Buchanan Ingersoll & Rooney PC

Is It Time to Cash in Your CHPs?
Increasing Energy Reliability and Savings

Brattle

Agenda

- Meet our Energy Team
- What is a Combined Heat and Power (CHP- pronounced “Chip”) Facility?
- Why are CHP Facilities Important for Energy Users?
- Is a CHP Facility Right for Your Organization?

Our Energy Team

Buchanan Ingersoll · Rooney

John Povilaitis

Alan Seltzer

We are energy and utility lawyers specializing in regulatory and transactional public utility and energy law.
We help power plant owners, operators, developers and energy users develop CHP facilities.

Our Energy Team

Brattle

Frank Graves

Metin Celebi

We help energy and utility market participants worldwide anticipate and navigate the challenges and opportunities in changing markets and regulatory environments. We support a wide range of clients, including investor-owned utilities, public utilities, electricity and pipeline customers, power generators, transmission organizations and regulatory agencies.

What is a CHP?

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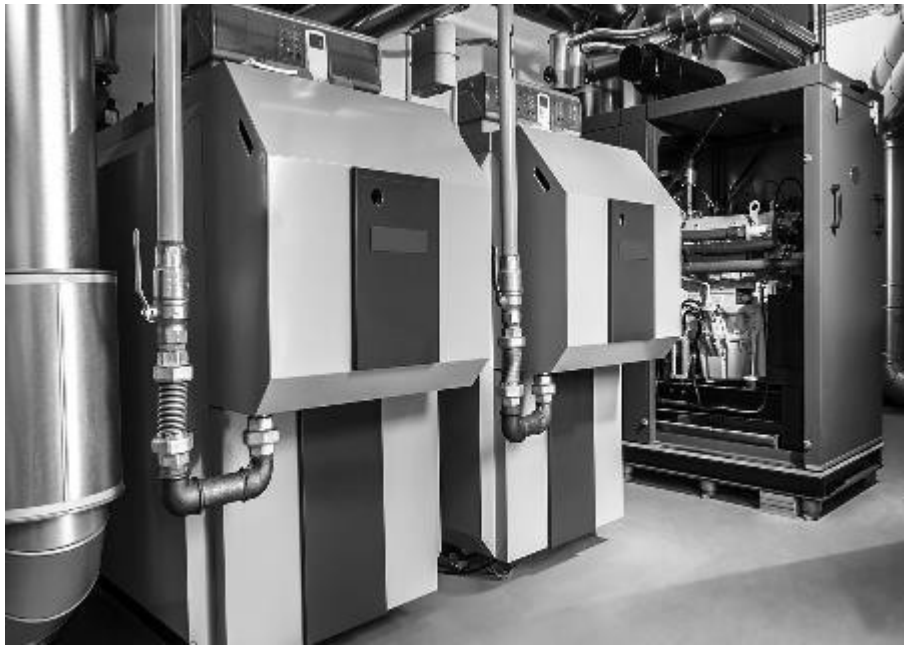
CHP Systems allow businesses to generate their own electricity without relying solely on the grid or backup generators

CHP

- "CHP" stands for "Combined Heat and Power"
- Also known as "cogeneration"
  - The concurrent production of electricity or mechanical power and useful thermal energy (for heating and/or cooling) from a single source of energy
  - A suite of technologies that can use a variety of fuels to generate electricity or power at the point of use, allowing the heat that would normally be lost in the power generation process to be recovered to provide needed heating and/or cooling

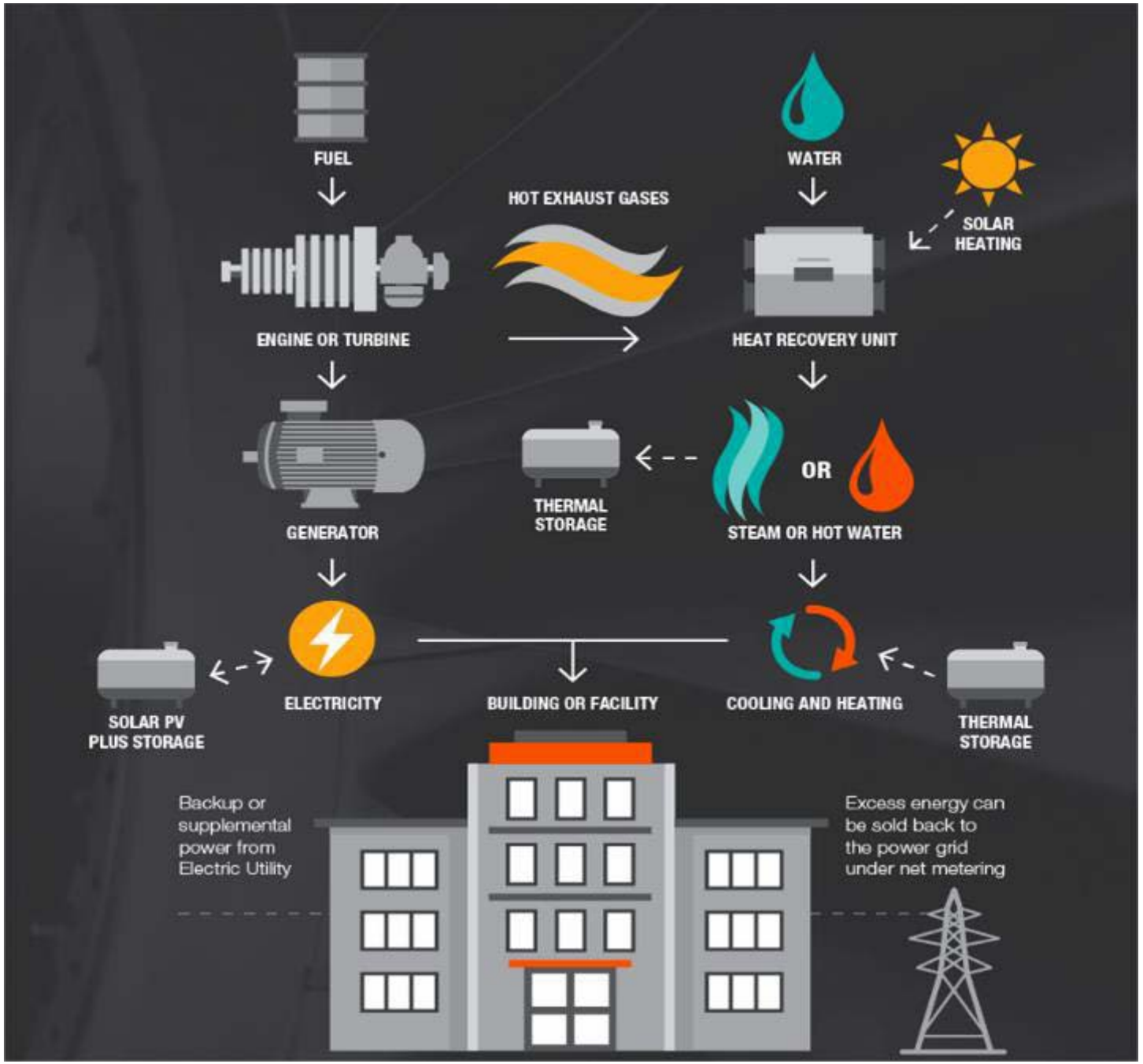
Why CHPs, Why Now?

