IM3 Projected US Data Center Locations

This dataset contains model projections of new data center facilities in the contiguous United States (CONUS) through 2035 using the CERF – Data Centers model. Data center locations are modeled across four data center electricity demand growth scenarios (low, moderate, high, higher) and five market gravity scenarios (0%, 25%, 50%, 75%, 100%). Projected locations are intended to be regional representations of feasible siting locations in the future to assess potential grid and water stress impacts.

The data center load growth scenarios correspond with the rates outlined in EPRI (2024) and include 3.71%, 5%, 10%, and 15% annual growth of electricity demand for data centers from 2023 values in 37 states across the CONUS. Market gravity scenarios correspond to the relative importance of proximity to data center markets or high population areas compared to locational cost in the siting algorithm. 0% market gravity means that siting decisions were entirely determined by the locational cost in each feasible location. 100% market gravity means that only market proximity was considered when siting. Other scenarios have weight placed on both components where total weight always equals 100%. Locational cost is dependent on facility cooling type and corresponding electricity cost, taxes, and other factors. Facility cooling type is spatially determined where high water stress and/or areas with high summer wet bulb temperatures are assumed to operate with mechanical cooling for a higher fraction of the year rather than evaporative cooling.

Feasible data center siting areas are based on geospatial suitability raster data developed with open-source information. The following areas are excluded from siting:

- Areas within 300 m of a federal airport runway
- Waterbodies
- Areas with slope >16%
- Areas susceptible to sinkholes
- High coastal or inland flood risk areas
- Local, state, and federal parks, leisure areas, and cemeteries
- Areas >2 km away from electric substations
- Areas >5 km away from a municipal water supplier service area
- Areas >2 km away from high-speed fiber provider service territory
- Protected Areas Database of the United States (PAD-US) areas
- Railroads, major roadways, and minor roadways
- Military areas and training grounds
- NLCD developed lands

- Areas >0.8 km (0.5 miles) from NLCD developed lands

Because we use open-source information, proprietary information that can influence siting decisions such as individual tax agreements with cities, detailed fiber line connectivity, electric grid power capacity agreements, and others, are not currently accounted for in the modeling process. Using specific building locations and footprints in the dataset for local planning purposes is not advised.

Technical Information

Geospatial data is provided in geojson format using the Albers Equal Area Conic (ESRI:102003) coordinate reference system.

The datasets contain the following parameters:

- **id** - unique identification number within given scenario file
- **growth_scenario** – data center demand growth scenario
- **market_gravity_weight** – market gravity weight scenario (%)
- **region** – name of region (i.e., US State)
- **total_cost_million_usd** – locational siting cost ($million)
- **campus_size_square_ft** – total land acquired for data center facility (square ft)
- **data_center_it_power_mw** – IT power of data center facility (MW)
- **mechanical_cooling_frac** – fraction of year when data center uses mechanical cooling system
- **water_cooling_frac**– fraction of year when data center uses evaporative cooling system
- **cooling_energy_demand_mwh** – total annual facility energy demand for cooling (MWh)
- **cooling_water_demand_mgy** – total annual facility water demand for cooling (MG)
- **cooling_water_consumption_mgy** – total annual facility water consumed (MG)
- **normalized_locational_cost** – normalized total locational cost score for location
- **normalized_gravity_score** – normalized market gravity score for location
- **weighted_siting_score** – total weighted siting score of locational cost and gravity score
- **geometry** – polygon geometry of facility

Citation

Mongird, K., Burleyson, C., Akdemir, K. Z., Thurber, T., Vernon, C., & Rice, J. (2025). IM3 Projected US Data Center Locations (Version v1) [Data set]. MSD-LIVE Data Repository. https://doi.org/10.57931/2571680

Acknowledgment

IM3 is a multi-institutional effort led by Pacific Northwest National Laboratory and supported by the U.S. Department of Energy's Office of Science as part of research in MultiSector Dynamics, Earth and Environmental Systems Modeling Program.

License

Disclaimer