


Image Credit: [Illinois Commerce Commission](https://www.icc.gov)

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Utility Regulation: Utility regulators approve utility rates through rate cases. The ComEd rate case is now underway and proposes to set delivery rates for the next four years.

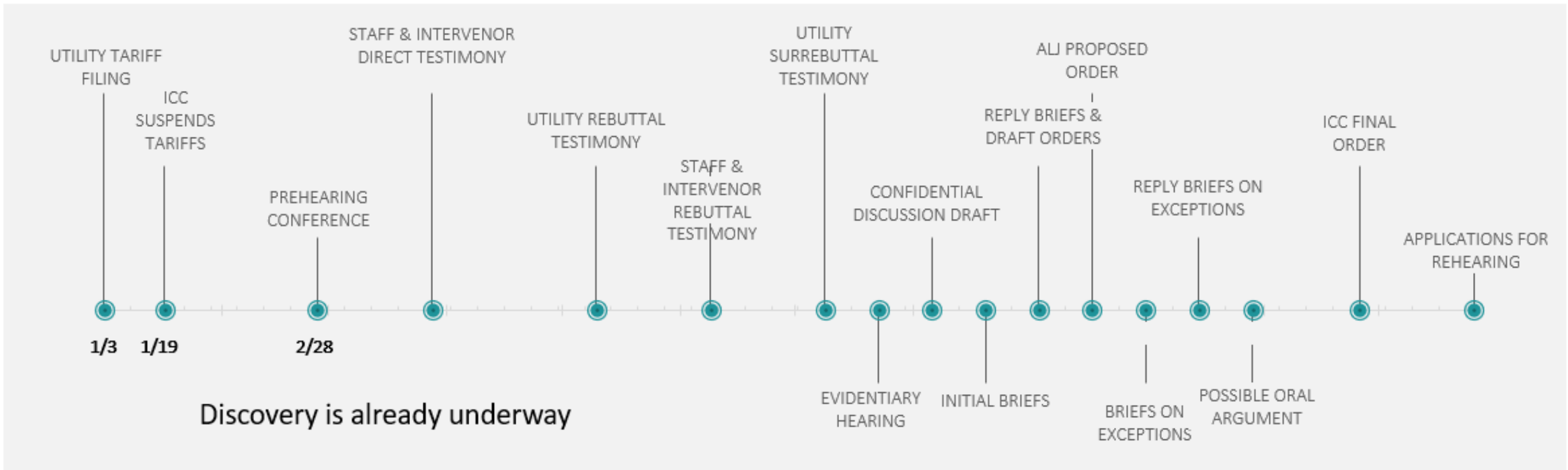


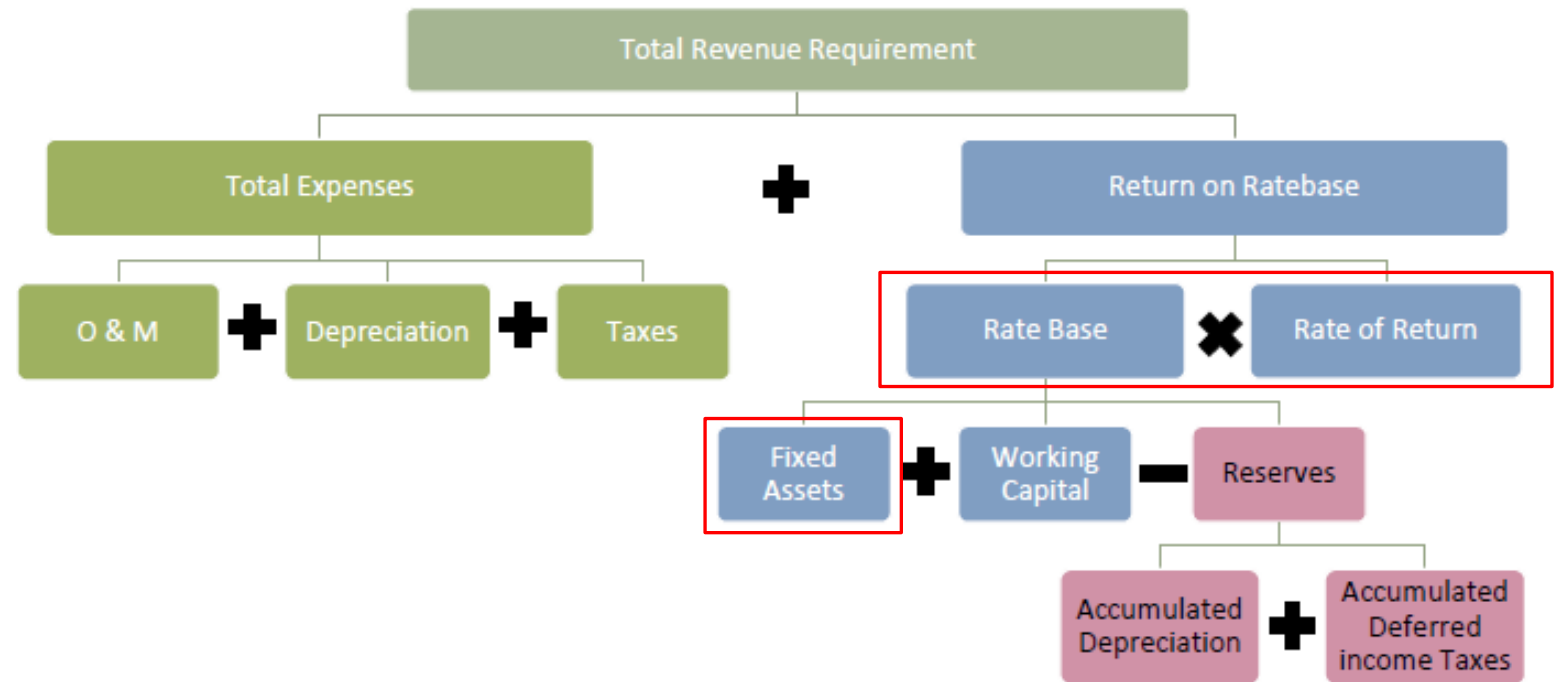
Image Credit: [Energy Information Administration](#)