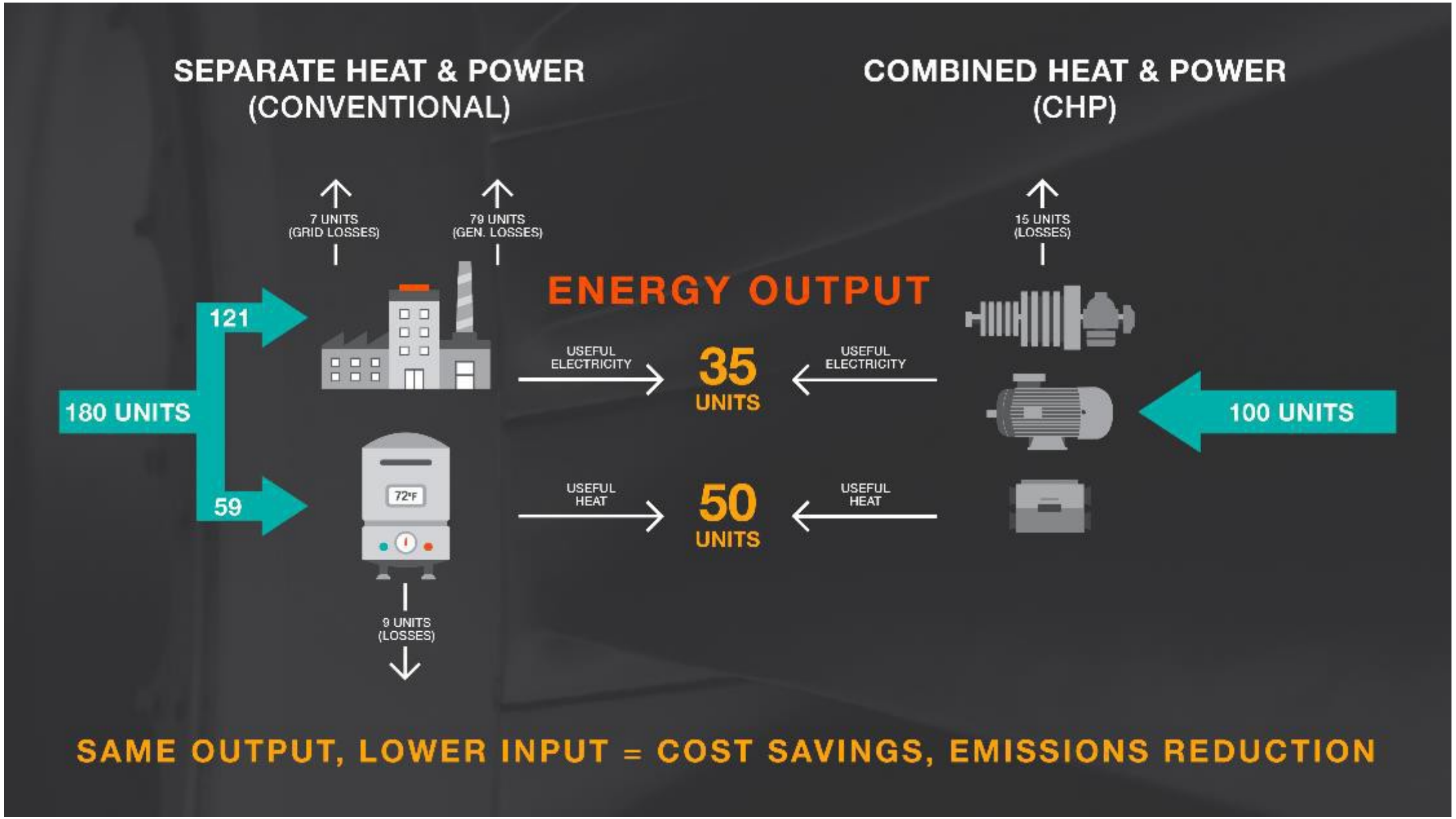
- Around since 1980, but spiking in popularity now
  - History of success in industrial, commercial applications
  - Long-term availability of reasonably priced fuel, especially natural gas
  - New approaches to evaluate, design and build on premises
  - Now a feasible option for smaller facilities



How it Works

How it Works


FUEL
WATER
HOT EXHAUST GASES
SOLAR HEATING
ENGINE OR TURBINE
HEAT RECOVERY UNIT
GENERATOR
THERMAL STORAGE
OR
STEAM OR HOT WATER
ELECTRICITY
BUILDING OR FACILITY
COOLING AND HEATING
SOLAR PV PLUS STORAGE
THERMAL STORAGE
Backup or supplemental power from Electric Utility
Excess energy can be sold back to the power grid under net metering



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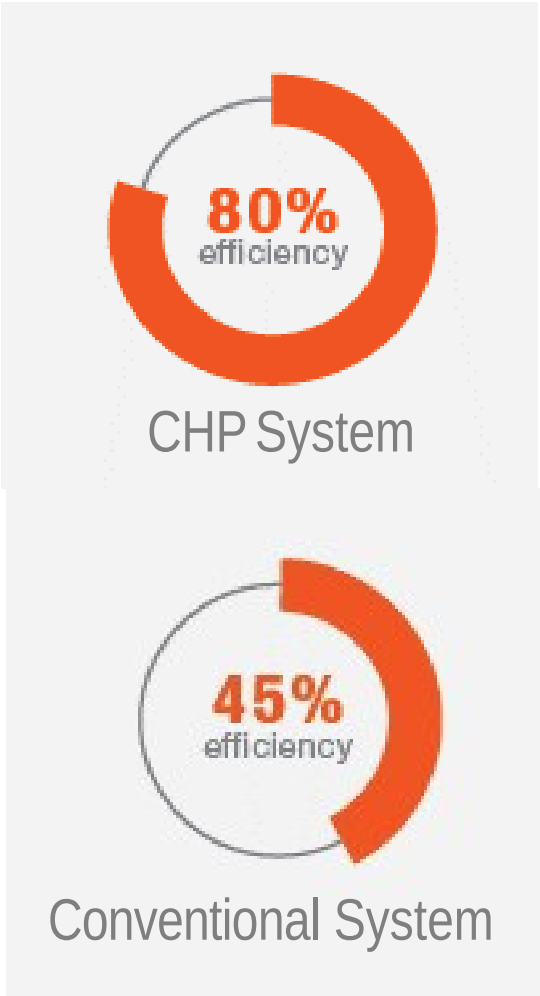
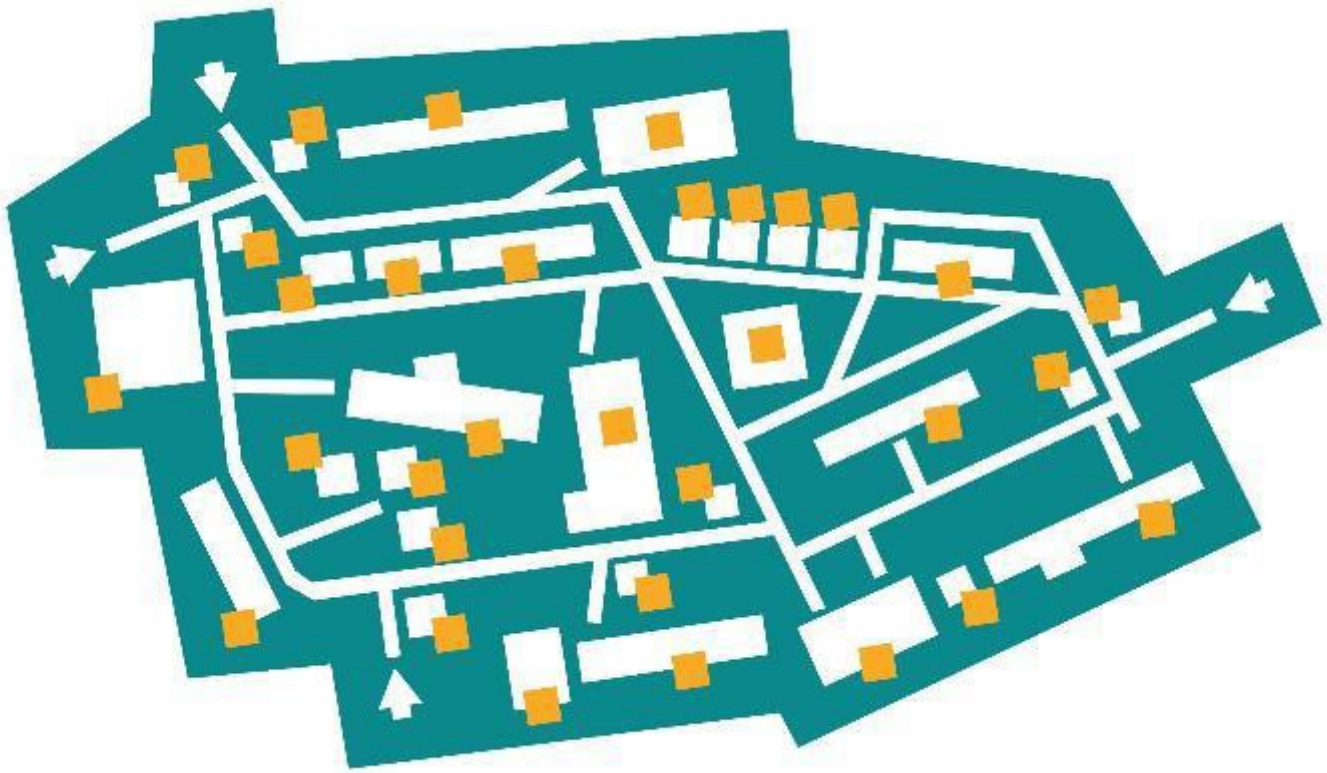
The Benefits

