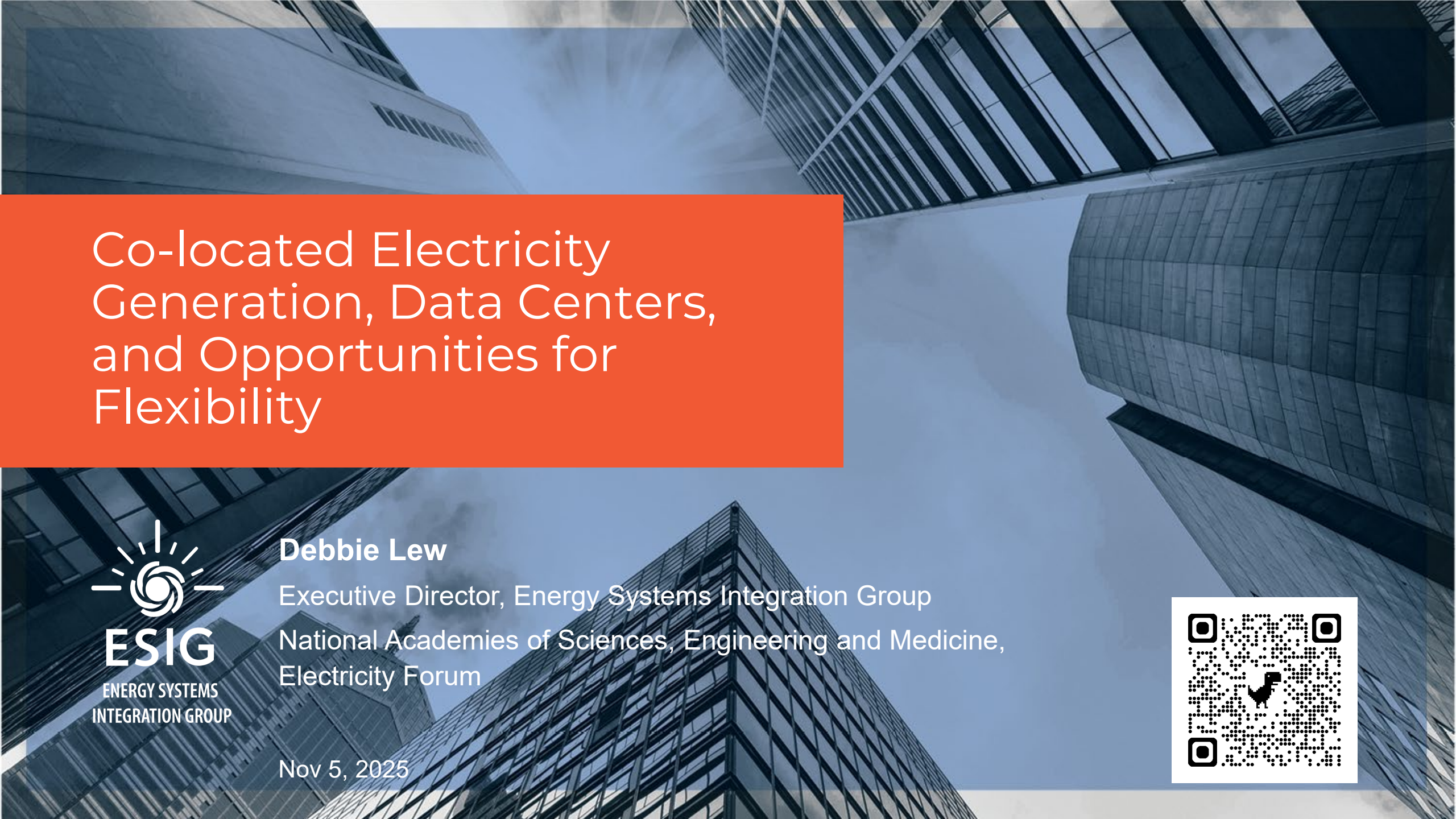
Co-located Electricity Generation, Data Centers, and Opportunities for Flexibility



ESIG
ENERGY SYSTEMS INTEGRATION GROUP

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National Academies of Sciences, Engineering and Medicine, Electricity Forum

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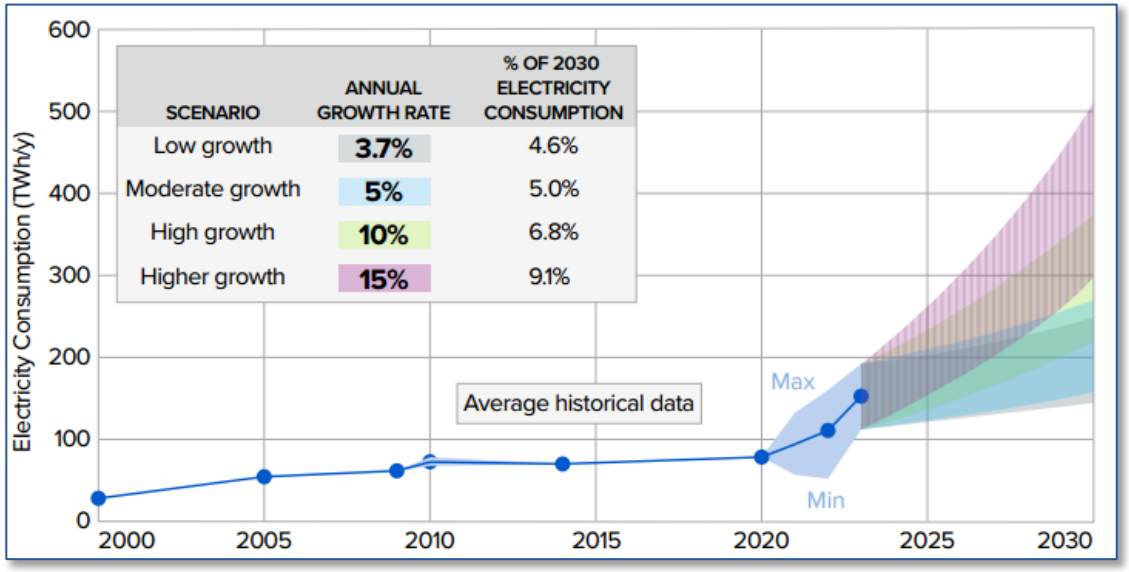
Data Centers and Impacts on the Grid

