Smart Data Center Siting Backed by NREL Expertise

To maintain and grow American leadership in artificial intelligence, the United States is rapidly building out new data center capacity and power generation to support that growth—but where we build matters. Implications of siting new data centers are highly dependent on location, and choosing wisely can reduce costs and speed to build, improve energy reliability, and avoid strain on the grid.

Siting new data centers to align with existing, planned, or needed infrastructure; accessible energy resources; and land availability is both critical and complex.

NREL brings decades of experience in strategic energy infrastructure siting and planning to help decision makers locate data centers where they make the most sense.

Mapping the Future With NREL's Cutting-Edge Geospatial Data Science

NREL is a pioneer in geospatial data science and has decades of experience creating and analyzing spatiotemporal datasets to reveal the best locations for infrastructure based on highly localized factors that include cost, reliability, land use, resource availability, and impacts and benefits to local communities.

Our geospatial research tackles major energy challenges using advanced computing methods, including artificial intelligence, to produce detailed and accurate datasets, automated analyses, models, applications, and visualizations that inform energy decisions.

NREL delivers powerful insights by combining and examining multiple layers of highly precise location-based data, and performs analysis at a national scale, to uncover meaningful connections that guide decisions across sectors and geographies.

Our work combines extensive expertise in grid modeling, transmission planning, land use, and policy constraints to help decision makers answer questions like:

- Where can we site data centers near abundant, low-cost, reliable energy?
- How will data center development affect grid reliability and energy costs?
- Where can stakeholder engagement address siting constraints and reduce project costs and risks?
- What areas provide access to critical resources like transmission or advanced fiber networks?
- Which locations already have the infrastructure and capacity to support rapid data center expansion?
- Where should infrastructure be built to attract data center development?

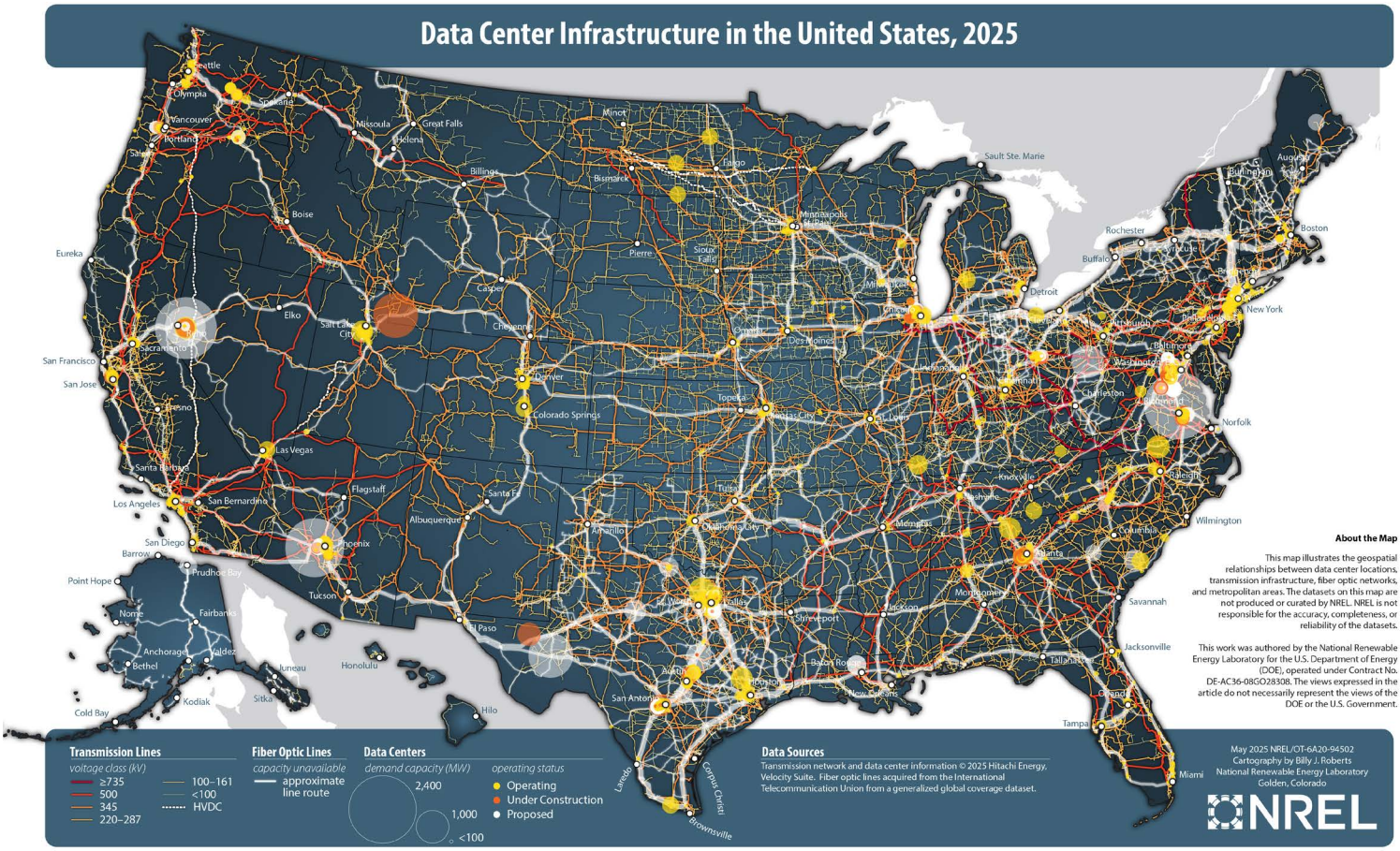
This work will help support data center growth while leveraging American resources and maintaining a reliable, affordable, and secure national energy system.

A Snapshot of Data-Informed Insights

A recently released NREL map brings together U.S. data center demand, major transmission lines, fiber optic networks, and population centers—all in one view.

Although this map represents only a portion of the data and analysis needed for siting data centers, it captures a **powerful snapshot of the intersection between siting options and the infrastructure available across those options.**

This map exemplifies NREL's capabilities to **deliver deeper**, **data-driven insights** that help guide strategic data center development across the country.



This map layers U.S. data infrastructure alongside power infrastructure to help visualize the overlap and simplify co-system planning.
Figure from Roberts (2025)

Learn more about NREL's geospatial data science work.
www.nrel.gov/gis

Reference: Roberts, Billy. 2025. *Data Center Infrastructure in the United States, 2025*. Golden, CO: National Renewable Energy Laboratory. NREL/OT-6A20-94502. https://docs.nrel.gov/docs/gen/fy25/94502.jpg.

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