- More reliable supply of electricity
- Better efficiency
- Lower, more predictable electricity costs
- Reduced carbon footprint
- Modernized infrastructure
- Potential to save companies millions of dollars in energy costs



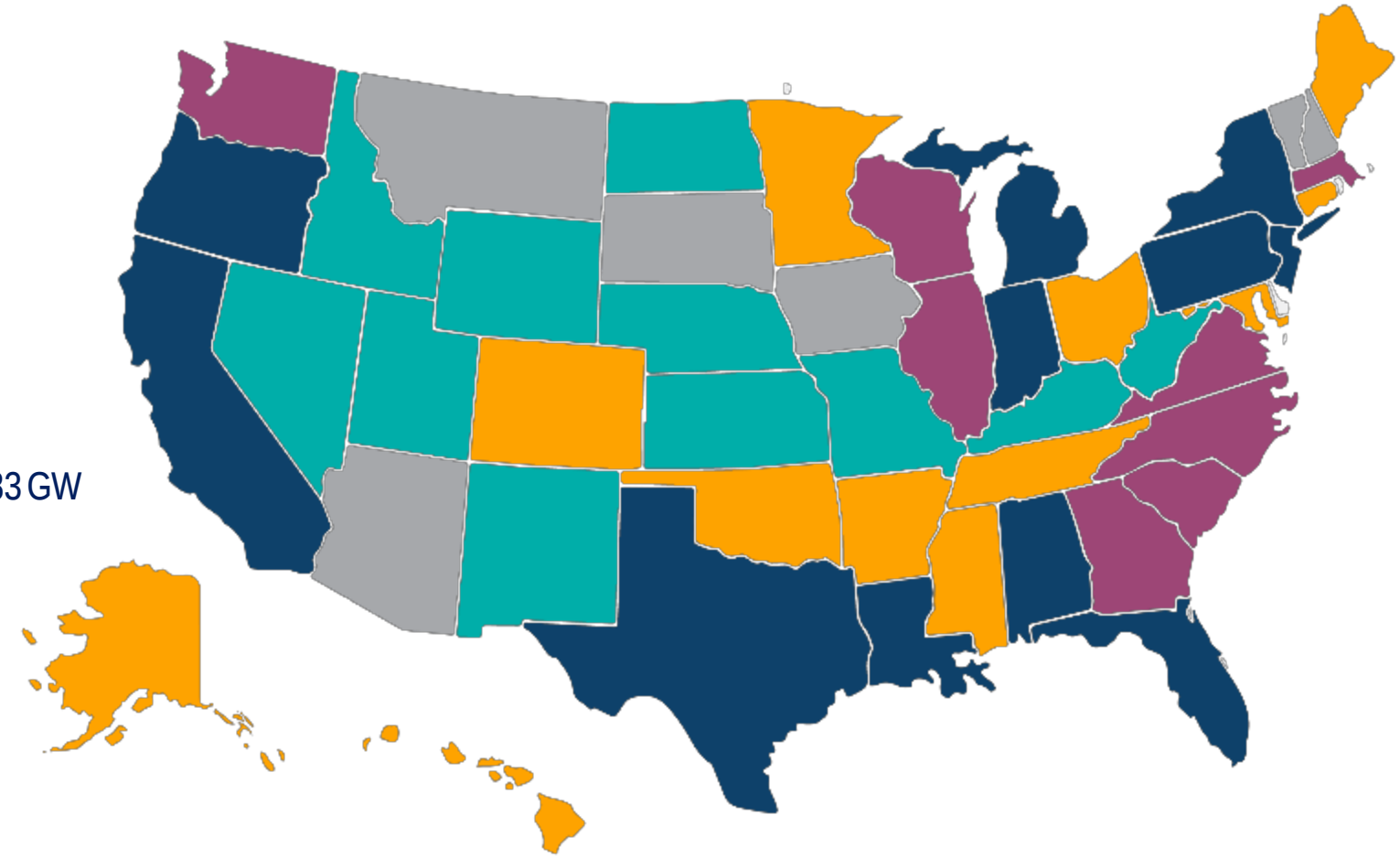
Who Can Benefit?

- Hospitals
- Acute care facilities
- Medical complexes
- Senior living facilities
- Universities
- Manufacturing
- Commercial buildings



CHP Adoption: Current

Existing CHP Capacity = 83 GW
55% Growth from 2000



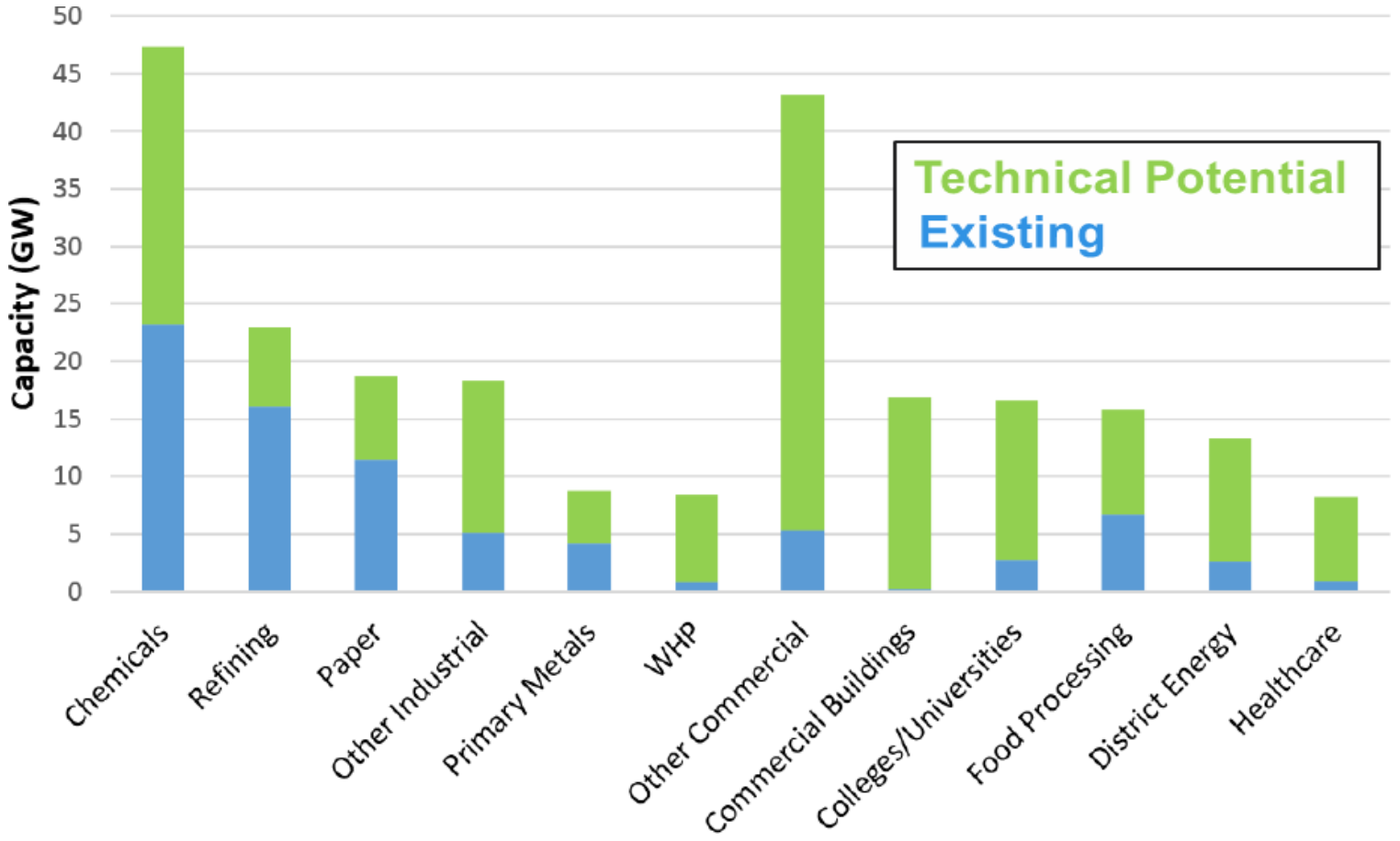
- <100 MW
- 100-399 MW
- 400-999 MW
- 1,000-1,999 MW
- >2,000 MW

