Optimizing Grid Infrastructure and Proactive Planning to Support Load Growth and Public Policy Goals

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Motivation

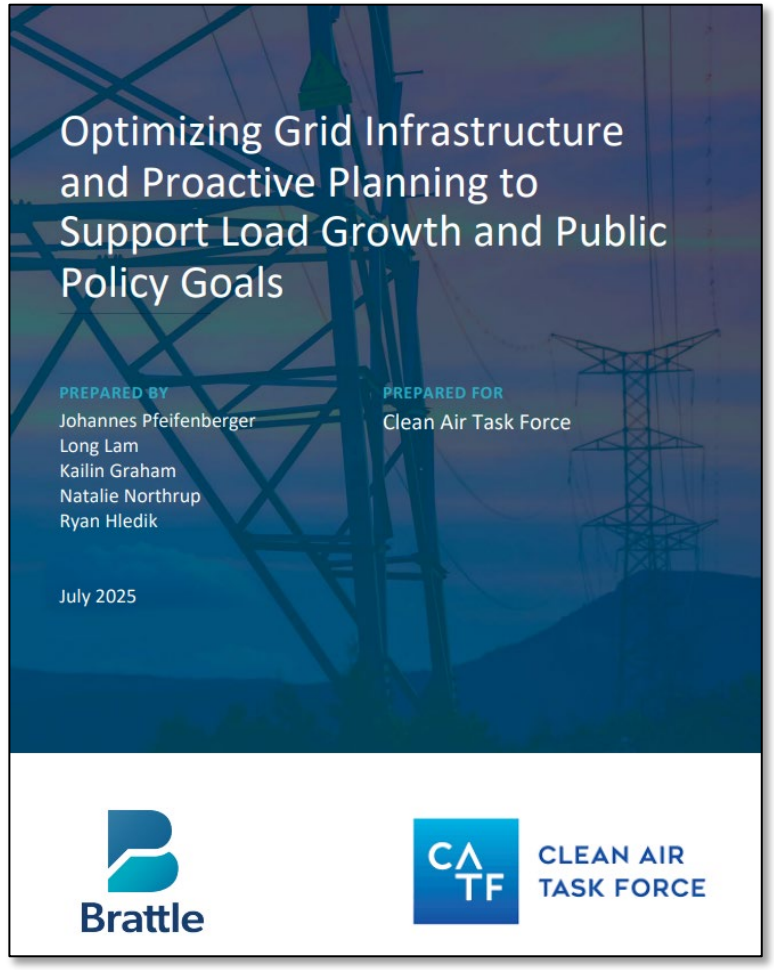
The US electric power system is entering a period of rapid and transformational load growth due to:

- Accelerating electrification of buildings and transportation
- Re-shoring of industrial activity
- Unprecedented surge in demand from data centers

Meeting this demand will require significant investments grid infrastructure, which can be costly and take a long time

- Many new large customers are prepared to pay a premium or invest in this infrastructure themselves to avoid interconnection delays
- However, existing customers may ultimately bear the costs of upgrades if changes are not implemented

Key question: How can utilities, system planners, policymakers, and regulators serve the new large loads quickly and cost-effectively, while still meeting state and corporate energy goals such as reliability and affordability?



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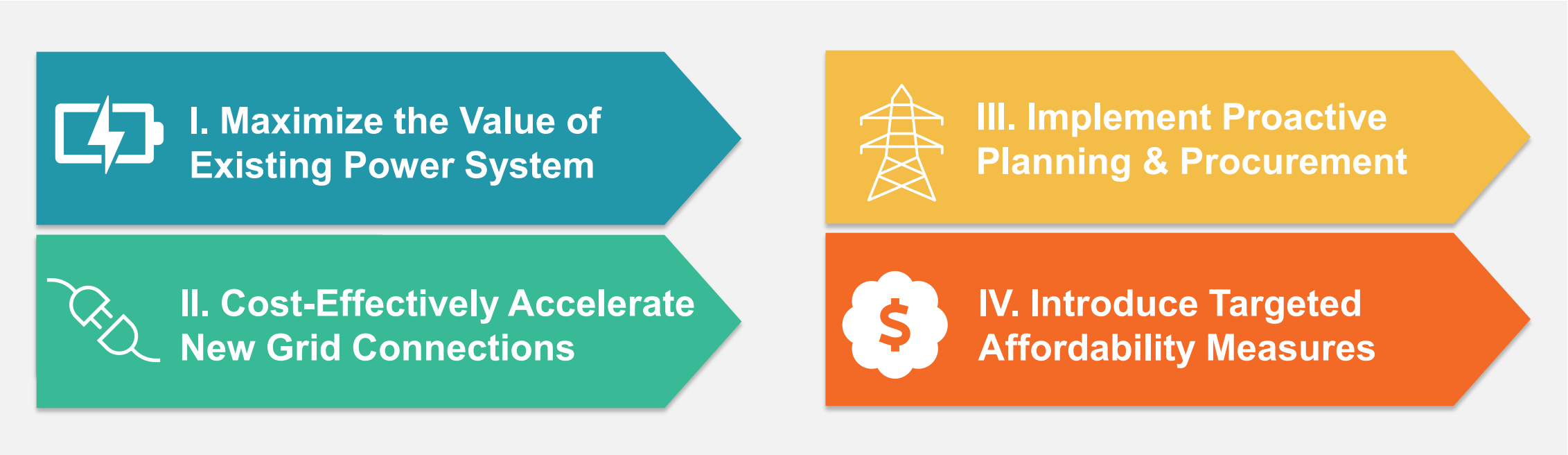
Key Pillars to Support Load Growth and Public Policy Goals



