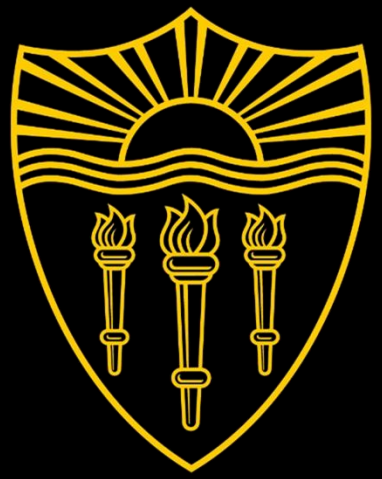

Meeting Anticipated Data Center-related Loads with Clean Energy: Challenges and Opportunities

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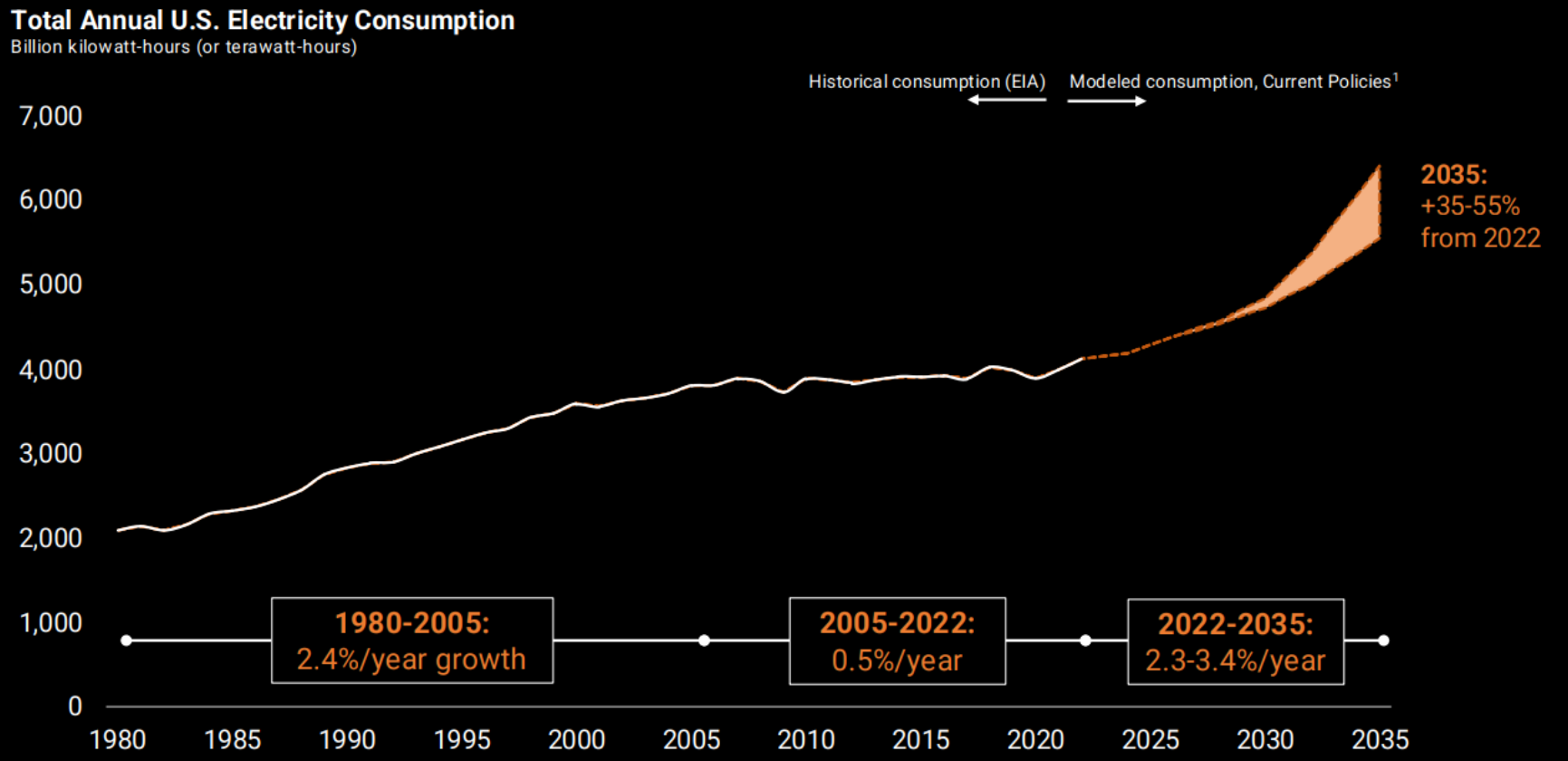
Anticipated load growth from data centers is large but only a fraction of projected US load growth more broadly



1 – Note that data center demand growth in this report is based on U.S. Energy Information Administration's *Annual Energy Outlook 2023* Reference scenario, which **does not fully account for potential growth in data center electricity demand**. Data center demand growth is highly uncertain at this time, but could add on the order of 50-260 TWh of additional demand by 2030 (and more by 2035) beyond the ~40 TWh included in the EIA scenario used herein (based on 2024 projections from Rhodium Group (see p. 14) and Goldman Sachs).