Source: U.S. Department of Energy (DOE), Combined Heat and Power Technical Potential in the United States, March 2016, available at:https://energy.gov/chp-potential

CHP Adoption: Potential

Technical Potential >240 GW

Existing CHP Capacity = 83 GW



Source: U.S. Department of Energy (DOE), Combined Heat and Power Technical Potential in the United States, March 2016, available at:https://energy.gov/chp-potential

CHP Potential for Commercial Customers

Commercial Building	Number of Sites	Total Capacity (MW)	Average Capacity (kW per Site)
Office Buildings	89,996	16,749	186
Colleges/Universities	5,385	13,932	2,587
Hospitals	6,240	7,312	1,172
Schools	18,073	6,854	379
Gov't Buildings	9,760	4,460	457
Hotels	14,903	4,275	287
Multifamily Buildings	19,047	4,265	224
Military	854	3,393	3,973
Other	76,103	14,690	193
TOTAL	240,361	75,930	316

40%

Source: U.S. Department of Energy (DOE), Combined Heat and Power Technical Potential in the United States, March 2016, available at:https://energy.gov/chp-potential

Is CHP Right For Your Organization?

1. Concerned about electric reliability & resiliency?

- CHPs are protection from short-term and more lengthy grid outages, voltage fluctuations and frequency fluctuations
- Be the first micro-grid on your block!

2. Concerned about the cost of electricity?

- Efficient CHPs offer operating cost savings relative to cost of steam from older boilers and cost of power from electric utilities
- With net metering, CHPs can avoid/reduce utility demand charges
- Can also be used to sell excess generation back to the utility

Net Metering Benefits

- Allows a utility customer to self-generate electricity to
  1. Offset the annual electricity consumption it would otherwise pay for
  2. Sell any excess annual generation to the utility
- Offers potential cost savings from replacing utility charges (transmission + distribution + supply) with CHP operating costs (gas + O&M)
- Some savings could be partially offset with utility's non-bypassable charges for net metering customers, such as backup and supplemental demand charges

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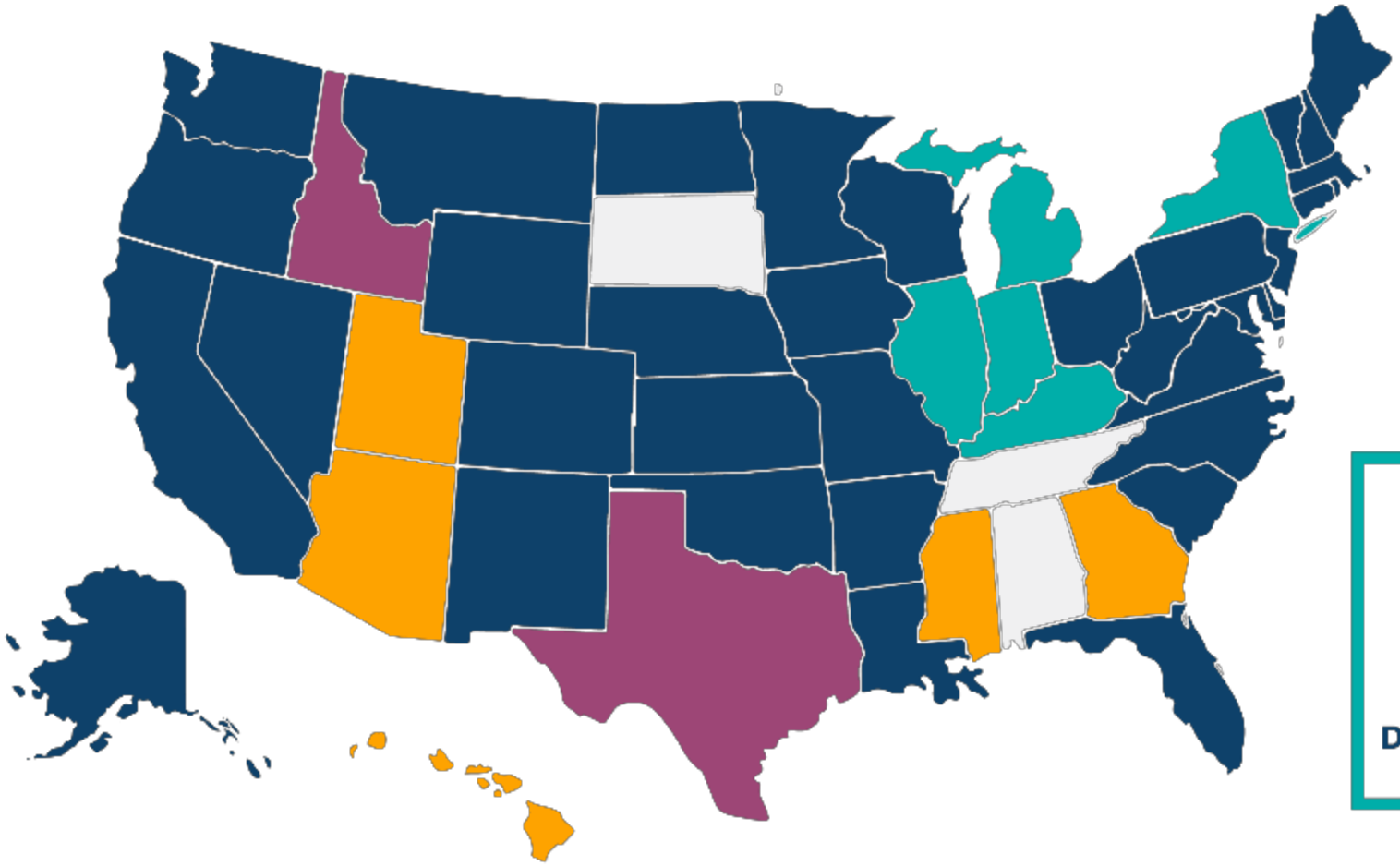
States with Net Metering

