

Data Center Energy Usage

Putting energy use in perspective

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City of St. Louis Planning & Urban Design Agency



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Outline

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- 6. Mitigating Challenges of Energy Demand**



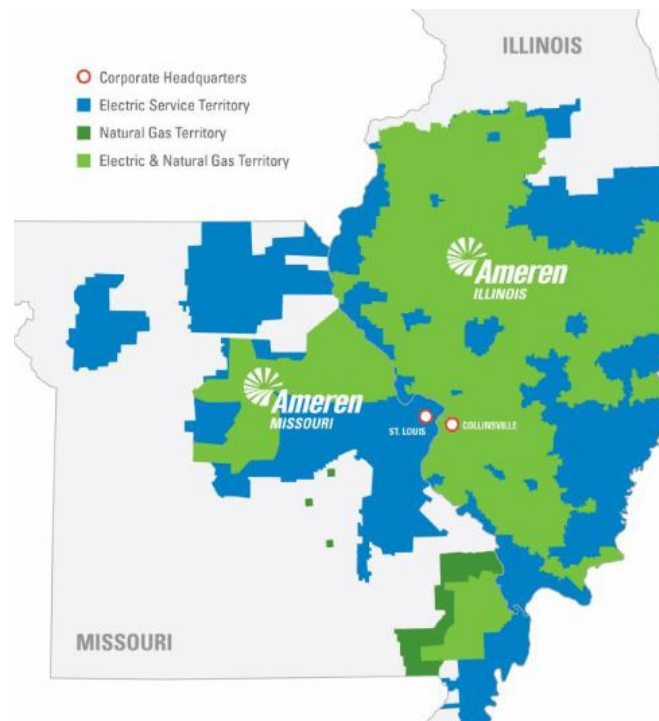
Ameren Service Area

Extreme challenge for utilities to meet growing energy needs, including from data centers

New demand requires new power generation and transmission infrastructure

- transmission costs are borne by customer (i.e., developer)
- new energy generation costs may impact all ratepayers

Any new costs for generation are shared by ratepayers across Ameren's entire territory.



Ameren Energy Mix

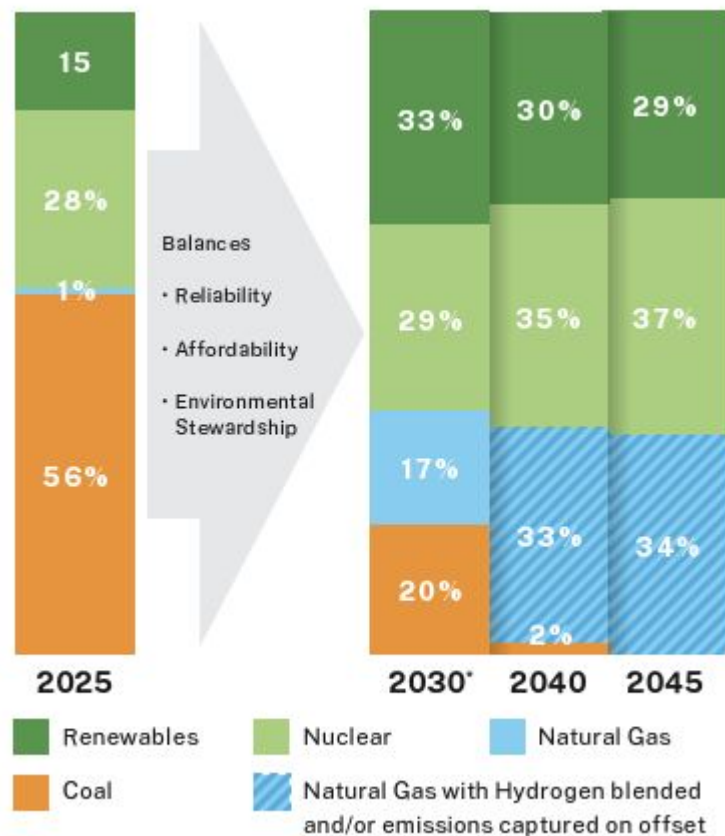
Ameren has renewable energy programs but limited supply in current mix

Current mix has about 12% renewable energy in the form of solar and wind

Requirement by the state to have a minimum of 15% renewable energy in the next few years

Completes updates to its Integrated Resource Plan every 3 years with one being filed this fall

Ameren's Preferred Resources Plan



* Percentages presented as round figures and do not total 100 due to rounding.



