Data Center Community Impact Assessment Model

Model Overview

This model estimates water usage, grid load, job creation, tax revenue, and carbon footprint for proposed data center facilities. It includes formulas, assumptions, and guidance for local impact analysis.

5 Impact Categories

Energy Impact

Annual MWh consumption, peak MW load, grid stress contribution, renewable percentage required

Water Impact

Annual water consumption (gallons), cooling water source, wastewater treatment, environmental impact

Economic Impact

Construction jobs, permanent jobs created, average salaries, annual tax contribution

Community Impact

Noise levels (dB), traffic volumes during construction, property value changes, community readiness

Carbon Impact

Scope 1 (direct emissions), Scope 2 (purchased electricity), Scope 3 (supply chain), net carbon intensity

Key Formulas

Annual Energy (MWh): Facility Size (MW) × 8,760 hours/year × PUE (Power Usage Effectiveness)

Water Consumption (gallons/year): Facility Size (MW) × Cooling Water Factor × Climate Multiplier

Construction Jobs: Facility Size (MW) × 15 jobs per MW during 2-3 year construction

Permanent Jobs: Facility Size (MW) × 1-2 operations staff per MW

Annual Tax Revenue: Facility operational costs × local tax rate + property tax on land/improvements

Carbon Intensity (lbs CO2/MWh): (Grid emission factor + Equipment manufacturing amortized) / Grid renewable percentage

Default Assumptions

Assumption	Value	Source/Rationale
PUE (All Types)	1.2	Industry average for modern facilities
Construction Jobs/MW	15	Bureau of Labor Statistics
Operations Staff/MW	1.5	Industry benchmarks
Avg Operations Salary	$85,000	Glassdoor data, US average
Property Tax Rate	0.8-1.2%	Varies by jurisdiction
Grid Carbon (US avg)	400 lbs CO2/MWh	EPA eGrid 2024
Construction Timeline	2-3 years	Typical for hyperscale facilities
Facility Lifespan	15-20 years	Expected operational period

Community Readiness Score

The Community Readiness Score (0-100) synthesizes economic, water, energy, noise, and employment dimensions to assess whether a community is prepared for a data center facility.

Scoring Components (weighted average):

• Economic Readiness (25%): Tax revenue vs. local budget, economic diversification needs

• Water Readiness (20%): Water availability vs. demand, drought risk, existing utility capacity

• Energy Readiness (20%): Grid capacity, renewable percentage, electricity cost competitiveness

• Noise Readiness (15%): Distance from residential areas, existing industrial zoning, noise abatement capacity

• Employment Readiness (20%): Local workforce skills, unemployment rate, wage expectations

How to Use This Model

• **Step 1:** Define facility specs (size in MW, cooling type, climate zone)

• **Step 2:** Collect local data (grid carbon, water costs, tax rates, labor availability)

• **Step 3:** Run calculations using provided formulas and local assumptions

• **Step 4:** Validate results against comparable facilities (Singapore, Dublin, US hyperscale hubs)

• **Step 5:** Present findings to community stakeholders with transparency on assumptions