Rate of Return Ratemaking compensates utilities for operating expenses (pass-through basis and capital expenses (return of and return on ratebase)

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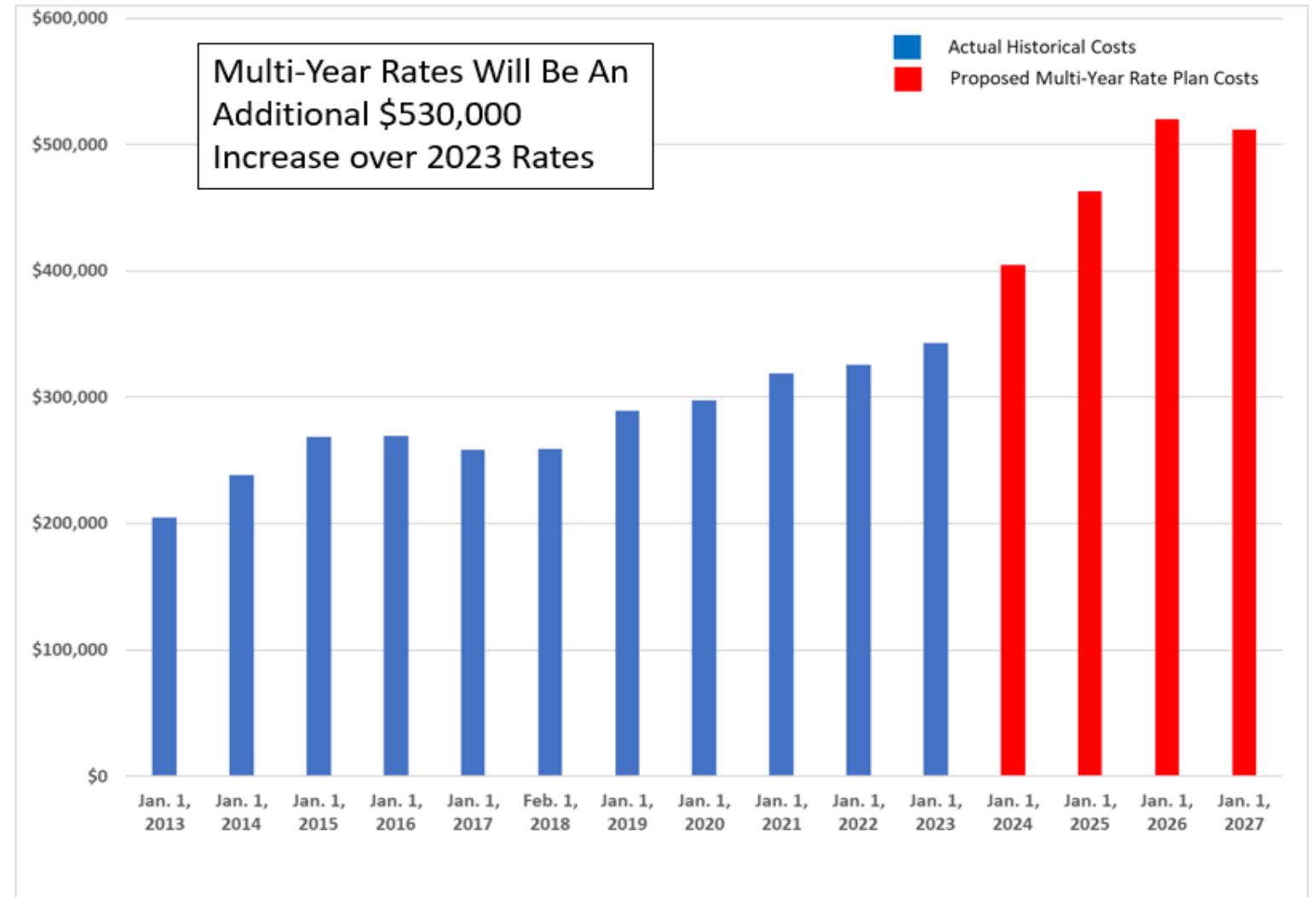
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THE INVESTOR-OWNED UTILITY MODEL

- Raw Competition
- The Natural Monopoly
- The Regulatory Compact
- Utility Regulation
- Rate of Return Ratemaking
 - Residential: 27.2%
 - Small: 52.3%
 - Medium C&I: 56.0%
 - Large C&I: 53.5%
 - Very Large C&I: 48.5%
 - Extra Large C&I: 43.5%
 - High Voltage: 52.2%
 - Railroad: 49.6%

Rate of Return Ratemaking provides a guaranteed rate of return to utilities and incentivizes utilities to expend capital (ratebase)

ComEd Annual Distribution Costs for Typical 4,000 kW Size Customer





DISCUSSION

DISCUSSION AND QUESTIONS

Open to the class

THANK YOU

Mark Pruitt

Principal | The Power Bureau

markjpruitt@thepowerbureau.com

C: (219) 921-3828