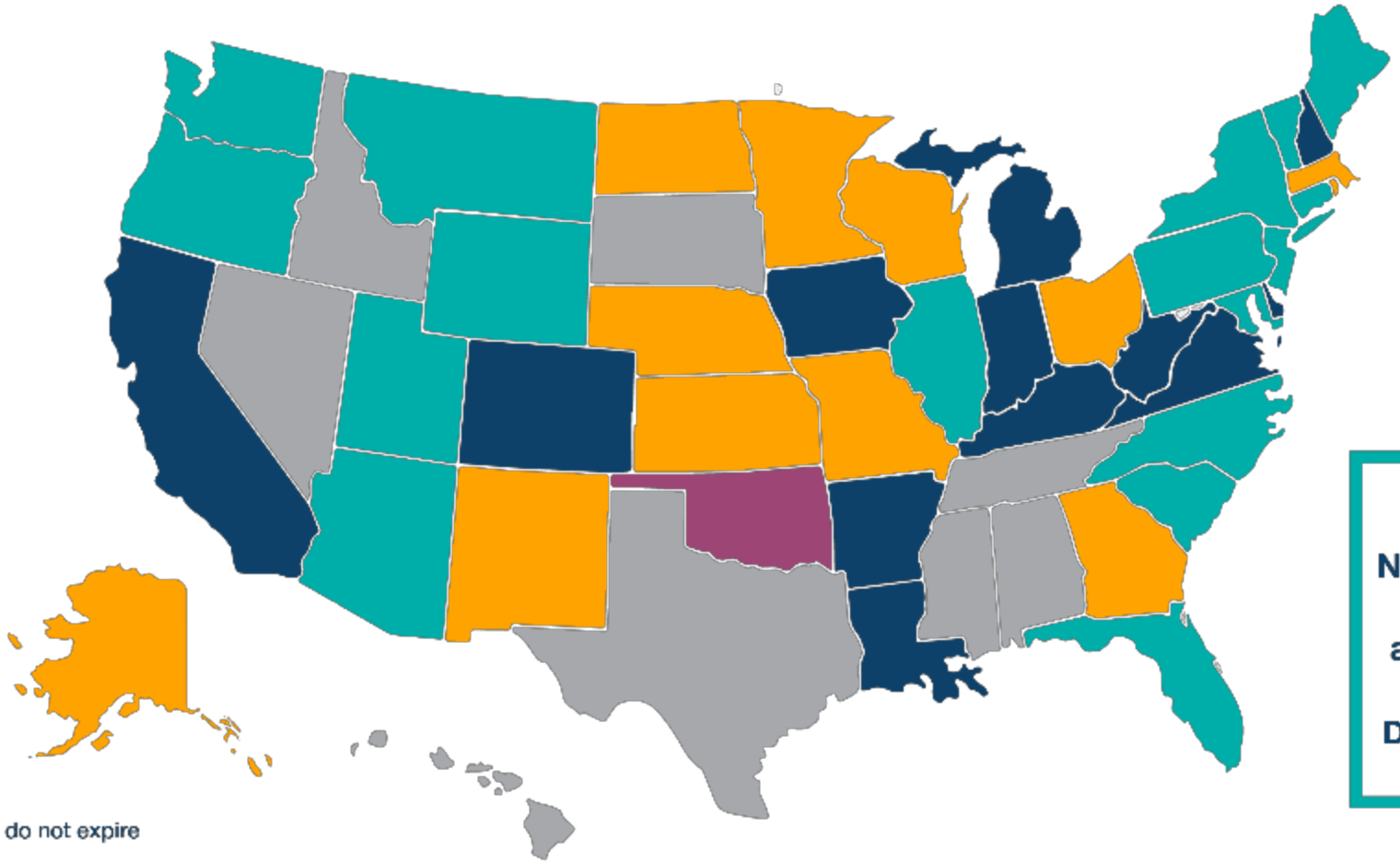


Currently
40+
States Mandate
Net-Metering

Dsireusa.org/April 2019

- State-developed mandatory rules for certain utilities (40 states + DC + 4 territories)
- In transition to statewide distributed generation compensation rules other than net metering (6 states)
- Statewide distributed generation compensation rules other than net metering (5 states)
- No statewide mandatory rules, but some utilities allow net metering (2 states)