Renewables at Scale

Solar and wind power are not constantly deployable like gas power

25% factor for solar; 33% for wind

25MW data center would need 100MW of solar to be 100% powered by solar or 75MW of wind

1MW of solar requires approx 5-10 acres e.g., IKEA rooftop

If approvals go smoothly, solar can be built in less than 2 years



Data Centers Are Not A Typical Commercial or Industrial Use

A typical data center uses 10 - 50 times more energy per square foot than a commercial office building ([energy.gov](https://www.energy.gov))

A large hyperscale or AI data center could use 20 - 50 times more energy per square foot than a hospital if it has high server density

Our largest energy users, based on BEPS, are hospitals and grocery stores - these are considered commercial uses

Benchmarking data center performance using ESPM is recommended by the US Department of Energy



How Much Power?

A 30MW data center uses as much power as:

22-25,000 homes, depending on its use and efficiency

A 13.7million sqft office space (approx. double the size of the Pentagon)

73,000 EVs driving 12,000 miles/year

Comparable to a medium chemical/manufacturing facility's energy load (however, chemical plants may also use natural gas and steam rather than strictly electricity)



Data Centers Are Not A Typical Commercial or Industrial Use

How big is that data center?

Source: NRECA Research

		
DATA CENTER TYPE	POWER USAGE	LOAD COMPARISON
Micro/Edge	Under ~0.1 MW	25-100 average homes
Small/Enterprise	~0.1-1 MW	Supermarket or medium-sized public school
Medium/Regional	~1-5 MW	Regional hospital
Large/Co-Location	~5-20 MW	Automobile plant or university campus
Hyperscale	>20 MW (often tens to hundreds of MW)	Heavy industrial facility or medium/large airport

<https://cepci.org/the-rise-of-data-centers/>



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Pollution Comparison

Data centers do not emit pollution like typical industrial plants with smoke stacks (direct emissions).

Emissions are mostly indirect, coming from the energy generation process

i.e., from the power plant, if not powered by clean energy

Direct emissions or local air pollution comes from generator use (NO_x, SO₂, VOCs, PM, odors)

Emissions from generators vary depending on when they used/tested and for how long

Example: If tested for 15 minutes at full capacity, a 2MW Tier 4 generator running is similar to having a parking lot full of cars idling for 15 minutes

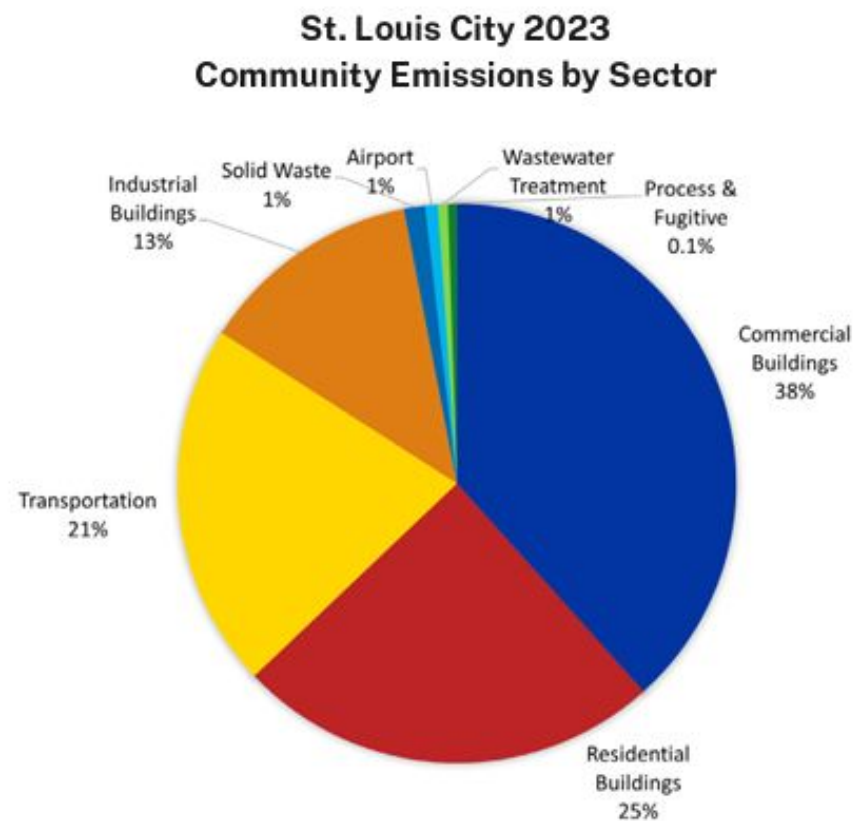


Emissions Comparison

Emissions from industrial buildings account for **13%** of the City's total community emissions.