I. Maximize the Value of the Existing Power System

A. Enhance distributed and demand-side resources

- Deploy proven demand-side programs (e.g., EV managed charging, virtual power plants and aggregations of DERs)
- Create incentives for (new) large customers to provide flexibility

B. Enhance rate options

- Offer time-of-use rates, critical peak pricing, real-time pricing more widely
- Leverage customers' load flexibility by tapping into their behind-the-meter resources

C. Utilize GETs, ATTs, and RASs

- Create additional grid capacity by promoting grid-enhancing technologies, advanced transmission technologies, and remedial action schemes
- Consider "loading order" that prioritizes increasing existing grid capacity ahead of the construction of new transmission lines

D. Capitalize on transmission upsizing opportunities

- Identify and capitalize on opportunities to upsize existing transmission lines where added transmission capability is needed now and where the refurbishment of aging lines becomes necessary now

E. Facilitate interregional trade

- Pursue intertie optimization in operation and planning to take advantage of available interregional transfer capability in real time and achieve production cost savings

II. Cost-Effectively Accelerate the Grid Connection of New Loads

A. Enhance customer-sponsored generation

- Encourage and allow customers to self-supply to enhance system reliability, address transmission constraints, and promote the adoption of efficient on-site technologies
- Design self-supply tariffs to avoid shifting costs of incremental grid investments to other customers without inadvertently creating barriers to customer self-supply

B. Co-locate new generation and load

- Support the development of precisely controllable "energy parks" (i.e., large microgrids) to minimize or avoid entirely the need for transmission upgrades, increasing speed to market while reducing system and customer costs
- Adopt interconnection processes that reflect the operation of co-located load and generation, and offer expedited screening processes given the controllable, non-firm nature of their grid injections

C. Streamline generator interconnection processes

- Continue to improve the interconnection study process through greater integration with transmission planning and other aspects of generator interconnection
- Accelerate interconnection requests for shared interconnection points and shovel-ready projects at grid locations with existing or planned interconnection capacity

III. Implement Proactive Planning and Procurement Processes to Accelerate the Necessary Investments

A. Proactively plan generation and transmission

- Adopt proactive, scenario-based planning practices that allow for the identification of more flexible, cost-effective generation and transmission solutions
- Develop “least-regrets” solutions that maximize long-term cost savings while minimizing over- and under-investment risks

B. Reform generator procurement processes

- Consider frequent procurement and accelerating their competitive procurement processes, differentiating between procuring energy and capacity needs, and evaluating system impacts in bid evaluations
- Structure procurements to be technology-neutral and inclusive of all cost-effective options

C. Proactively plan distribution systems

- Pursue scenario-based planning that facilitates the prebuilding of projects in constrained parts of the grid
- Develop spatially and temporally granular load forecasts

D. Improve load interconnection processes

- Revise interconnection processes and rate structures to reflect economic and energy policy objectives
- Explore how a multi-criteria load auction may be a useful tool to allocate system headroom

IV. Introduce Targeted Affordability Measures

A. Offer energy efficiency and bill assistance

- Prioritize energy efficiency and conservation programs for low-income and vulnerable customers
- Provide targeted bill assistance programs to further support to low-income customers and energy-burdened households

B. Implement specialized rates for new large loads

- Consider tariff structures designed for large customers and provisions to protect against stranded asset risks (e.g., by requiring long-term commitments to pay for contracted energy and/or capacity)

C. Explore alternative financing

- Explore levelized cost recovery frameworks and performance-based ratemaking, as well as securitization of investment costs
- Consider public-private partnership models to assist with reducing financing costs and expedited construction of energy projects

Success Will Require Coordination & Collaboration among Key Stakeholders

SOLUTION	REGULATORS	UTILITIES	GRID PLANNERS /OPERATORS	GOVERNORS LEGISLATORS	OTHERS
I. Maximize the Value of Existing Power System	☑	☑	☑	☑	Third-party DER aggregators
II. Cost-Effectively Accelerate New Grid Connections	☑	☑	☑	☑	Energy park developers
III. Implement Proactive Planning & Procurement	☑	☑	☑	☑	Power procurement authorities; state energy offices
IV. Introduce Targeted Affordability Measures	☑	☑		☑	State energy offices

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webbio and publications

Dr. Lam is a Managing Energy Associate at The Brattle Group with expertise in resource planning, electricity markets, renewable and climate policy analysis, and economic analysis of generation, transmission, and demand-side resources.

His work for regulated utilities, market operators, and regulators focuses on issues related to the energy transition, including developing and evaluating net-zero energy plans and policies; designing and implementing innovate rate designs and load flexibility programs; and evaluating the economic benefits of distributed energy resources, grid modernization, and transportation electrification programs. Prior to joining Brattle, Dr. Lam served as an IEEE/AAAS Fellow, advising a US Senator and the Department of Defense on energy and climate issues.

Dr. Lam holds a dual Ph.D. degree in Engineering and Public Policy from Carnegie Mellon University and Católica Lisbon School of Business and Economics, and a B.S. degree in Mechanical Engineering from the Massachusetts Institute of Technology.

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- Finance and Ratemaking
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- Market Design
- Natural Gas & Petroleum
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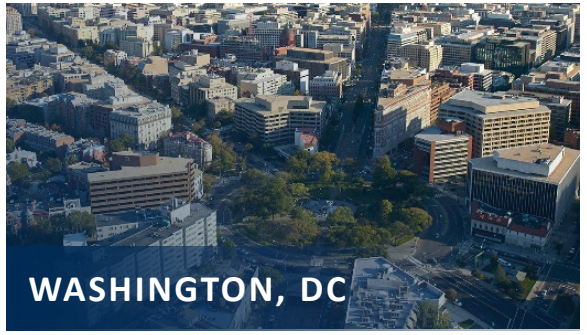

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