States with Net Metering

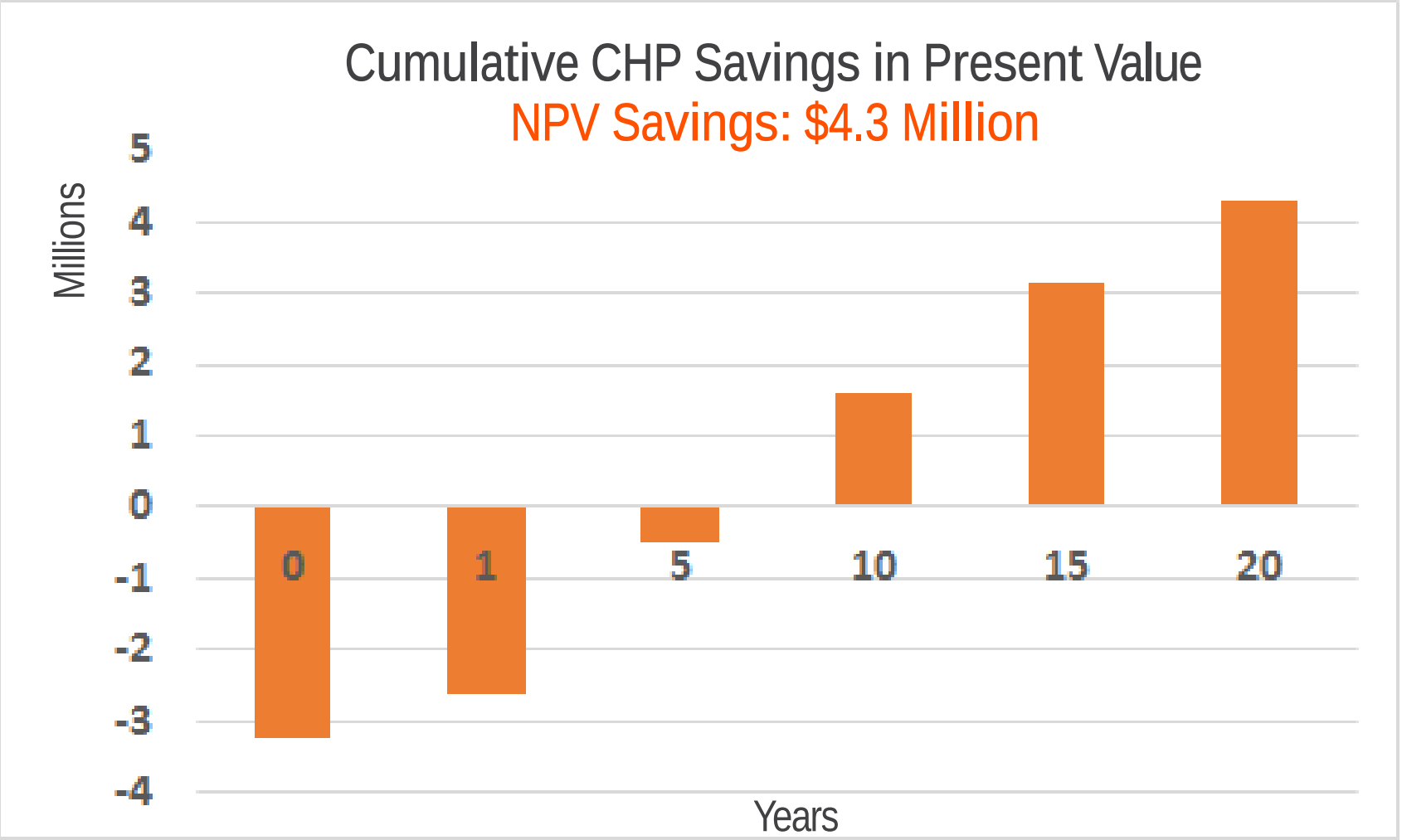


Some Credit Excess Net Excess Generation (NEG) at the Full Retail Rate

Dsireusa.org/July 2019

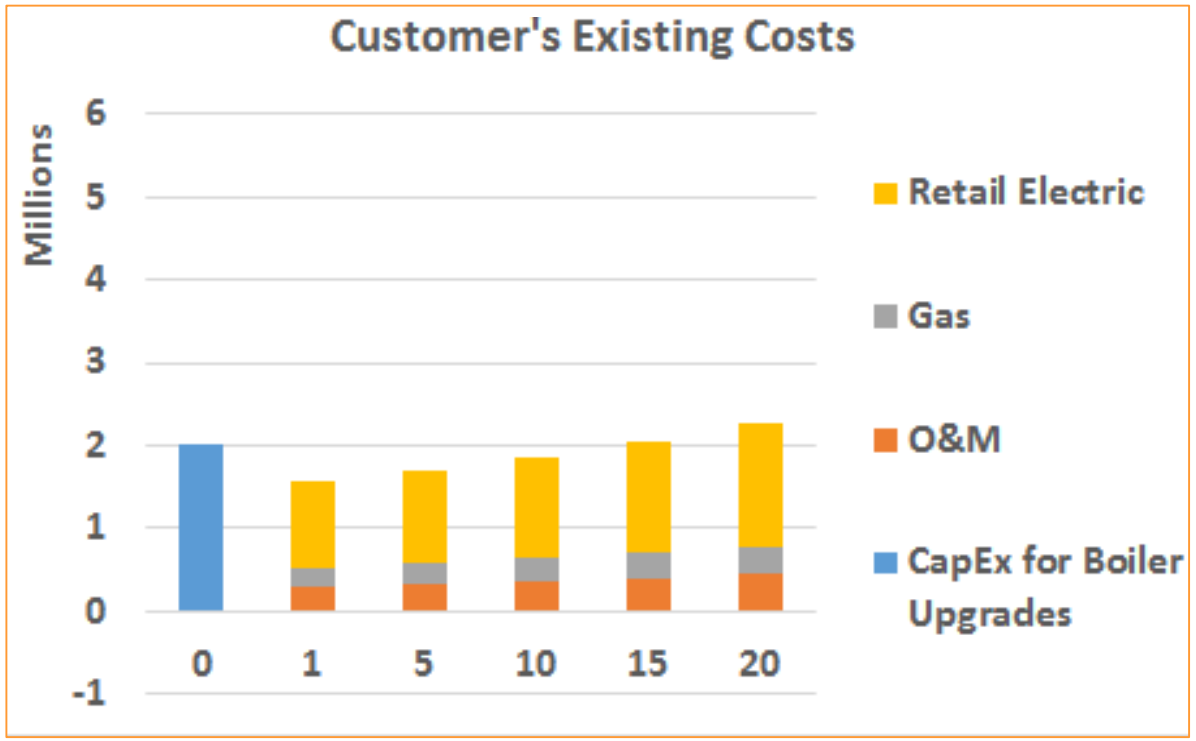
- NEG credited at retail rate; credits do not expire
- NEG credited at retail rate at first, then credits expire or are reduced (e.g., to the avoided cost rate at the end of year)
- NEG credited at less than retail rate (e.g., avoided cost rate)
- NEG is not compensated
- No statewide mandatory net metering rules

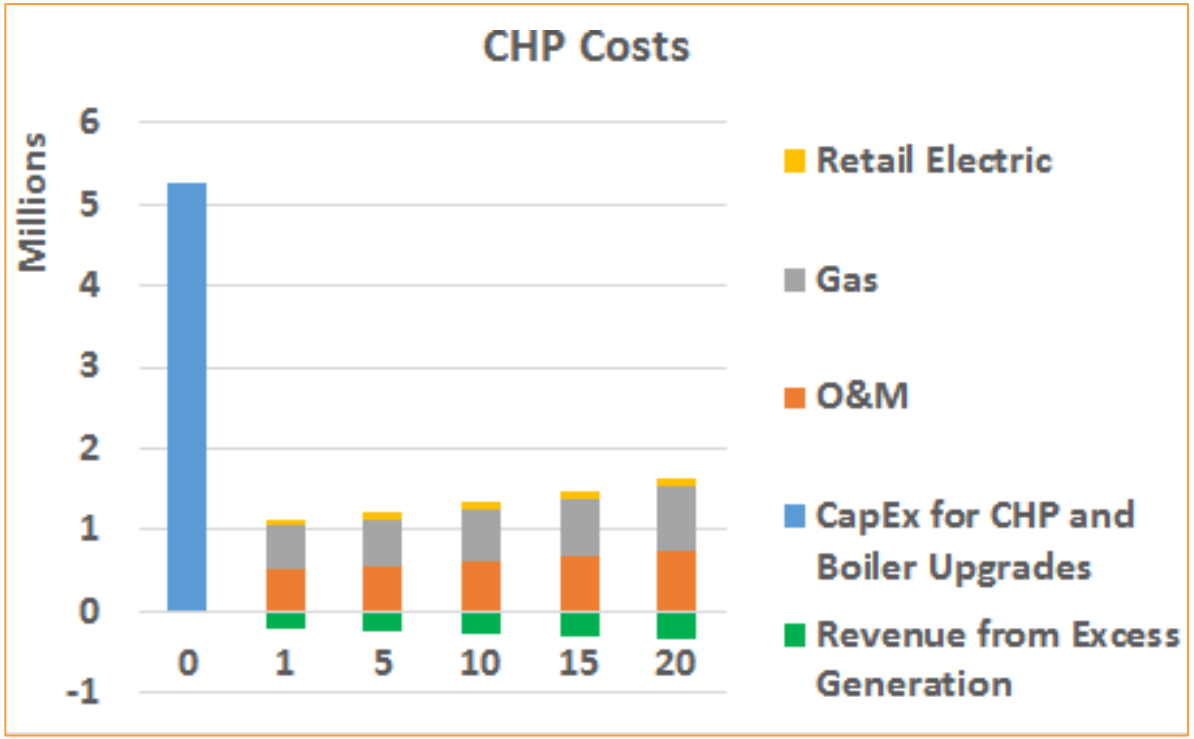
Potential Cost Savings



An illustrative 1.5 MW CHP project (with 1 MW average and 2 MW peak load)

CHP Savings = Customer's Existing Costs Minus CHP Costs





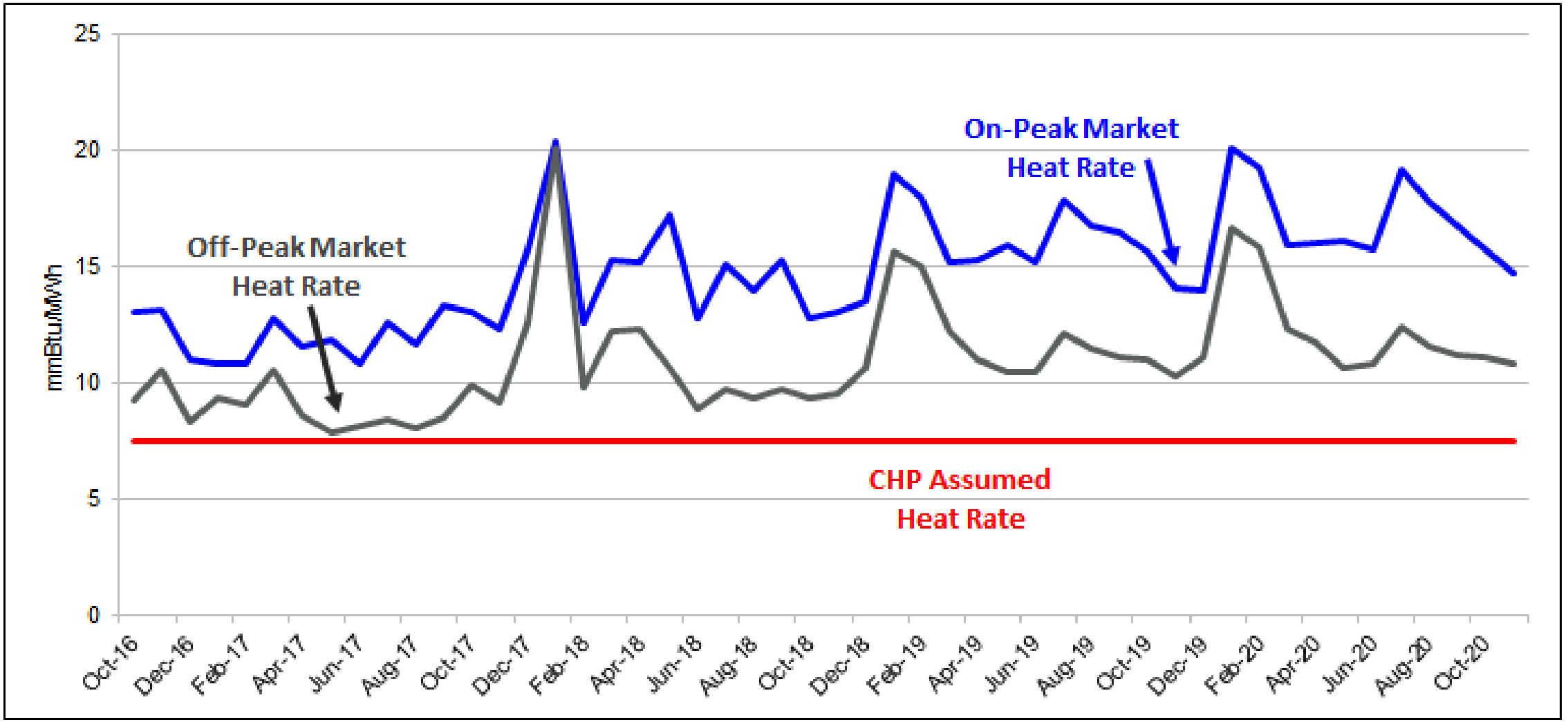
3. Concerned about managing the risk of the cost of the electricity you consume?