Based on Ameren's current energy mix, a 120MW data center running at full power demand could account for 8-9% of the City's community emissions

Varies based on usage
and grid mix

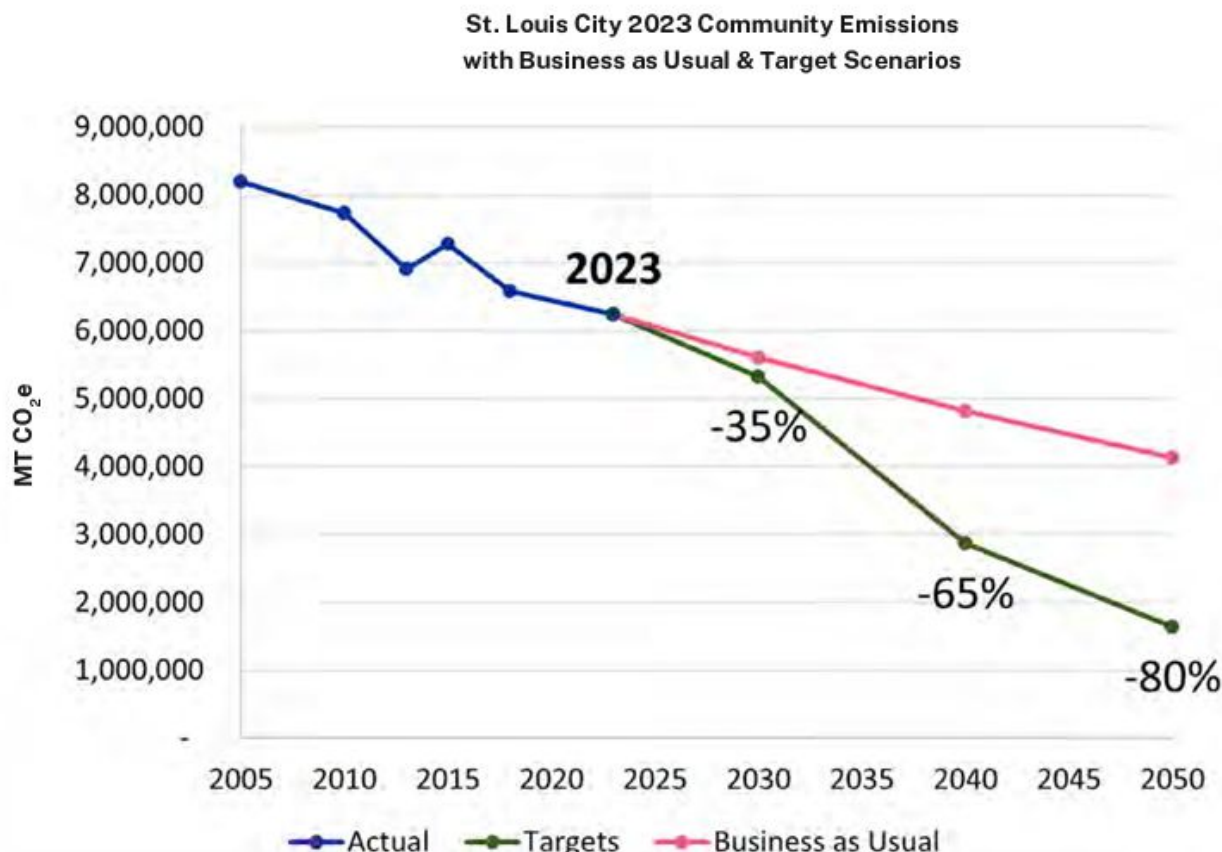


2023 City of St. Louis GHG Inventory



Community Emissions Reduction Goals

1.51% reduction/year rate - Business as usual means we only get to 50% of our goal by 2050



In the face of data centers, there's an immediate need to deploy emissions reduction strategies at scale



Energy Demand and Costs Will Continue to Rise

Increased in energy demand for many reasons, especially data centers, means we need to activate emissions reduction strategies

Drive energy investment toward households/small businesses*

Consider households as energy infrastructure

Dedicated fund from Data Centers/Large Energy Users (tax revenue, PIAs, CBAs, etc.) to mobilize energy upgrades for residents and small business owners

Reduces energy burden on owners/renters, mitigates local emissions, helps stabilize the local grid, can help protect residents from rising energy costs

Key strategy outlined in Rewiring America Report, *Homegrown Energy: A policy blueprint for energy affordability