- Data center development and electricity consumption has been accelerating in recent years.
- The size and speed of the load growth impacts:
  - Resource adequacy (planning sufficient supply to meet demand) because load is growing and supply is challenged to keep up.
  - Interconnection and transmission planning because data centers can be built faster than transmission facilities.
- Data center load growth is difficult to forecast.
- **Data centers need speed to power. How can the power industry support this while maintaining reliability and affordability?**



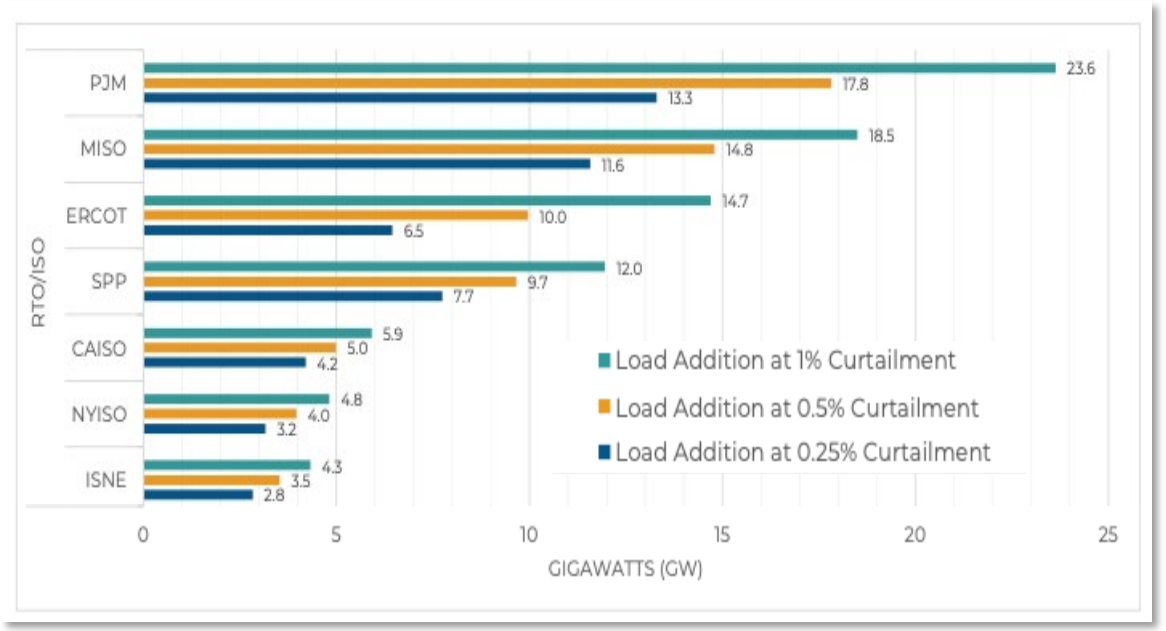
Source: EPRI, Powering Data Centers 2024

Interactive SLIDO poll for definition of co-location

- How do you define co-location?
  1. Multi-tenant data center facility
  2. Diesel backup generator that is not operated synchronously with the transmission grid but are used in emergencies when the grid is down
  3. Generator/storage and data center behind a single point of interconnection
  4. Generator/storage and data center behind different points of interconnection that are on the same bus or very close by

Flexibility can enable speed to power

- Duke University study finds 76-126 GW of new load could be interconnected today if those loads could curtail for 0.25 – 1% of the maximum uptime.
- How do we get the flexibility?
  - Some loads have inherent flexibility but data centers may not have the economic incentive to provide that type of flexibility..
  - Co-located generators/storage may provide flexibility to allow for faster interconnection. This could include backup generators that are *designed* for this purpose.



T. Norris et al, Duke University, Rethinking Load Growth, 2025

Any resource that operates synchronously connected to the grid needs to be studied!

Recent Advance Notice of Proposed Rulemaking on Large Load Interconnections

- Asserts FERC jurisdiction over large loads > 20 MW that interconnect directly to transmission
- Encourages load and hybrid (large loads and generation) facilities to be studied together with generating facilities (could be at same point of interconnection or nearby)
- Interconnection studies should be based on amount of injection or withdrawal rights
- Hybrid interconnections need system protection to prevent unauthorized injections or withdrawals that exceed the rights
- Expedited interconnection studies (60 days) for curtailable large loads and curtailable and dispatchable hybrids
- Large loads would be responsible for 100% of network upgrade costs
- Existing generator that seeks partial suspension to serve a new load must undertake a reliability must run study, studying 3 years out

Today's speakers

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