- CHPs have more predictable long-term energy costs, since they are protected from power market price fluctuations compared to purchases from your local utility or the competitive market
- CHP operations can be reduced during days/hours when the power market is cheaper
- Even more risk mitigation with storage capability

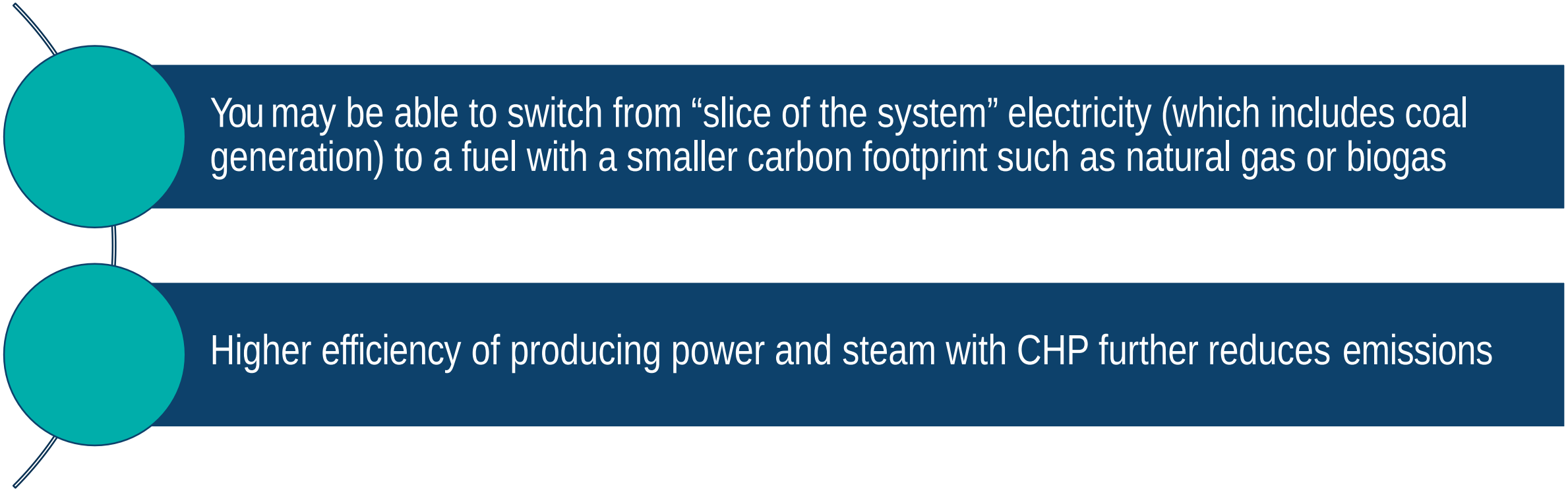
Protection Against Power Price Risk

PJM Western Hub Implied Market Heat Rates

(Implied Heat Rate = Electricity Price / Gas Price)



4. Interested in reducing your impact on the environment?



5. Need to upgrade or replace your boiler, generator or heating/cooling facilities?

- CHPs can provide the solution to reducing your long-term energy costs
- Implemented energy efficiency measures – new lighting, smart controls – but still have large energy costs? CHPs can reduce and stabilize your costs even more
- Many options to build a CHP including fully customer-built to contracting with a turn-key, third-party developer

CHPs in Action

CHP Pioneers

Geisinger

CHP Facility

- 5 megawatt natural gas fired turbine, boilers, electric and steam turbine-powered chillers
- Installed in 2011

Cost Savings

- $2.2 million/year

Other Benefits

- CHP plant provides 40% of the Danville campus electricity needs
- Remainder is purchased from the grid using the services of a broker
- CHP plant provides 80% of the campus' steam needs and gas-fired boilers provide the rest
- Chilled water is stored and provides air conditioning; lets them take chillers off line in the daytime, reducing the campus' peak electricity load

CHP Pioneers

CHP Facility

- Five 60 kW natural-gas-fired micro turbines, low-emission, dual-fuel boilers
- Installed in 2002; upgraded in 2007 and 2011

Cost Savings

- $13 million over 30 years

Other Benefits

- Heat generated by the micro turbines preheats water for the boilers
- CHP plant eliminated a coal-fired plant that consumed 5,000 tons of coal a year
- Emissions reduction is the equivalent of removing 2,000 cars from the road or planting 1,000 acres of trees
- Power plant staffing was reduced from two workers on 24/7 shifts to one person on a 40-hour/week schedule

So You've Decided to Develop a CHP Plant . . . Now What?

Assemble the Right Team

CHP Process Stages

1. Opportunity Scoping

Assess current and projected energy use

Evaluate potential savings from typical configuration

Identify institutional issues for implementation

4-8 weeks

Feasibility and cost-benefit estimate

2. Project Structure Development

Customer vs. 3rd-party owned

Identify possible EPC and fuel/plant services firms

Develop 20-year financial model for site-specific facility with risk analysis of alternative scales, features

Execute Memorandum of Understanding with partner(s)

3-6 months

Implementable plan elements

3. Contractual Formalization

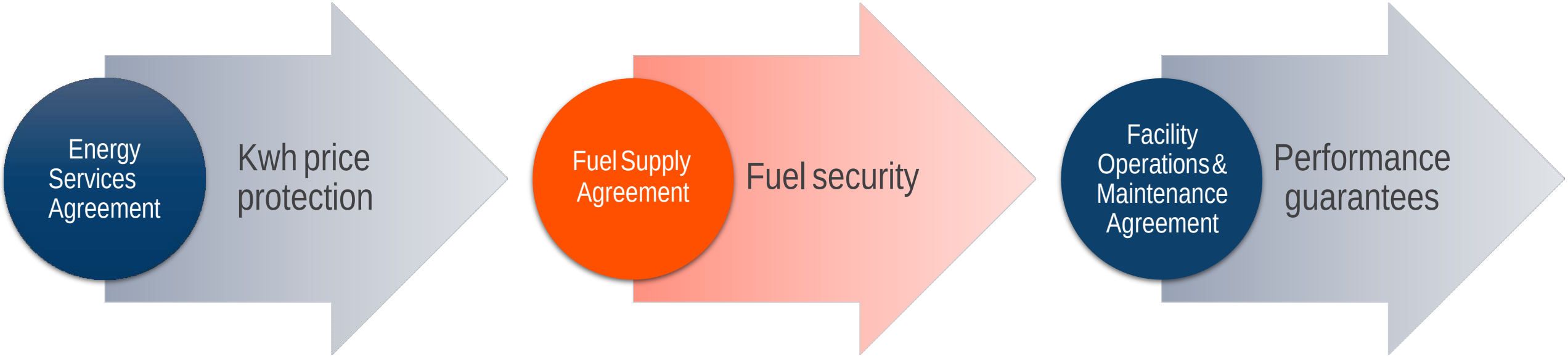
Negotiate agreements for site approvals, construction, equipment procurement, fuel supply, purchased power agreement (ESA), backup from/sales to local utility, performance guarantees, plant O&M, financing