US annual data center load growth projections vary widely but are generally ~+100s of TWh through 2030

Broader annual load growth projections are ~ +1000s of TWh by 2035, for example:

- Electrified transport
- Electrified buildings
- Electrified Industries
- Hydrogen Production
- Cryptocurrency

However, data centers are unique loads that pose unique challenges for regional power grids

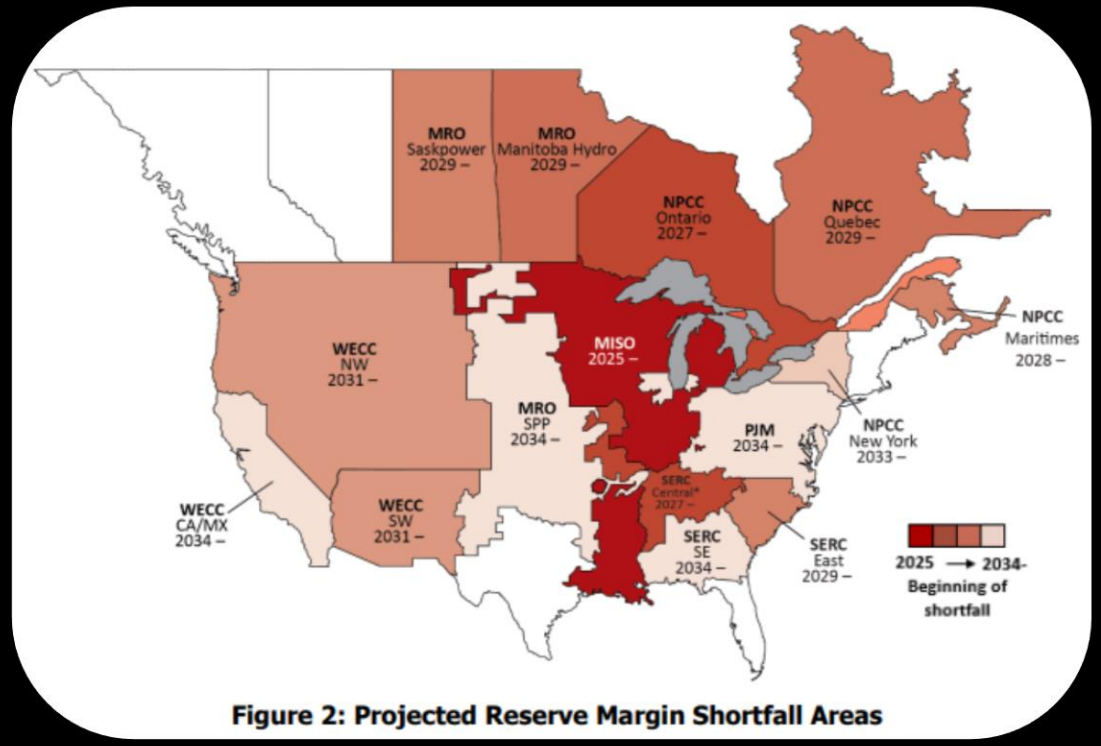


Figure 2: Projected Reserve Margin Shortfall Areas

- Grid was not designed to accommodate large, concentrated loads
- Some data center loads are more flexible than others, but many facilities will be adding to peak load
- Meeting large, around-the-clock demand will be difficult in many regions

…But if we set markets up for success, data centers could offer opportunities for peak load management

Powering large data center loads will not be cheap whether it be from fossil fuels or renewables

Three Mile Island (Credit: Constellation Energy)

Adding new peak capacity is going to be expensive regardless of source

- Natural gas is much more expensive today than a couple years ago (turbine shortages, constraints in natural gas grid, etc.)
- Cheap variable renewable energy will need to be paired with some form of back-up storage
- Many analyses are underestimating the true costs of bringing on new peak capacity

Economic analyses need to reflect the true cost of providing electricity so that a full suite of potential grid responses are considered…

The US needs an “all of the above” clean load growth strategy for data centers…

- **Squeezing more out of the grid that we have** (e.g., grid enhancing technologies, advanced reconductoring, storage as transmission, identifying underused interconnections, etc.)
- **Accelerating emerging clean firm energy deployment** (e.g., advanced nuclear, next-gen geothermal, long duration energy storage, etc.)
- **Leveraging flexibility when possible** (e.g., geographical flexibility, operational flexibility, onsite storage for peak demand management, etc.)
- **Maximizing onsite energy efficiency opportunities**

Need innovation in utility business models, rate structures, and financing tools to unlock these opportunities

State & local governments, regulators, utilities, and large energy purchasers can drive action to protect ratepayers, grid reliability, the climate, and the environment while meeting load growth

- Setting and enforcing ambitious clean energy goals & efficiency standards
- Developing innovative rate structures that send clear price signals to influence demand-side behavior and investment
- Incentivizing “low hanging fruit” investments
- Accelerating development of clean firm resources
- Advocating to protect IRA incentives for clean energy
- Streamlining siting, permitting, and interconnection of new infrastructure
- Supporting workforce development, equity, and environmental justice

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