Conduct detailed financial model evaluating final terms

2-6 months

Fully executed plan

Negotiate and Execute Key Transaction Documents



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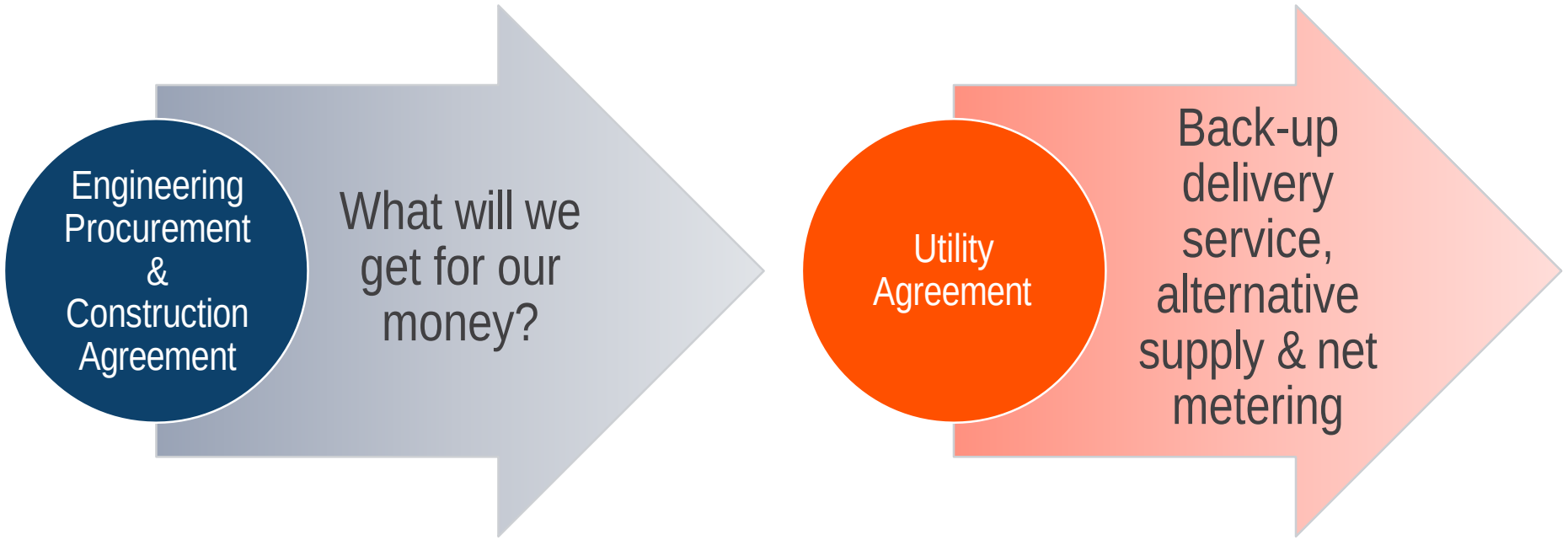

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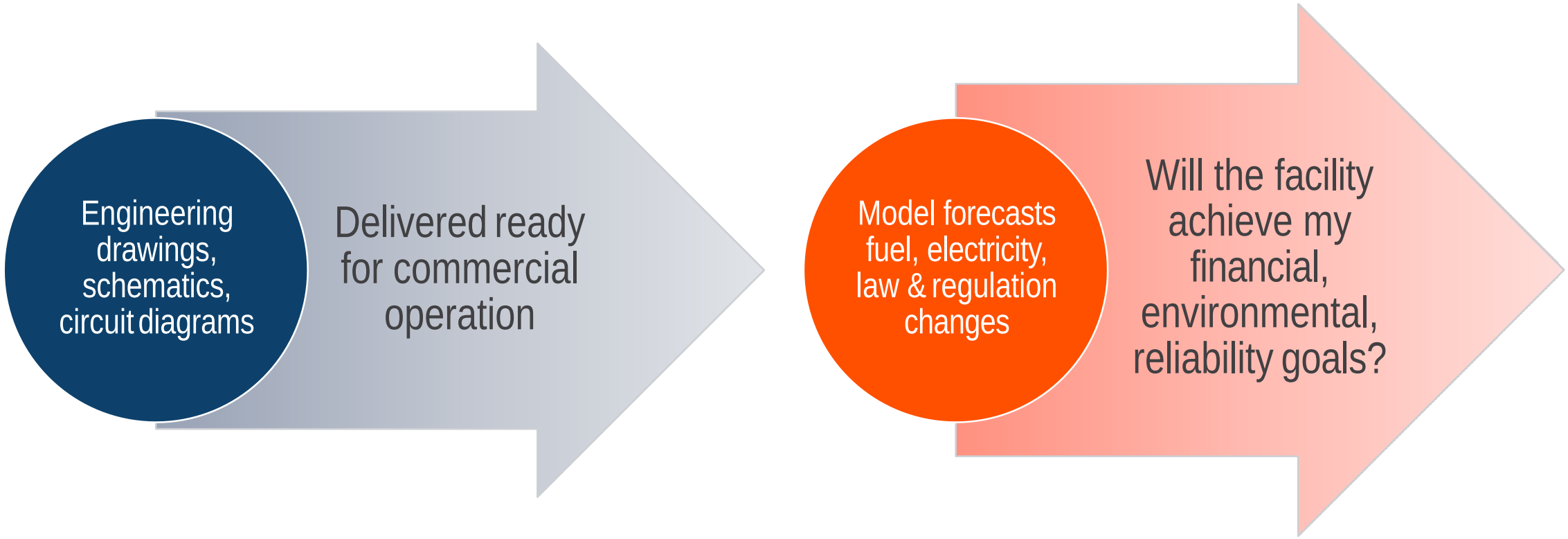


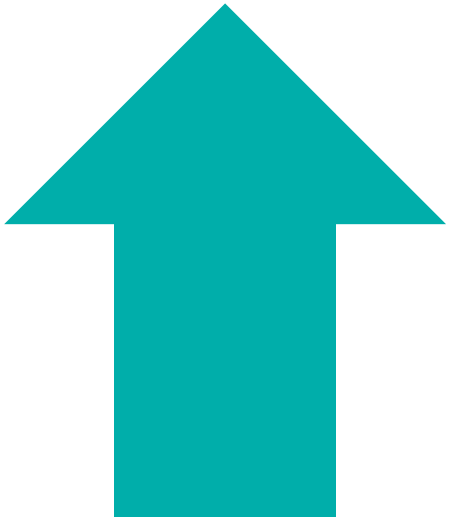
What Are the Risks?

- We can work with you to mitigate them
  - Risk of customer building the facility
  - Allocation of business risk if using a third-party developer
  - Proper economic/business analysis
  - Provision for change in law or regulations
  - Assess governmental financial support

Managing Risk: Best Practices

- Conduct a thorough analysis and manage through negotiation – all risks upfront
- Develop contract terms that allocate the cost responsibility to the parties in certain ways and/or amounts based on the item involved
- Negotiate and clearly identify the appropriate party and mechanism to handle each risk
- Give the greatest amount of risk on any item to the party that can most cost effectively and efficiently manage that risk
- Risks that cannot be addressed via contract can be mitigated through professional evaluations and opinions from experts

Risk vs. Reward?



CHP Systems

- Ever-dependable energy source
- Environmentally friendly solution
- Predictable long-term energy costs
- Excess can be sold back to a local utility

Potential to save companies millions of dollars in energy costs!

The Buchanan Team

John F. Povilaitis, Shareholder

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John focuses his practice on administrative law matters with special emphasis on energy, communications, water/wastewater and transportation public utility law and related transactions. His practice ranges from proactive counseling to litigation before administrative agencies, and appellate matters before state and federal courts. He is a former Chief Counsel of the Pennsylvania Public Utility Commission and has significant regulatory experience in electricity, natural gas, water, transportation and communications law.

Alan M. Seltzer, Shareholder

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Alan focuses his practice on electric and gas matters. He has actively represented public utilities and other stakeholders before the Pennsylvania Public Utility Commission, particularly in the areas of electricity, gas, water and transportation. His current emphasis is on energy-related transactions, obtaining the state regulatory approvals for the merger or acquisition of gas and electric utilities, and addressing the real estate, regulatory and financing phases of renewable energy project development.

The Brattle Team

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Frank specializes in regulatory and financial economics, especially for electric and gas utilities, and in litigation matters related to securities litigation and risk management. He has over 30 years of experience assisting utilities in forecasting, valuation, and risk analysis of many kinds of long-range planning and service design decisions, such as generation and network capacity expansion, supply procurement and cost recovery mechanisms, network flow modeling, renewable asset selection and contracting and hedging strategies.

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Metin provides expertise in electricity markets and the analysis of environmental and climate policy. He has testified and consulted primarily in the areas of electricity spot pricing and market design and has experience in developing and analyzing climate policies, LMP modeling and generation plant valuation. His recent engagements include estimating economic damages in energy contracts, valuations of coal-fired and gas-fired power plants, impacts of environmental regulations on power markets and cost/benefit assessment of RTO membership to electric utilities.

Questions?

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